EMBRACING THE DIGITAL HORIZON:

PIONEERING COMMERCE AND MANAGEMENT STRATEGIES FOR A TRANSFORMATIVE FUTURE

Editors:
D. Arul Pon Daniel
T. Rajasanthosh Kumar
Satya Prakash Yadav

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(Volume 5)

Embracing the Digital Horizon: Pioneering Commerce and Management Strategies for a Transformative Future

Edited by

D. Arul Pon Daniel
Department of Computer Science & Applications
Loyola College of Arts and Science, Mettala
Rasipuram Taluk 637408, Tamil Nadu
India

T. Rajasanthosh Kumar
Department of Mechanical Engineering
Oriental Institute of Science and Technology
Bhopal 462022, Madhya Pradesh
India

&

Satya Prakash Yadav
School of Computer Science Engineering
and Technology (SCSET)
Bennett University
Greater Noida 201310, Uttar Pradesh
India

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Preface

This book explores a wide range of current subjects and advanced technologies that are shaping the world we live in today. The book explores various contemporary subjects and advanced technologies that are shaping today's world. Each topic represents a crucial area of research or practice with substantial implications for enhancing efficiency, effectiveness, and progress in their respective professions. This book aims to provide insights into significant commercial and technological breakthroughs, ranging from innovative pricing tactics and enhanced HR management to the application of AI in construction and advanced E-commerce monitoring systems. The underlying topic discusses supply chain networks, sentiment analysis, LED cubes, media pipelines, and the profound influence of AI, deep learning, and quantum machine learning. This comprehensive book explores practical applications in various industries, including healthcare, finance, manufacturing, and education. It analyses technologies such as 3D printing, digitalized HR, and generative AI. The manuscript addresses pressing issues such as disease detection, environmental challenges, and digital addiction, providing a comprehensive perspective on the modern world for both professionals and academics.

This preface encompasses a diverse range of current subjects, all of which contribute to the larger story of technological advancement and its influence on society. As these sectors evolve, they offer the potential to address complex problems and unlock new opportunities for innovation and growth.

This inclusive guide explores and discusses practical applications in healthcare, finance, manufacturing, and education. It also provides insights to professionals and researchers by exploring important advances in healthcare, finance, manufacturing, and education. The outcome is a comprehensive examination of the impact of these technologies and strategies on various firms and their ability to address critical issues.

D. Arul Pon Daniel
Department of Computer Science & Applications
Loyola College of Arts and Science, Mettala
Rasipuram Taluk 637408, Tamil Nadu
India

T. Rajasanthosh Kumar
Department of Mechanical Engineering
Oriental Institute of Science and Technology
Bhopal 462022, Madhya Pradesh
India

&

Satya Prakash Yadav
School of Computer Science Engineering
and Technology (SCSET)
Bennett University
Greater Noida 201310, Uttar Pradesh
India

List of Contributors

A. Swathi	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
A.K. Sharma	Department of CSE, School of Engineering & Technology, Career Point University, Kota 325003, Rajasthan, India
A.L. Parvathi	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Abhishek Jain	Department of Computer Science and Engineering, Uttaranchal University, Dehradun 248007, Uttarakhand, India
Aditya Sai Srinivas	Department of AIML, Jayaprakash Narayan College of Engineering, Mahabubnagar 509001, Telangana, India
Aiman Peerzade	Department of Management Studies, Rizvi College of Arts, Science and Commerce, Mumbai 400050, Maharashtra, India
Ajit Prasad Mahato	Department of commerce, NERIM Commerce College, Guwahati 781022, Assam, India
Alekh Alekh	Department of Computer Applications, SRM Institute of Science and Technology, NCR Campus, Modinagar, Ghaziabad 201204, Uttar Pradesh, India
Anil Kumar N.	Department of Electronics and Communication Engineering, School of Engineering, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India
Anzar Ahmad	Department of Electronics & Communication, Graphic Era Deemed to be University, Dehradun 248002, Uttarakhand, India
Arpit Jain	Department of Computer Science Engineering, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India
Arpitha Devangavi	Department of Artificial Intelligence and Machine Learning, BNM Institute of Technology, Bangalore 560070, Karnataka, India
Ayain John	Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India
B. Amrutha Raju	Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India
B. Chaitanya	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
B. Lakshmi	Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
B. Sravani	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Basi Reddy A.	Department of Computer Science and Engineering, School of Computing, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India
Bilal Asghar	School of Business, Al Fayha College, Al Jubail 31961, Saudi Arabia, AL Jubail Kingdom of Saudi Arabia, Saudi Arabia

Boppudi Lingarao	Department of S&H, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Bramah Hazela	Amity School of Engineering & Technology, Amity University Lucknow Campus, Lucknow 226028, Uttar Pradesh, India
C Barna A Naidu	School of Business & Management, Christ University, Pune 412112, Maharashtra, India
Ch. Silpa	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
D. Divya Kalpana	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
D. Joseph Reethika	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
D. Karunamma	Department of CSE, QIS College of Engineering and Technology, Ongole 523272, Andhra Pradesh, India
D.K. Girija	Department of Computer Science, Government First Grade College, Tumkur 572102, Karnataka, India
DA. V.L. Narayana Rao	Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
David Asirvatham	Faculty of Innovation and Technology, Taylor's University, Subang Jaya 47500, Selangor, Malaysia
Deepika Verma	Department of Computer Science and Engineering, School of Engg. & Technology, Om Sterling Global University, Hisar 125001, Haryana, India
Dolores L Montesines	College of Computer Studies, University of Perpetual Help Systems DALTA, City of Bacoor 4102, Cavite, Philippines
E. Pradeepthi	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Edmar G. Tan	College of Information and Communication Technology, Taguig City University, Taguig City 1630, Philippines
Edward N. Cruz	College of Computer Studies, University of Perpetual Help Systems DALTA Molino, City of Bacoor 4102, Cavite, Philippines
G. Durvasi	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
G. Maheswara Rao	Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
G. N. R. Prasad	Department of MCA, Chaitanya Bharati Institute of Technology, Hyderabad 500075, Telangana, India
G. Silpa	Department of Management, School of Commerce and Management, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India
G. Siva Prasad	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
G. Uday Kishore	Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India

G. Venkata Lakshmi	Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India
Gaikar Vilas B.	Department of Economics, Smt. CHM. College, University of Mumbai, Mumbai 421003, Maharashtra, India
Gundraju Yamuna	School of Commerce and Management, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India
H Swaraj Bharath	Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India
J Siva Ram Prasad	Department of Mathematics, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
J. Divyashree	Department of Chemistry, PES PU College, Bangalore 560050, Karnataka, India
J. Rameshkumar	Department of Electronics and Communication Engineering, K.S.R. College of Engineering, Namakkal 637215, Tamil Nadu, India
J. Ramya	Department of Business Administration, SRM Institute of Science and Technology (Vadapalani Campus), Chennai 600026, Tamil Nadu, India
Jafar Ali Ibrahim Syed Masood	Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India
Janardhana Rao	Department of MBA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Jayashree Jayashree	Department of Artificial Intelligence and Machine Learning, BNM Institute of Technology, Bangalore 560070, Karnataka, India
K Parish Venkata Kumar	Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
K. Ankababu	Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
K. Bhanu Sree	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
K. Gideon	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
K. Guru Surya Bharat Kumar	Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
K. Jaya Krishna	Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
K. Maharajan	Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India
K. Sahithi	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India

K. Sai Charitha	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
K. Satya Sai Bhuvanesh	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
K. Sreenath	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
K. Sunila Jasmin	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
K. Vivek	Department of CSE, QIS College of Engineering and Technology, Ongole 523272, Andhra Pradesh, India
K. Om Sathvik	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Kamal Dhanda	Department of Computer Science and Engineering, School of Engg. & Technology, Om Sterling Global University, Hisar 125001, Haryana, India
Kodavalla Jeevan Krishna	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Kuchikar Aneeque Ahmed	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Kuheli Mondal	Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Kunal Gaurav	Department of WPU School of Business, Dr. Vishwanath Karad MIT World Peace University, Pune 411038, Maharashtra, India
Kundan Kumar	Department of Technical Services (Tata Project Limited), Department of Technical Services (Tata Project Limited), Hyderabad 500016, Telangana, India
KVJ. Bhargav	Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
L. Bharathi	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
L. Kanya Kumari	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
L.S. Geeta	Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore 560070, Karnataka, India
Lakshmi Prasad	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Leena Jain	Department of Computer Applications, Global Group of Institutes, Amritsar 143501, Punjab, India
M Nirmala	Department of Computer Science and Engineering, New Horizon College of Engineering, Marathalli, Bangalore, 560103, India
M S Ramesha	Department of Mathematics, Government College for Women, Mandya 571401, Karnataka, India

M. Bhavya	Department of CSE, QIS College of Engineering and Technology, Ongole 523272, Andhra Pradesh, India
M. Narendra	Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
M. Parameswar	Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India
M. Rama	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
M. Rashmi	Faculty in Computer Science, Government First Grade College, Bangalore 560057, Karnataka, India
M. Ravichand	Department of English, V. R. Siddhartha Engineering College, Siddhartha Academy of Higher Education, Vijayawada 520007, Andhra Pradesh, India
M. Sandra Carmel Sophia	Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India
M. Sathya	Department of IT, Nadar Saraswathi College of Engineering and Technology, Theni 625 531, Tamil Nadu, India
Martha Tri Lestari	Department of Digital Public Relations, School of Communication & Business, Telkom University, Bandung 40257, West Java, Indonesia
Md. Imran	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Mohammad Shukur	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Monica Bhutani	Department of Electronics and Communication, Bharati Vidyapeeth's College of Engineering, New Delhi 110063, India
Monica Gupta	Department of ECE, Bharati Vidyapeeth's College of Engineering, New Delhi 110063, India
Mulugu Prudhvi Sriram	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Munish Kumar	Department of Computer Science and Engineering, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India
N Kirubasankar	Department of Business Studies, Sri Manakula Vingayagar Engineering College, Madagadipet 605107, Puducherry, India
N. Hariharan	Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
N. S. Kalyan Chakravarthy	Center for Data Science, School of Computer Science and Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
N. Srinu	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Neelam Raut	Department of WPU School of Business, Dr. Vishwanath Karad MIT World Peace University, Pune 411038, Maharashtra, India

P. Adi Lakshmi	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
P. Bhaskar	Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
P. Narendra	Department of EEE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
P. Sudheer	Department of CSE (AI&ML), CVR College of Engineering, Ibrahimpatnam 501510, Telangana, India
P. William	Department of Information Technology, Sanjivani College of Engineering, Savitribai Phule Pune University, Pune 411007, Maharashtra, India
Pastor R Arguelles, JR	College of Computer Studies, University of Perpetual Help Systems Dalta, City of Bacoor 4102, Cavite, Philippines
Pramoda Patro	Department of Mathematics, KLEF (Deemed to be University), Hyderabad 500045, Telangana, India
R. Amutha	Department of ISE, AMC Engineering College, Bengaluru 560083, Karnataka, India
R. Deepika	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
R. Senthamil Selvan	Department of Electronics and Communication Engineering, Annamacharya Institute of Technology and Sciences, Tirupati 517520, Andhra Pradesh, India
R. Shankar	Department of CSE, QIS College of Engineering and Technology, Ongole 523272, Andhra Pradesh, India
Raja Kumar Murugesan	School of Computer Science, Taylor's University, Subang Jaya 47500, Selangor, Malaysia
Rama Devi P.	Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India
Rashi Rashi	GL Bajaj Institute of Management and Research. PGDM Institute, GL Bajaj Institute of Management and Research. PGDM Institute, Greater Noida 201310, Uttar Pradesh, India
Renu Vij	University School of Business, Department of AIT Management, Chandigarh University, Mohali 140413, Punjab, India
Rodelio Dela Fuente	College of Information and Communication Technology, Taguig City University, Taguig City 1630, Philippines
Rupak Sharma	Department of Computer Applications, SRM Institute of Science and Technology, NCR Campus, Modinagar, Ghaziabad 201204, Uttar Pradesh, India
S Shivananda	Department of ISE, M S Ramaiah Institute of Technology, Bangalore 560054, Karnataka, India
S. Sivakumar	Department of Electrical and Electronics Engineering, Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology, Avadi, Chennai 600062, Tamil Nadu, India

Sanjay Sharma	Department of Applied Sciences and Humanities, Ajay Kumar Garg Engineering College, Ghaziabad 201009, Uttar Pradesh, India
Sankara Mahalingam M.	Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India
Santosh Reddy P.	Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore 560070, Karnataka, India
Saurav Das	Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Shabnam Siddiqui	Department of Commerce and Management, Faculty of Management Studies (FMS-WISDOM), Banasthali Vidyapith, Tonk 304022, Rajasthan, India
Sk. Heena	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Sk. Sheema	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Somesubhra Panda	Department of Electrical Engineering, Global Institute of Science & Technology, Medinipur 721657, West Bengal, India
Suresh Babu Chandolu	Department of CSE (AI & ML), Dhanekula Institute of Engineering and Technology, Vijayawada 521139, Andhra Pradesh, India
T. Jayasri	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
T. Nikitha	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
T. Suresh	Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
Tanwir Alam	Department of Mechanical Engineering, Maulana Mukhtar Ahmad Nadvi Technical Campus, Malegaon 423203, Maharashtra, India
Thanapal Pandi	School of Computer Science and Engineering and Information Systems, Vellore Institute of Technology, Vellore 632007, Tamil Nadu, India
Thiruma Valavan A	Training Department, Indian Institute of Banking & Finance, Mumbai 400005, Maharashtra, India
U. Prasad	Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
U. Sireesha	Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India
Ujwal Dhokania CA	Swayam Siddhi College of Mgmt and Research, Swayam Siddhi College of Mgmt and Research, University of Mumbai, Mumbai 421003, Maharashtra, India

Uppada Bhaskar	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
V. Gopinath	Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Vijay Kumar Rayabharapu	Department of Civil Engineering, B V Raju Institute of Technology, Hyderabad 502313, Telangana, India
Vijay Singh Thakur	Department of Computer Science and Engineering, Hindustan College of Science and Technology, Mathura 281122, Uttar Pradesh, India
Vikas Roshan	Department of Applied Sciences and Humanities, Ajay Kumar Garg Engineering College, Ghaziabad 201009, Uttar Pradesh, India
Vishwa Priya V	Department of Computer Science, Vels Institute of Science, Technology and Advanced Studies, Chennai 600117, Tamil Nadu, India
Y. Kalyana Krishna	Department of ME, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India
Y. Yaswanth Kalyan	Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India
Yogeesh N	Department of Mathematics, Government First Grade College, Tumkur 572102, Karnataka, India

CHAPTER 1

Pricing Strategy of Electric Vehicle Charging Station Behaviour on Charging Station

Kundan Kumar[1,*], S. Sivakumar[2], Neelam Raut[3], Kunal Gaurav[3], G. Silpa[4] and **Somesubhra Panda[5]**

[1] *Department of Technical Services (Tata Project Limited), Hyderabad 500016, Telangana, India*

[2] *Department of Electrical and Electronics Engineering, Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology, Avadi, Chennai 600062, Tamil Nadu, India*

[3] *Department of WPU School of Business, Dr. Vishwanath Karad MIT World Peace University, Pune 411038, Maharashtra, India*

[4] *Department of Management, School of Commerce and Management, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India*

[5] *Department of Electrical Engineering, Global Institute of Science & Technology, Medinipur 721657, West Bengal, India*

Abstract: Congestion at Electric Vehicle (EV) Charging Stations (CS) is influenced by the activity of EV owners and their choice of charging stations. With a set price plan, certain charging stations become overcrowded with EVs waiting to charge, while others have available electric plugs. This situation negatively impacts the income of Charging Station Operators (CSOs) and the welfare of EV users.

This study proposes a dynamic pricing method to move EVs from crowded to uncongested CSs by adjusting charging fees at various periods. The issue involves scenario-based stochastic optimization to maximize CSO revenue. Furthermore, an attraction functional method is created to measure EV owners' charging choices, taking into account the effective characteristics of CSs. A genuine method for CS sites and EV routes is created using Quantum Geographic Information System (QGIS) software to compute distances between EVs and CSs. The suggested framework is evaluated in three stages and compared to the fixed-price strategy. The proposed dynamic pricing method reduces congestion in CSs, increases EV charging by up to 49%, and boosts CSO income.

Keywords: Charging stations, CSO, Electric vehicle, Price strategy, QGIS.

[*] **Corresponding author Kundan Kumar:** Department of Technical Services (Tata Project Limited), Hyderabad 500016, Telangana, India; E-mail: getkundan.singh1987@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Recently, consumers and governments have been integrating transportation electrification to achieve lower fuel costs and cleaner energy. EVs are gaining popularity due to advancements in manufacturing technology [1]. EVs can activate in both Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V) methods, making them versatile resources for power networks. Excessive EV adoption may disrupt power grid operations and pose significant issues for Distribution System Operators (DSOs) [2]. Managing EV charging at charging stations and on the grid is a challenging issue in power system research. Study a situation where certain CSs are clogged using EV customers waiting for charging, but others have enough charging outlets, depending on location, number, and time slot [3]. This negatively influences the grid load profile and reduces CSO earnings from selling power to EV customers. Electricity prices are the primary factor attracting EVs to uncongested CSs. Multiple dynamic charge strategies are suggested for this purpose [4].

The paper investigates charging price strategy rivalry among CSOs using game theory frameworks. The Stackelberg game approach is used to study price rivalry among CSs with renewable power sources [5]. This study examines the cost adaptability of EVs, the impact of distance among CSs and EVs, and the effect of charging outlets. However, it does not use a realistic EV route model and calculates distances using a simple geometric model, which lowers the precision of the outcomes [6]. The article proposes a non-cooperative Stackelberg game-based CSO strategic charge pricing mechanism. The Stackelberg optimal framework, which considers price competition among numerous CSOs and privacy-conservation requirements, is solved by a soft actor-critic-based multi-agent deep reinforcement learning system [7]. This study does not provide a closed-form explanation for vehicle attraction to distinct CSs. The authors examine competition for prices among CSs with limited-service capacity using a normal potential game framework [8]. They also suggest a decentralized algorithm for efficient cost collaboration to achieve balance and maximize societal welfare, but their cost competition method does not account for the impact of plugged capacity and charger types, which affect CS competition.This study mathematically models EV charging choices based on key criteria, including EV and CS location, charging outlet number, and CS average charging power. QGIS is used to accurately predict distances for the billing process and dynamic pricing scheme [9]. The authors propose a dynamic pricing strategy to eliminate residential-CS load overlaps by promoting PEV load shifting during nighttime peak hours. This approach aims to dynamically adjust pricing incentives to encourage PEVs to shift into less underutilized CSs. While steering EVs towards uncongested CSs improves the daily load profile, it may not optimize

income [10]. The study examines electric car travel patterns to forecast their controlled capacity. The study examines the charging preferences of various customers and develops a pricing model that addresses microgrid dispatching and electric vehicle charging demand according to price signals. Analysing the EV charging issue from the viewpoint of EV types and status, rather than power system factors, might lead to inaccurate answers due to numerous variables and uncertainties [11].

This paper's main contributions are: Created an attraction function to describe EV charging choices based on CS charging price, distance, number of charging ports, and average charging power. Proposed dynamic pricing method formulating probabilistic optimization issues based on scenarios to guide EV owners from crowded to uncongested CSs, maximizing gross profit for all CSs. QGIS software and tools were used to create an accurate geographical representation of locations on CS, as well as to calculate the shortest paths from EVs to CSs for the charging process and the dynamic rating method [12].

The structure of the paper follows: the system methods are explained in section 2, including the attraction function depicting user selection of charging CS, EV charging method, and important assumptions. In section 3, the dynamic pricing method is introduced using a stochastic optimization issue based on the scenario. Next, section 4 discusses the performance assessment and simulation findings of the created pricing plan. Finally, section 5 presents key findings.

ELECTRIC VEHICLE CHARGING SYSTEMS

This section describes the modelling of the EV charging system in this study. EV charging CS selection assumptions are outlined. The CS coverage zone and attraction to EVs are specified. Modelling EV charging and CS distribution follows.

Presumptions

Studying various types of behavioural traits of people has shown that many EV charging habits were influenced. Generally, these aspects are socio-demographic and alternative. Behavioural studies use socio-demographic characteristics to represent passengers' shifts in charge preferences. Sociodemographic, activity participation, and travel behaviour are linked. Income, gender, age, education level, and driving experience considerably impact the travel habits of higher-income and lower-income individuals. The approach also takes into account individual variation and uses latent characteristics such as risk aversion & positive vehicle maintenance attitudes as unique influencing factors.

CHAPTER 2

Optimization of HR Management System based on IoT

Rama Devi P.[1,*], **C. Barna A. Naidu**[2], **Gundraju Yamuna**[3], **Anzar Ahmad**[4], **Tanwir Alam**[5] and **M. Sandra Carmel Sophia**[1]

[1] *Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India*

[2] *Department of School of Business & Management, Christ University, Pune 412112, Maharashtra, India*

[3] *School of Commerce and Management, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India*

[4] *Department of Electronics & Communication, Graphic Era Deemed to be University, Dehradun 248002, Uttarakhand, India*

[5] *Department of Mechanical Engineering, Maulana Mukhtar Ahmad Nadvi Technical Campus, Malegaon 423203, Maharashtra, India*

Abstract: This research develops and implements an edge management system, optimizes the corporate HR system using IoT-first technology, and examines the demand phase. After installing the software, hardware, and edge node management platform, the edge layer's possible interactions with the sensor, boundary, and cloud layers must be analyzed. Then, to ensure reliable communication between the various layers of the system, the organization's type-driven hyperlink selection method and the northbound multi-link transitioning method are developed and executed, respectively. The edge management system may fulfill the expansion, intelligence, and safety needs of IoT applications by implementing the aforementioned functionalities. Conducting thorough research is essential for identifying corporate functional and performance needs, creating a logical framework, and designing the system's architecture and other components. Individuals can adapt the system to their needs by utilizing its three pre-built modules: organizational change management, remuneration and benefits, and people transformation. System components include staff change management, organizational management, benefits and pay management, and personnel data management. HR management is covered in these modules. The system meets design goals utilizing advanced tools and software.

Keywords: Edge management system, Hyperlink selection, Internet of things, Optimization of HR, System components.

[*] **Corresponding author Rama Devi P.:** Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India; E-mail: ramadevinaresh@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Many businesses have come to realize that they need to maximize the importance of their human resources and utilize them as a key factor in this new market environment. However, to achieve this, they must implement a robust human resource management strategy and utilize a range of techniques [1]. This realization is a direct result of the material age and the fast expansion of financial globalization. Effective human resource management requires both a solid strategy and technology tools to accomplish it [2]. As computer and network technology advances, the integration of objects into the internet blurs the line between the virtual and real worlds, resulting in the IoT. This search arrangement is crucial for processors to obtain data regarding the physical environment and is essential for a successful IoT system [3]. IoT search involves gathering, storing, and organizing spatial-temporal data for user searchability [4]. As big data and 5G technologies mature, IoT corporate data has grown exponentially, requiring significant computational power [5]. Cloud computing's fixed architecture makes it challenging to complete tasks efficiently, even with improved hardware performance. To address this, an effective computing architecture and optimization scheme are needed to address the root cause [6]. Due to the fixed cloud computing architecture, the IoT network architecture (Fig. **1**) lacks flexibility [7]. Future networks should be adaptable to changing business needs and environments, requiring intelligence [8]. Enhancing HRM Information Technology (IT) may enhance resource integration and lower management expenses. Numerous HRM software systems are homogenous, utilized for statistical data, and may waste resources due to limited interaction, compatibility, and repetitive procedures [9]. Integrating HRMS allows for the integration of management resources, enabling the development of new activities [10].

Rapid advancements in science and technology have ushered in a new era. The advancement of science and technology has not only improved everyday lives but also opened up opportunities for business growth [11]. Technological advancements, including big data, IoT, and others, have led to the integration of new technologies into enterprise management. This trend is expected to continue in the future [12]. Enterprises must address key issues such as maximizing human resources value, meeting employee needs, maximizing economic benefits, and developing in complex markets. Due to intense market competition and advancements in electronic technology and information systems, human resource management is becoming increasingly important in today's society. Human resource management information systems are widely recognized and utilized throughout all areas of society [13]. Future company growth relies on HR management systems to respond to market changes and drive reform. The method enhances staff management efficiency and fosters task development. The safety of

user information is a growing concern for industries such as the internet and communications. The data handled by HR management systems cannot be changed at will. To prevent theft and protect individuals, strict controls should be implemented to protect data resources.

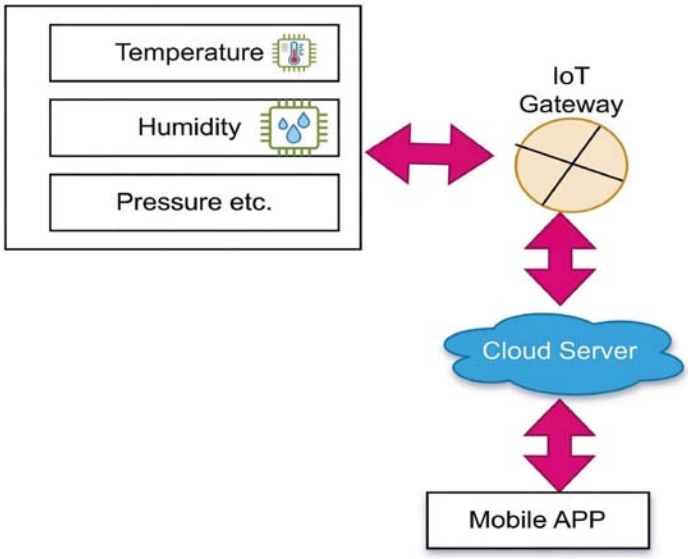

Fig. (1). IoT network architecture.

INFORMATION SYSTEM DESIGN ANALYSIS WITHOUT IOT

HR-IoT Design

IoT systems are crucial for creating spatial-temporal data in our data-driven culture. The IoT is crucial to several industries, including environmental monitoring and smart manufacturing. Building a complete IoT system requires addressing the issue of large data volumes and spatial-temporal data categorization. The basic architecture for cloud computing involves the Sensing Terminal (SE) or User Terminal (UE) uploading IoT data directly to the cloud, which then feeds back the data once the activity is completed. However, the postponement of the round-trip period due to information transmission is significant. Excessive data concentration strains bandwidth, leading to network congestion, jitter, and a worse user experience in IoT applications. Incorporating edge computing architecture into IoT systems may successfully address this issue. The edge management paradigm integrates edge cloud components into the core of computing on the edge, which is built of edge nodes. Located at the user side of the access network, the edge cloud is between the consumer layer and the network. Edge control systems provide reduced task processing latency and more

CHAPTER 3

Evaluation of HR Management System Based on the IOT

J. Ramya[1,*], G. Venkata Lakshmi[2], Anzar Ahmad[3] and **G. N. R. Prasad[4]**

[1] *Department of Business Administration, SRM Institute of Science and Technology (Vadapalani Campus), Chennai 600026, Tamil Nadu, India*

[2] *Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India*

[3] *Department of Electronics & Communication, Graphic Era Deemed to be University, Dehradun 248002, Uttarakhand, India*

[4] *Department of MCA, Chaitanya Bharati Institute of Technology, Hyderabad 500075, Telangana, India*

Abstract: The Internet is one of the new market economic innovations of the 21st century. The Internet of Things (IoT) is a new technology that integrates processors, the net, and portable phone networks. It has large potential applications and is considered one of the five key developing sectors. The IoT sector faces tremendous competition due to the fast growth of digital technology and the evolving market economy. The strength of an enterprise's market competitiveness is, to some degree, determined by the consequences of Human Resources (HR) management. This chapter analyzes the fundamental features of the Internet industry and examines the competitiveness of Internet enterprises to study industry HR management. It directly relates to several factors of HR and uses the AHP process to develop the Internet initiative hierarchy. Finally, this chapter investigates an IoT company's human resources organization quality assessment model, strategy, and optimization, which supports their market competitiveness with theory.

Keywords: AHP, Digital technology, Human resource management, IoT, Internet enterprise hierarchy.

INTRODUCTION

The Internet of Things (IoT) connects computers, the Internet, and mobile networks after the third data industry revolution. Large application potential is one of the five emerging calculated productions [1]. Forrester forecasted that the IoT market will be the next trillion-dollar communication service, bringing 30

* **Corresponding author J. Ramya:** Department of Business Administration, SRM Institute of Science and Technology (Vadapalani Campus), Chennai 600026, Tamil Nadu, India; E-mail: ramya.jayaram80@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

times more value than the Internet. Computers, the Internet, and mobile networks collectively constitute the Internet of Things (IoT) after the third wave of information technology [2]. One of the five emerging key sectors is big application development. According to Forrester, the IoT industry is expected to become the next trillion-dollar communication service, 30 times larger than the Internet [3]. IoT refers to the installation of information-sensing devices that can all connect to the network for simple identification and administration. The Basic IoT information diagram in Fig. (**1**) shows that the IoT industry is:

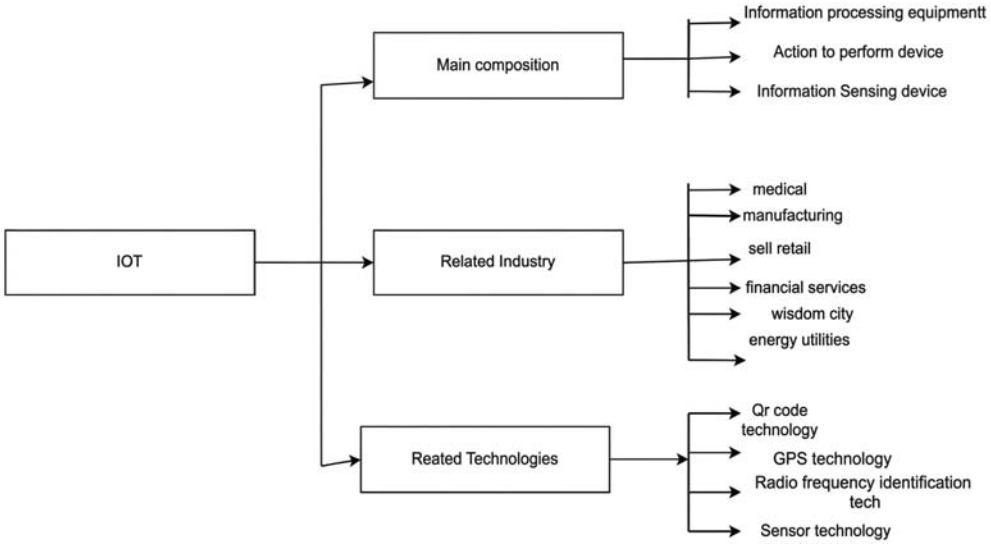

Fig. (1). Basic IoT data diagram.

- Knowledge sensing and networking devices that perceive the external environment, process information, and implement actions.
- Industries IoT generally comprises.

IoT-driven manufacturing: The next industrial revolution has started

Using IoT technology, industrial enterprises can leverage feedback data from products and equipment to evaluate risk, preserve assets, and enhance employee safety [4]. A better understanding of consumer preferences and behaviour may enhance product development, dependability, performance, and service. In the medical field, IoT enables patients to receive therapy at home. IoT technology enables medical professionals and equipment to monitor patients, improving conditions and enabling faster action. Appreciation of health tracking and condition will be faster than previously [5]. The use of IoT technology in the

medical field can automate and speed up logistical processes. Additionally, Unicom Internet information may enhance the quality and variety. For example, baby monitor markets capture data *via* continuous video and audio technology; however, false alarms are common. Using IoT technology, parents may get timely alerts on their phones if their infant stops breathing unexpectedly. Energy and utilities: IoT technology can augment energy sources and requests, enabling the clean utilization of renewable energy for power generation [6]. People can access equipment information online in real-time, thereby decreasing the impact of power outages. All smart cities are called Wisdom cities, since city building requires knowledge; therefore, they cannot be built instantly. IoT technology can enhance energy efficiency, improve traffic management, and boost citizen security. With IoT, half of the world's population and urban inhabitants may enjoy a simpler, cleaner, safer, and more enjoyable existence. In data-driven global financial services, IoT enhances intelligence, reduces risk, and enhances the digital experience. It calculates insurance costs, analyzes credit for precise and individualized retail banking, and creates bespoke new products [7]. The furniture market is very active, and demand is strong due to the importance of home items in everyone's life [8]. According to recent data, 80% of the domestic market has been involved in making intelligent appliances. Some examples of devices that can be linked to the Internet include vacuum cleaners, televisions, washing machines, air conditioners, bicycles, locks, and even blood pressure monitors [9]. The Internet of Things (IoT) is expected to generate a trillion-dollar technology economy in the next decade *via* its use in transference, conservational, protection, governance, public security, and health [10 - 12].

IoT Technology Generally Includes

Computer, statement, and sensor technology make up information technology's three main technologies. According to bionics, the processor is a “brain” that processes and classifies information, its statement system is a “nervous system” that passes material, and sensors are “sense organs”. The Internet of Things (IoT) consists of tiny wireless sensor technologies and a sensor network, which acts as a perception. Radio-Frequency Identification (RFID) technology identifies targets and reads/writes data wirelessly *via* radio waves. RFID Technology is used in several sectors, including ID cards, electronic toll collection, logistics management, and others. Although RFID technology is established and has low-cost labels, it lacks data gathering functions such as product identification and storage quality. It has limited applications in metal and liquid environments. It is part of the IoT information acquisition technology. QR Code technology, a mobile intelligent gadget, has become more widespread due to its ability to store more information and complicated data forms, expanding its application area. The Global Positioning System (GPS) is a next-generation satellite-based navigation

CHAPTER 4

Integration of AI and Construction Projects for Cost Simulation

Vijay Kumar Rayabharapu[1,*], G. Uday Kishore[2], Leena Jain[3], Monica Gupta[4] and **Bramah Hazela[5]**

[1] *Department of Civil Engineering, B V Raju Institute of Technology, Hyderabad 502313, Telangana, India*

[2] *Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India*

[3] *Department of Computer Applications, Global Group of Institutes, Amritsar 143501, Punjab, India*

[4] *Department of ECE, Bharati Vidyapeeth's College of Engineering, New Delhi 110063, India*

[5] *Amity School of Engineering & Technology, Amity University Lucknow Campus, Lucknow 226028, Uttar Pradesh, India*

Abstract: It is helpful for management to have a clear understanding of the project's scope and trajectory early on, so they can make informed estimates about the project's primary engineering quantity and cost. Furthermore, it may aid managers in avoiding risks, making appropriate construction deployments, and preventing the introduction of adverse project elements; it can also play a significant guiding role in the project's ongoing construction management. In this research, we build a system to simulate the costs of building projects using artificial intelligence. The primary use of Building Information Modelling (BIM) in this system is to model the cost of construction engineering, which is then combined with the price file for analysis and evaluation. The chapter's intelligent model has the potential to impact building project costs significantly, according to experimental studies.

Keywords: Artificial intelligence, Building information modeling, Construction management, Intelligent model, Project's scope.

INTRODUCTION

The development of manufacturing cost management is a lengthy process. Devise a modern engineering cost organization. Project cost management approaches have evolved as nations and regions have blended their features [1]. Although the

[*] **Corresponding author Vijay Kumar Rayabharapu:** Department of Civil Engineering, B V Raju Institute of Technology, Hyderabad 502313, Telangana, India; E-mail: vkraya@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

theory of contemporary engineering management of costs began relatively late, it has rapidly developed based on several management models, including those from India [2]. After the Republic of India was founded, the country adopted the former Soviet Union's engineering building management model to create a limited system of management compatible with a planned economy, which helped the economy recover and grow [3]. Marketization has experienced an upward trajectory since the establishment of the reform, and the initial approach to leadership has been unable to meet the needs of contemporary and rapid market growth. India's engineering cost sector has also entered a golden era. Project pricing continues to evolve, cost management has improved, and the consulting business has grown significantly [4]. The country's engineering cost structure likewise switched from fixed-rate to list-based pricing. In India, project cost control is internationalizing, becoming more specialized, and utilizing information technology.

Traditional quota or list measuring and pricing are precise, but they require lengthy working hours, a huge labor input, an enormous workload, and accurate drawings [5]. Today's building business requires bidders to provide quotes rapidly. Bidding firms sometimes limit bid quotes to personal experience [6]. This unconvincing offer relies on personal engineering experience. Rapid engineering of quantity and cost estimates eliminates time-consuming and laborious quota or list procedures, meeting contemporary market efficiency demands [7]. The model foundation of this method is based on data samples from numerous completed market projects, making the indicators credible and providing crucial data and theoretical guidance for bidding and quote decision-making [8].

Effective project cost management is crucial for achieving economic success. Extreme managerial and cost control wastes societal resources and keeps the project in a state of uncertainty, which hurts the company's long-term growth [9]. By comparing the project's cost estimates with those of the actual finished project, management can rapidly grasp the project's evolution and examine its deviations [10]. Meanwhile, they may track project issues and adjust the plan [11]. This chapter explores the development of an AI-powered construction project cost modeling system. BIM is typically used to model building projects, aiming to increase cost accuracy in this system [13-15].

AI-BASED BUILDING STRUCTURE SIMULATION

In computational geometry, Voronoi diagrams are of significant importance. Voronoi diagrams divide the plane into distinct regions. It's defined:

Give p_i (i =1, 2, 3… n) as a station a set P = $\{p_1, p_2, p_3,..., p_n\}$ of n distinct ideas at distinct plane locations. The equation below shows how to classify all plane points by Euclidean distance and get the point set VR (p_i) nearest to each p_i:

$$VR(p_i) = \{q|qp_i| \leq |qp_j|, \ \forall j \neq \ i, \ p_i, p_j \ \in P\} \quad \textbf{(1)}$$

|qp| is the Euclidean distance between p and q. The Voronoi area of point pi is VR (p_i). As illustrated in the equation, p_i The Voronoi diagram is the blending of all stations' Voronoi regions:

$$V\ D(P) = U_{i=1}^{n} VR(p_i) \quad \textbf{(2)}$$

The plane has non-overlapping subregions, each representing a site. |qp_i |≤|qp_j |, for each idea q in the pi subarea at the place, wherep_j ƐP-{p_i} . The Voronoi grid, consisting of 8 discrete points, is shown in Fig. (**1**).

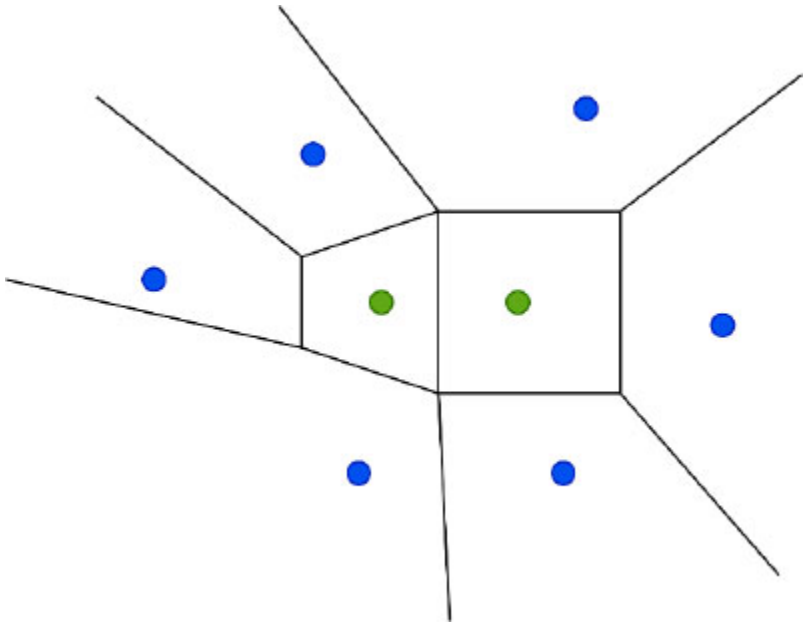

Fig. (1). 8 discrete points of the Voronoi diagram.

A vertex pi in a multi-boundary polygon P is considered concave if an angle α > 180° between it and the two related sides in the Voronoi diagram's drafting region. Sites are P's concave vertices or edges. Voronoi diagrams of polygon P are formed by the union of Voronoi regions at each site. This yields a Voronoi diagram of polygon P:

Different sites list three bisector types:

- Fig. (**2a**) depicts the vertical bisector of the link between the vertices.

CHAPTER 5

E-Commerce Order Management System by GPST Tracking System

Santosh Reddy P.[1,*], **Jayashree**[2], **Arpitha Devangavi**[2] and **L.S. Geeta**[1]

[1] *Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore 560070, Karnataka, India*

[2] *Department of Artificial Intelligence and Machine Learning, BNM Institute of Technology, Bangalore 560070, Karnataka, India*

Abstract: Supply chain management systems, such as order management systems, impact customer satisfaction and corporate profits. Order management software helps hardware stores keep sales and purchase data. Faulty records lead to unhappy customers, less money in storerooms, and slower sales. Customers submit orders, visit hotels or cafeterias to learn about the cuisine, and then pay; this requires time and human labor. E-commerce sites make it easier to purchase all our everyday necessities thanks to technology. In this sophisticated technological age, we have no app or website to acquire recipe ingredients. This document reduces ingredient waste, time, and cost. Provide recipes and quantities within 1–2 hours. This mechanism will enable us to deliver orders quickly to our customers.

Keywords: E-commerce, GPST, Supply chain management, Tracking system.

INTRODUCTION

Order management takes place in order to obtain the right inventory at the right place at the right time, in the right numbers, in the right structure, and at the right price [1]. Inspired by this approach, inventory includes materials and extras that enhance the creation and gathering process but don't shape the end item or raw resources [2]. Having inadequate stock structures will result in a company suffering huge losses; therefore, the role of Stock Executives is of the utmost importance. The company's appearance can be enhanced with a robust stock management system [3]. Thus, it requires intentional stock management, controlled by a team of professionals [4]. Most emphasis is on creating a division for Western businesses since Western executives are aware of efficient stock. Thus, this study examines a material chain shop to increase topography [5]. Stock

[*] **Corresponding author Santosh Reddy P.:** Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore 560070, Karnataka, India; E-mail: santoshreddy@bnmit.in

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

and creativity work together to achieve one goal. Failure to produce stock will result in stoppages and subsequent production problems. The Consumable Store Stock Count and Adjustment Policy and Procedure states that Rustenburg Warehouse reduces inventory holding and costs [6].

Stock and creativity work together to achieve one goal. The Consumable Store Stock Count and Adjustment Policy and Procedure states that Rustenburg Warehouse reduces inventory holding and costs [7]. Smaller companies may send goods to the stock area rather than an accepting area, and if they are discount wholesalers, they may sell finished goods rather than raw materials or parts [8]. From inventories, merchandise is transported to generating offices for completion. An enterprise's stock receives 60% of the money. Material management involves organizing, confirming, maintaining, and providing the proper material, quantity, and location at the right time to coordinate and plan mechanical project development in an integrative course [9]. Extraordinary or scarce stock can lead to company failure. A recommendation that stocks out a simple inventory item may cause group endings [10]. Stock management and stock casing are seen on the board. The stock management process helps determine the optimal stock level and address issues related to good stock and lead time. Stock inventory is a significant advantage in this particular area; executives have been deeply invested in ramping up production to meet growing business demands. [11]. Due to global rivalry, several governments have adopted Just-In-Time (JIT) inventory systems. Many organizations have used JIT to manage their inventory management systems and reduce inventory expenditures. Stock management using the Just in Time Technique. This gadget reduces costs, a JIT advantage [12]. This mechanism will enable us to deliver orders quickly to our customers. Ingredient quantities classify many recipes under this approach. Users can register for the app by signing up. Each user has a separate app login account [13]. Customers can add recipes to our app for a unique service [14]. Users with a valid login ID and admin approval can upload recipes to our app. Customers may also watch video lessons on our app to create recipes. Order tracking is available through the app, and updates on order delivery allow users to monitor their orders. Personalized recipes are also available, and users may edit recipe components to their desired quantities.

METHODOLOGY

Paper should be used to visualize page components before computer construction. Using cartoons and storyboards, arrange the site's look and navigational structure like a site map. The current approach requires individuals to buy items at the market to prepare recipes. Because not all the necessary items are in one place and some are even unavailable in local marketplaces, a lot of time is spent. After one

usage, certain goods in large quantities expire since they are no longer needed in subsequent recipes, resulting in wasted money and resources (Figs. **1** and **2**).

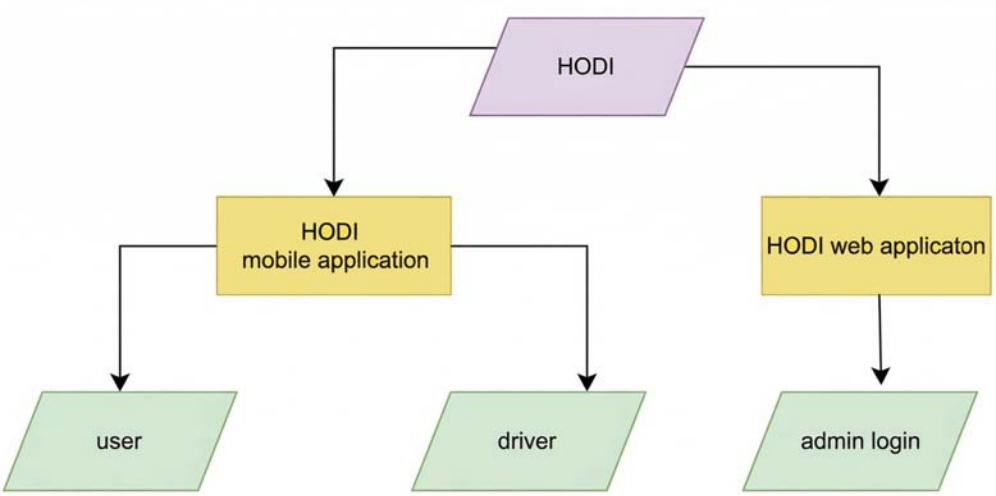

Fig. (1). System specification.

Site Map-Hodi

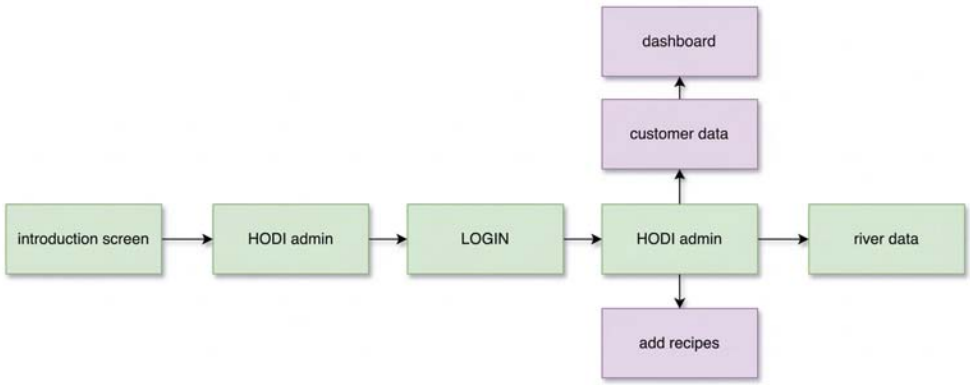

Fig. (2). Website maps for HODI.

IMPLEMENTATION

Register/Login

End-users may register and log in using HODI. Individuals must register and log in to use the HODI system. The system supplier provides login and registration functionalities for all users.

CHAPTER 6

Inline Sentimental Analysis Using Social Voice Messages

Sankara Mahalingam M.[1,*], K. Maharajan[1], N. Srinu[2], T. Jayasri[2], V. Gopinath[3], Martha Tri Lestari[4] and **Kuheli Mondal[5]**

[1] *Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India*

[2] *Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[3] *Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[4] *Department of Digital Public Relations, School of Communication & Business, Telkom University, Bandung 40257, West Java, Indonesia*

[5] *Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: In the present world, it is challenging to study sentiment and emotion in human multimodal language. However, in specific cases, such as calls, only sound information is available. In this work, we examined sentiment analysis and feeling identity freely. Current self-supervised learning models, especially speaker-mindful pre-preparation models, were used to prepare discourse, particularly in widespread discourse portrayals. For three sentiment tasks and an emotion test, three distinct sizes of universal models were examined. The study found that two types of sentiment analysis produced the best results, based on weighted and unweighted accuracy scores of 81% and 73%, respectively. When compared to previous methods that utilized multimodal fusion, our binary classification of unimodal audio data performed competitively. The models failed to make accurate predictions during an experiment, as evidenced by their inability to make precise predictions on tasks involving sentiment analysis and emotion detection. As the number of courses available increases, the reported performance decreases in the six-class emotion, three-class sentiment, and seven-class sentiment tasks may also be attributed to the inconsistent nature of the datasets.

Keywords: Feature extraction, NLP, Recurrent neural networks, Sentiment analysis.

[*] **Corresponding author Sankara Mahalingam M.:** Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India;
E-mail: sankaramahalingam@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Using machine learning and natural language processing, an inline sentiment analysis system analyzes spoken language to identify emotions and feelings [1]. This method has several potential applications, such as providing emergency services with real-time information about the caller's emotional state and analyzing phone conversations and audio messages to determine the speaker's emotional state [2]. The system utilizes acoustic analysis, prosodic aspects, and lexical analysis to identify patterns in speech that may reflect emotions, enabling the analysis of voice messages or calls [4]. For instance, if you want to express excitement, you may use a high-pitched voice and babble; however, a low-pitched voice and agitated speech pace would imply sadness or despair [5, 6]. When used in customer service interactions, sentiment analysis can reveal how customers feel, enabling businesses to cater to their needs more effectively [8]. Textual communication, such as social media feeds and online reviews, may also indicate popular opinion [9]. During emergency calls, in-line sentiment analysis may identify distress and warn authorities [10]. Consider a hypothetical emergency hotline contact from a visibly concerned or frightened person. Here, the sentiment analysis system may notify appropriate parties of the caller's current emotional condition. Last, integrated sentiment analysis may improve communication, customer service, and emergency response times.

ALGORITHM

This approach utilizes lexical or dictionary-based emotional word grading to assess the tone of a text. Our opinions assign a positive, negative, or neutral value to every word, adding all ratings to determine the text's cumulative tone. Recurrent neural networks provide real-time sentiment analysis. With additional data and expertise, these computers can learn complex word associations. RNNs process input sequences sequentially, using earlier sequence knowledge to influence the current sequence. Voice-based sentiment analysis uses syllable order to determine the speaker's mood. RNNs must be trained to recognize voice inflection by converting speech into characteristics. Mel Frequency Cepstral Coefficients (MFCCs) are used to describe the spectral features and evolution of speech signals. To train a Recurrent Neural Network (RNN) to identify speech mood, convert the audio stream into attributes. Supervised learning trains the RNN using sound samples and sentiment labels. After learning from past sequences, the RNN changes its internal state to assess MFCC features. It understands the speaker's mood and timing between speech portions.

Real-time emotion classification is possible with RNNs after training. According to its internal state, an RNN successively classifies speech emotion. People

describe speech signal spectral properties and variations using MFCCs, which converts audio into attributes, starting RNN speech mood training. Using audio data and sentiment labels, supervised learning trains RNNs, whichadjust their internal state to analyze MFCC qualities after learning from previous sequences, enabling RNNs to recognize spoken emotions and temporal relationships. Following training, RNNs can classify emotions in real-time audio samples, as it analyzes voice input, an RNN identifies sentiment using speech internals, as shown in Fig. (**1**). RNN identifies sentiment using speech internals.

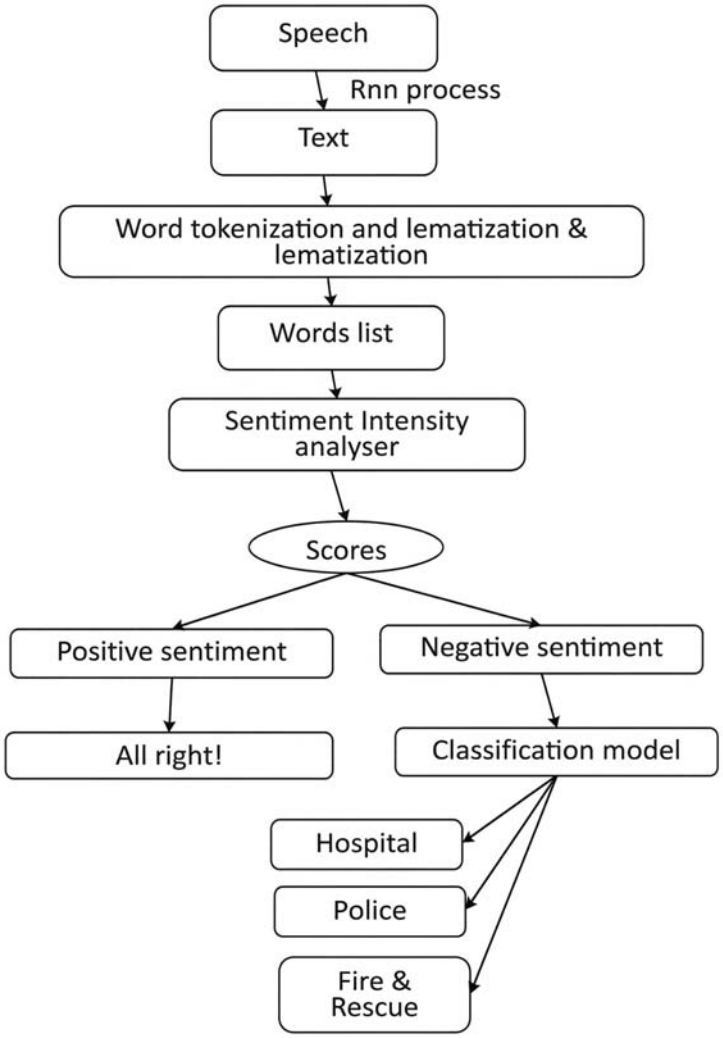

Fig. (1). RNN identifies sentiment using speech internals.

CHAPTER 7

LED Cube Using Arduino to Support Dyslexic Children

Sankara Mahalingam M.[1,*], P. Bhaskar[2], A. Swathi[2], K. Jaya Krishna[3], G. Siva Prasad[4], Edmar G. Tan[5] and **DA. V.L. Narayana Rao[6]**

[1] *Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India*

[2] *Department of IT, QIS College of Engineering & Technology Ongole 523272, Andhra Pradesh, India*

[3] *Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[4] *Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[5] *College of Information and Communication Technology, Taguig City University, Taguig City 1630, Philippines*

[6] *Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: Dyslexia is a condition that normally occurs in children with average or above-average intelligence. Children with dyslexia show symptoms of slow reading, writing problems, lack of communication, and also suffer from short-term memory. Studies show that education can have a significant impact on a child's life and influence their future job opportunities. Literacy is affected significantly when there is no clear understanding of the structure of the language and its phonological components. Dyslexic children especially face obstacles in reading and writing proficiency due to the linguistic component of language. To nurture children affected by dyslexia, various projects and programs are introduced to increase phonological awareness in children. Game-based learning is an effective method for enhancing children with dyslexia's interest in learning. The game-based learning model is interactive, attractive, user-friendly, and easily understandable by children. A Game-based learning model must address language-based learning difficulties that are considered both cognitive and emotional. In this prototype model, a 5x5x5 LED cube has been developed and is being tested for its performance.

Keywords: Arduino, Dyslexia, Game-based learning.

[*] **Corresponding author Sankara Mahalingam M.:** Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India;
E-mail: Sankaramahalingam@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Dyslexia is a condition that normally occurs in children who possess normal qualities and intelligence [1]. Children with dyslexia show symptoms of slow reading, writing problems, lack of communication, and also suffer from short-term memory [2]. Studies show that education can influence a child's life and also affect their future job opportunities [3]. Literacy is affected significantly when there is no clear understanding of the structure of the language and its phonological components [4]. Dyslexic children face obstacles due to the linguistic component of the language [5]. To nurture the children affected by dyslexia, various projects and programs are introduced to increase phonological awareness in children [6].

Game-based learning is the best method that can enhance the interest in learning in children with dyslexia [7]. The game-based learning model is interactive, attractive, user-friendly, and easily understandable by the children [8]. A Game-based learning model must address language-based learning difficulties that are considered both cognitive and emotional [9]. In this prototype model, a 5x5x5 LED cube is designed and tested for kids to start to learn the phonological components by acknowledging the whole words and later realizing the relationship between the letters displayed and sounds being presented [10]. The countless approaches available for developing literacy skills in children with dyslexia include repeated reading practice, frequently used word drills, improving the glossary and connotation, and developing the rate at which they process words and their syllable patterns [11].

Apace with this entrenched analogue apprenticeship, a preview of game-based learning in digital has come up with a reassuring new technique to address a child’s inspirational barriers, considering games can overturn a socially significant form the latest research by Holmes (2011) set in the context of children family houses revealed that a preview of game-based learning improved the children's participation in reading and writing activities [12], encouraged skill reinforcement, and enhancedtheir learning progress. However, challenges come with the usage of games [13]. The need to choose suitable games in the kids' zone to support adjacent development, alongside the importance of ensuring that reading and writing activities are well-defined, highlights the requirement for a perfect balance between a child's independence and parental guidance.

In this modern technological world, devices like mobile phones, tablets, and other smart devices have become an integral part of our lifestyle [14]. Accordingly, in recent years, smart-device-based game applications have been developed for kids affected by dyslexia, which will assist them in boosting their learning. With the

help of mobile devices, children can easily learn lessons and review them at any time and place they choose [15]. Interactive media components have been integrated into the game application to attract the kids and grab their attention.

Many software-based applications have been developed to boost these children. However, to achieve a perfect balance between attraction and innovation, the need for physical models to help visualize 3D structures is inevitable. Game-Based Learning (GBL) explains how the principles of gaming are integrated into the educational sector to encourage participation, inspiration, and the learning. Surveys show that GBL integrations can boost the learning process of children affected by dyslexia. One out of ten children of the population in developed countries are dyslexic, with 4% of them severely affected by dyslexia.

Children tend to have a high interest in digital and game literacy as games are an essential part of their lives. Children often tend to avoid reading activities; thus, GBL helps in digital education games by incorporating motivational components. This game includes rewards (*i.e*., money, prizes, *etc*.), levels (*i.e*., easy to difficult), achievements (*i.e*., task completion), feedback, and strike rate.

LED cubes are ideal learning models for kids. LED cubes, which resemble toys, would engage kids and help them learn in a fun and engaging manner. Dyslexia affects children differently. Over 40 dyslexia-related traits exist. Cognitive or logical dysfunction makes it hard for kids to examine closely. The 3-dimensional LED cube helps youngsters understand various topics starting at age 4 and may be readily modelled. The chosen age group or topics should inform the LED cube's design. Based on the given criteria, cube size and complexity will vary.

When building an LED cube with the microcontroller, the number of patterns increases as the model grows, which may lead to insufficient physical I/O ports or higher processing costsBecause of this, an Arduino Mega is preferable for such applications. Arduino switches logic states quicker than microcontrollers. The 5x5x5 LED Cube is a child dyslexia visual aid. The cube has 125 LEDs in a matrix configuration, 5 levels stacked with 25 LEDs each.

MOTIVATION

Dyslexia is a neurological learning disorder that is often observed among children between the ages of 5 and 6. It makes it hard for the children to use and recognize sounds in language. Children with dyslexia sometimes show slower language development than other children their age, and they tend to learn more slowly than other children.

CHAPTER 8

Yoga Pose Detection Using Mediapipe and the Cue Method

Sankara Mahalingam M.[1,*], M. Narendra[2], Sk. Heena[3], A.L. Parvathi[3], Ch. Silpa[4], Rodelio Dela Fuente[5] and **G. Maheswara Rao[6]**

[1] *Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India*

[2] *Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[3] *Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[4] *Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[5] *College of Information and Communication Technology, Taguig City University, Taguig City 1630, Philippines*

[6] *Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: Popular exercises, such as yoga, have numerous positive health benefits. However, incorrectly executed yoga poses can be harmful and lessen the advantages of the practice. In recent years, yoga positions have been investigated and altered using computer vision techniques. This study presents a novel Mediapipe-located cue-located calculating fantasy method for reconstructing yoga postures. The urged method is compared to good adjustment by requesting deep knowledge algorithms to identify the ultimate main physique parts in yoga poses. The computer, therefore, instructs the consumer to adjust their posture to achieve the appropriate adjustment as soon as possible. The projected method is validated using a dataset of yoga poses, and the veracity and real-world opportunity accomplishment effects are promising. In yoga classes, especially when conducted online or in other settings, the submitted method may be employed to increase benefits, though it also poses risks of harm to practitioners.

Keywords: Cue method, Mediapipe, OpenCV, Pose correction.

[*] **Corresponding author Sankara Mahalingam M.:** Department of Computer Science and Engineering, School of Computing, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamil Nadu, India;
E-mail: sankaramahalingam@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Yoga is a practice with its roots in ancient India, emphasizing the development of the body, mind, and spirit. Yoga is now widely acknowledged as a form of physical activity that enhances balance, flexibility, strength, and overall health [1]. To get the most out of yoga and lower the risk of injury, correct posture and technique are essential, just like with any physical activity [2]. One of the most crucial challenges in practising yoga is ensuring proper execution of the various positions, or asanas. Even seasoned practitioners can develop negative habits that are challenging to break, and beginners often struggle to get their bodies into proper position [3]. Yoga practitioners have traditionally relied on the guidance of professional instructors to refine their form and receive feedback. But, if you live in a distant place or during a pandemic when many studios are closed [4], there can be some restrictions on where you can attend in-person classes. In this case, technology is essential. Computer vision and machine learning advancements have made it possible to analyze video footage and correctly identify significant human body components [5]. Yoga practitioners can utilize this technology to enhance their posture by providing beginners with immediate feedback on their poses [6]. Real-time posture monitoring and recognition using deep learning computer vision frameworks like OpenCV and Video Pipe may modify yoga poses [7]. Experts may improve their alignment using Media Pipe and OpenCV by comparing their body alignment to the yoga posture. Aural alarms or visual overlays allow practitioners to modify [8]. With real-time input, technology may enhance yoga poses, form, and muscle memory, while improving performance and decreasing injury risk [9]. Technology makes yoga more accessible and inclusive, particularly for individuals without skilled teachers or those who are uncomfortable in conventional classes [10]. Medical professionals with either physical or mental limitations may adapt their techniques using Media Pipe and OpenCV, which provides yoga posture correction for all levels [11, 12, 15, 16]. Modern technology makes yoga more private, safe, & accessible [13, 14].

RELATED WORKS

The emerging discipline of yoga posture correction uses algorithms for learning and computer vision. Yoga poses were assessed using the motion-sensing Kinect in a 2017 Society of Sports Medicine and Science research, revealing its promise in workouts and rehabilitation. Fig. (**1**) illustrates the entire workflow of the system.

Kinect may help yoga practitioners modify posture by precisely recording the angles of joints and motion trajectories, according to the research. Wearable IMU technology was used to correct yoga posture in a 2018 Journal of Neural Science

and Rehabilitation research. The IMU gadget, attached to participants' extremities, employs machine learning algorithms to correct yoga postures in real-time.

In 2020, the Journal of Healthcare Systems covered a smartphone app for yoga posture correction. Through a Media pipe, the program locates and analyzes the body's most critical anatomical characteristics, delivering instantaneous form input. A 2020 article published in the Journal of Healthcare Systems discussed a smartphone app designed to improve yoga posture. The program monitors key body aspects using MediaPipe to provide instant form input. This technology can repair improper yoga postures and enhance overall practice. While computer vision and machine learning may improve yoga safety and efficacy, further research is required to determine their strengths and weaknesses.

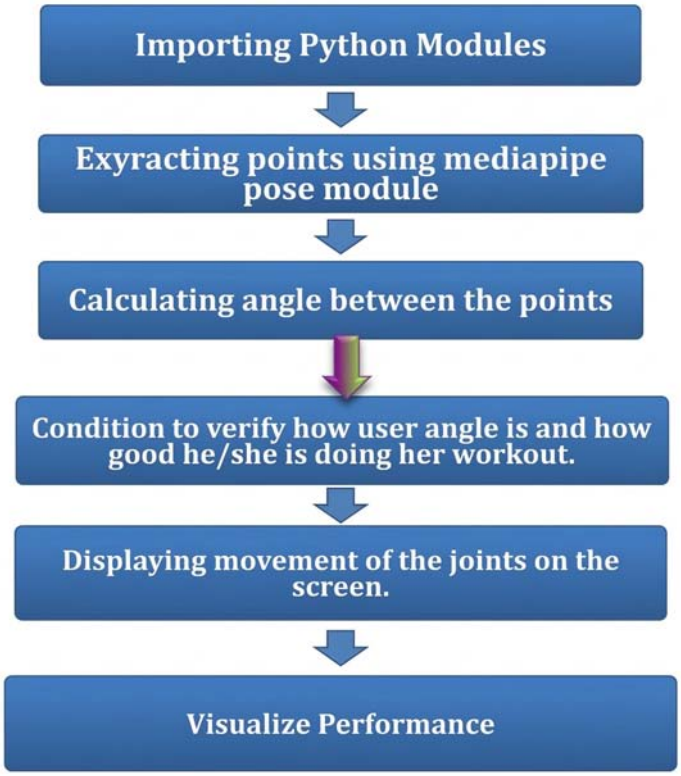

Fig. (1). The workflow of the system.

PROPOSED METHODOLOGY

Yoga positions may be difficult to perform with the perfect alignment for maximum benefit, even for experienced practitioners. Computer vision technology can be used to detect and correct improper posture in real time.

CHAPTER 9

Self-Checkout System using One-Time QR Code

R. Amutha[1,*], D. Karunamma[2], M. Bhavya[2], K. Vivek[2], R. Shankar[2], Edward N. Cruz[3] and **M. Sathya[4]**

[1] *Department of ISE, AMC Engineering College, Bengaluru 560083, Karnataka, India*

[2] *Department of CSE, QIS College of Engineering and Technology, Ongole 523272, Andhra Pradesh, India*

[3] *College of Computer Studies, University of Perpetual Help Systems DALTA Molino, City of Bacoor 4102, Cavite, Philippines*

[4] *Department of IT, Nadar Saraswathi College of Engineering and Technology, Theni 625 531, Tamil Nadu, India*

Abstract: Inventory Management System (IMS) is software that assists firms operating hardware stores to track sales and purchases. This project streamlines the process by eliminating paperwork, human errors, and manual delays. The Inventory Management System will track sales and available inventory, alerting business owners when it's time to restock. Sales, inventory, Customer Relationship Management (CRM), Human Resource Management (HRM), and account handling are just some of the business activities that the program documents. The application mainly allows a self-checkout environment supporting a takeaway system. The software is beneficial to firms that manage retail outlets and keep track of sales and purchases. In this application, the purchase and sales transactions are employed using Code Igniter, PHP, and Web Development tools to develop an inventory system. It provides a thorough corporate perspective and helps owners manage development and sales.

Keywords: Cooperation management, Company-client interaction, Employee management, Invoice management, Inventory management, Rapid application development, Self-checkout, United modelling language.

INTRODUCTION

Model-View-Controller (MVC) is a three-part architectural design [1]. Its original purpose was to create GUIs for desktop computers, but nowadays it's all about making applications for phones and the web. A robust PHP framework, CODE IGNITER follows the well-liked MVC design style [2-4]. Designed for developers looking for a lightweight framework to build feature-rich web apps, it

[*] **Corresponding author R. Amutha:** Department of ISE, AMC Engineering College, Bengaluru 560083, Karnataka, India; E-mail: amutha.shruthi@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

prioritizes minimalism. The Framework and View classes are not required; however, the Controller classes are [5], [6]. The Hierarchical Model View Controller (HMVC) allows the developers to maintain the grouping of Controller, Models, and View arranged in a directorial format, which can be directly modified by the Code Igniter framework. Records are managed across the system [7-9]. The user must enter product names as well as the rate amount. This area is an optional field for invoicing management. Meanwhile, after completing all these fields, proceed to client management. The administrator can also manage system users [10]. On the other hand, a key characteristic of this invoicing system is that it generates invoices based on sales [11]. An administrator must provide due dates, customer information, product items, quantity selections, and discount amounts [12]. Otherwise, the system will automatically add all extra amounts, such as TAX and VAT, during the calculation [13]. Based on this management, the system generates an overall invoice for each customer.

LITERATURE REVIEW

The organic merger of inventory management and information technology in the IT environment aids in setting up an information-based inventory management system. Improving inventory accounting accuracy and inventory management validity has significant practical implications.

According to the study, this assessment task manages the part of the stock administration of consumer loyalty in paper production. The data for this project's improvement will be acquired through surveys from various levels of administration in the distribution.

Furthermore, it concludes that there are two missing things: inventory control and bill eras. The article raises an alert regarding the bill's information portion, which is in PDF format so that the shopkeeper is informed about the remaining inventory.

Vendor Managed Inventory (VMI) is a cost-effective replacement strategy that allows a vendor to adapt to demand without relying on purchase decisions to do so. EDIFACT inventory news in a standard business system environment, such as SAP R/3, has been utilized in previous VMI implementations. Small and Medium Enterprises (SMEs), which often operate at the low end of the supply chain, find such deployment excessively expensive.

Consequently, the VMI concept has been largely overlooked in this domain. A cost-effective alternative to Electronic Data Interchange (EDI) is web services. This research provides an implementation plan and a VMI architecture that is built on composite Web Services.

PROPOSED WORK

More precisely, it divides the app into three logical parts: the model, the view, as well as the regulator. MVC is a popular architectural style that demonstrates these three pieces.

Its original use was in desktop graphical user interface design, but it is now more often used in the development of mobile and online apps.

The application primarily utilizes the MVC architecture, which divides the application into three parts: model, controller, and view. The main advantage of using this architecture is that it is easily modifiable.

The application requires constant updating and has to support large-scale web application usage, which is a requirement. Since it is an integrated working environment, the server cost can also be minimized. It is also an SEO-friendly platform.

We have also used CodeIgniter to implement this application. CodeIgniter is an MVC-based framework that can be comfortably migrated to different environments. For the web implementation, use HTML, CSS, JavaScript, and MySQL.

Self-checkout System Using QR Code

After successfully authenticating with a one-time QR from the shop and the customer's mobile number, the self-checkout software (Fig. **1**) allows store customers to use their mobile phones to scan the products they're interested in.

Then, once they have finished shopping, they may use the app to buy the products they want. The self-checkout retail technology solution does not require the business to invest in additional hardware.

Link with the merchants' existing back-office systems and payment gateways to a carefully curated partner network, ensuring a quick and low-cost implementation.

Self-serve requesting through Square Online provides a contactless, in-person requesting experience that enhances security and workflow productivity. Rather than perusing a paper menu and setting orders with a staff member, clients use their cell phones to scan a QR code at their table, seat, parking space, or any other location where they want to place an order. Each QR code can be linked to a specific ordering station—ideal for smaller food venues and cafés—or customers can be prompted to enter their location manually, which is better suited for large-scale events and arenas. To improve self-serve operations, explore best practices

CHAPTER 10

E-Commerce Website Management System

Aiman Peerzade[1,*], H Swaraj Bharath[2], Renu Vij[3] and **Monica Bhutani[4]**

[1] *Department of Management Studies, Rizvi College of Arts, Science and Commerce, Mumbai 400050, Maharashtra, India*

[2] *Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India*

[3] *University School of Business, Department of AIT Management, Chandigarh University, Mohali 140413, Punjab, India*

[4] *Department of Electronics and Communication, Bharati Vidyapeeth's College of Engineering, New Delhi 110063, India*

Abstract: Popular website and e-commerce software platforms, such as CMS, are favored due to their simplicity and versatility in practice. However, website usability is one of the most significant quality elements that is difficult to quantify since it relies on various other variables. Thus, this article aims to determine which CMS is best suited for the usability and design needs of website developers. This study examines many e-commerce CMSs and outlines their characteristics that may aid with usability and design. This study uses E-commerce Total Quality Management usability. Choose Shopify, Open Cart, with the help of Magento, or WooCommerce, the most prominent e-commerce CMS. The design idea is evaluated using website design components. CMS characteristics that aid usability and design principles were found in this investigation.

Keywords: CMS, E-commerce software, E-commerce total quality management, Website usability, Website design components.

INTRODUCTION

Standard industrial practice is e-business [1]. Most successful e-commerce companies are realizing that a high-quality platform is more important than a cheap price or online presence. Due to e-commerce, several individuals universally choose to buy, transfer, sell, or provide services, and trade goods and information online. Consumer confidence drives e-commerce growth [2]. The importance of usability, which is described as "a quality characteristic that evaluates how easy interfaces are to use," should be kept in mind by software

* **Corresponding author Aiman Peerzade:** Department of Management Studies, Rizvi College of Arts, Science and Commerce, Mumbai 400050, Maharashtra, India; E-mail: peerzadeaiman83@gmail.com

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product providers [3]. It defines usability as "the extent to which a definite set of users can use a product to realize predetermined goals in a way that is efficient, effective, and satisfying within that set of contexts" [4]. Developers must consider visitors' needs to create a successful website [5]. Many usability studies focus on end-user viewpoints, rather than developer perspectives, as a measure of website quality [6]. For designers to identify users early on and establish usability standards, usability must be prioritized.

The CMS helps manage, modify, and enhance website content [7]. The simplicity and convenience of use of these electronic programs for website and e-commerce launches are making them popular [8]. Frameworks and models enable quick design; therefore, CMS has grown [9]. CMS saves text on web pages and distributes information in databases instead of HTML pages [10]. The features included in these tools were user-focused, which helped address usability concerns and plan ideas for an e-commerce website [11].

STUDYING CONTENT MANAGEMENT SYSTEM

Details about the comparative tools can be found here. WooCommerce, OpenCart, Magento, and Shopify.

Shopify

Shopify creates sales websites for everyone. Online shopping, credit card receipts, and trade sales powered by Shopify POS are available from Shopify. Shopify's e-commerce software enables users to manage their business from a single platform. Construct their online shop, launch additional distribution systems in seconds, manage products and inventory without constraints, process orders in one phase, analyze distribution and growth patterns, and more.

OpenCart

Retailers utilize OpenCart, an open-source e-commerce platform, to sell online and can expand their business by adding new products to their e-commerce store. OpenCart's built-in SEO tool helps merchants determine page positions and keywords to boost traffic and optimize their websites.

Magento

Magento eCommerce software powers online stores for big and developing organizations. Front-end and back-end processes may be managed using the software to provide a customized and bespoke user experience. For effective online shop development, the software integrates with many other applications and provides improvements, maintenance, consultancy, and training.

WooCommerce

WooCommerce serves businesses of all sizes, from small to large online operations. WordPress eCommerce add-in WooCommerce is open-source. WordPress users may create a free basic online shop using WooCommerce (customization plug-ins and modules are paid). WooCommerce users can build or purchase pre-made plugins to enhance the functionality of their store.

CMS Functions

E-commerce CMS features should include:

- API - Facilitates fast and efficient data sharing between applications.
- Activity Dashboard - Provides managers with essential information for decision-making.
- Automatic Backup - Copy website data automatically.
- Campaign Management - Activities aligned with an action plan to achieve a business goal.
- Filter for content
- Client Segmentation — The act of categorizing clients into distinct subsets
- Personalization Options for Branding—Call and Web Bridge Personalization
- Drip Marketing - Sending scheduled emails to inform and move users to preferred intervals.
- Utilize multi-channel marketing, focusing on client-favored channels.
- Processing orders
- PCI DSS Compliant - Ensures safe credit card processing, storage, and transmission for organizations.
- Catalogue of products.
- Centralize product data available from many departments and sources.
- Ratings and Reviews may increase online and offline traffic and revenue for transparency.

These features may help fix usability concerns. Key usability objectives include effectiveness, efficiency, safety, usefulness, learnability, memorability, and other quality indicators. Several measurable construct sets connected to e-commerce services are used to measure software quality. Some e-commerce service build sets were identified in this study. These construct sets are quantifiable.

- E-S-QUAL and e-SQ reflect key online service quality. An essential measure of e-SQ is E-S-QUAL, which incorporates user satisfaction.
- Information System Success is the source of E-commerce Success Metrics (ESM). The commercial characteristics of a system are the primary emphasis.

CHAPTER 11

AIML-Based Price Negotiation in E-Commerce by Analyzing the Test and Voice-Based Chatbot

P. Sudheer[1,*], Rupak Sharma[2], Alekh[2], A.K. Sharma[3] and **Pramoda Patro[4]**

[1] *Department of CSE (AI&ML), CVR College of Engineering, Ibrahimpatnam 501510, Telangana, India*

[2] *Department of Computer Applications, SRM Institute of Science and Technology, NCR Campus, Modinagar, Ghaziabad 201204, Uttar Pradesh, India*

[3] *Department of CSE, School of Engineering & Technology, Career Point University, Kota 325003, Rajasthan, India*

[4] *Department of Mathematics, KLEF (Deemed to be University), Hyderabad 500045, Telangana, India*

Abstract: The popularity of buying things online has skyrocketed in recent years. During this time, most features of online buying have been refined, but others are still missing, such as the ability to negotiate prices with shop owners. To negotiate product costs, this article proposes utilizing a chatbot equipped with a voice assistant. A customer may ask the chatbot for help determining a fair price for an item. Both the buyer and the seller run the risk of having their finances squeezed when they shop online. Machine learning algorithms have been developed to aid in buying by predicting future outcomes based on past data to prevent compromise. Nevertheless, the accuracy of predicting prices might be compromised if the dataset is inappropriate or if irrelevant elements or attributes of the information are used. Because even one incorrect price forecast could result in substantial financial losses, e-commerce enterprises do not rely solely on such techniques. Furthermore, when data becomes too abundant or a characteristic is no longer available after the period used to make the model's prediction, very few models do poorly. The model proposed in this work maintains its accuracy and reliability by regulating these adjustments.

Keywords: Chatbot, E-commerce, Machine learning, Negotiate prices, Online shopping.

[*] **Corresponding author P. Sudheer:** Department of CSE (AI&ML), CVR College of Engineering, Ibrahimpatnam 501510, Telangana, India; E-mail: sudheerchanty7@gmail.com

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INTRODUCTION

Modern e-commerce systems use a variety of AI methods to determine which goods are most popular, making it easier for users to search for what they need [1]. The greatest products may be expensive, however, so buyers frequently have to settle for less [2]. Additionally, problems can arise when purchasing inexpensive items. Customers might haggle over product pricing by introducing a haggling option, which would alleviate their concern [3]. Negotiation entails exploring ideas that may satisfy all parties. Within their selling range, the seller specifies a minimum price as the lower limit, while the unique item value serves as the maximum limit in the algorithm [4]. The model is implemented by integrating a chatbot into the website utilizing Flask APIs, allowing users to witness functionality in real-life circumstances [5]. The implementation method has been demonstrated in Fig. (**1**) [6].

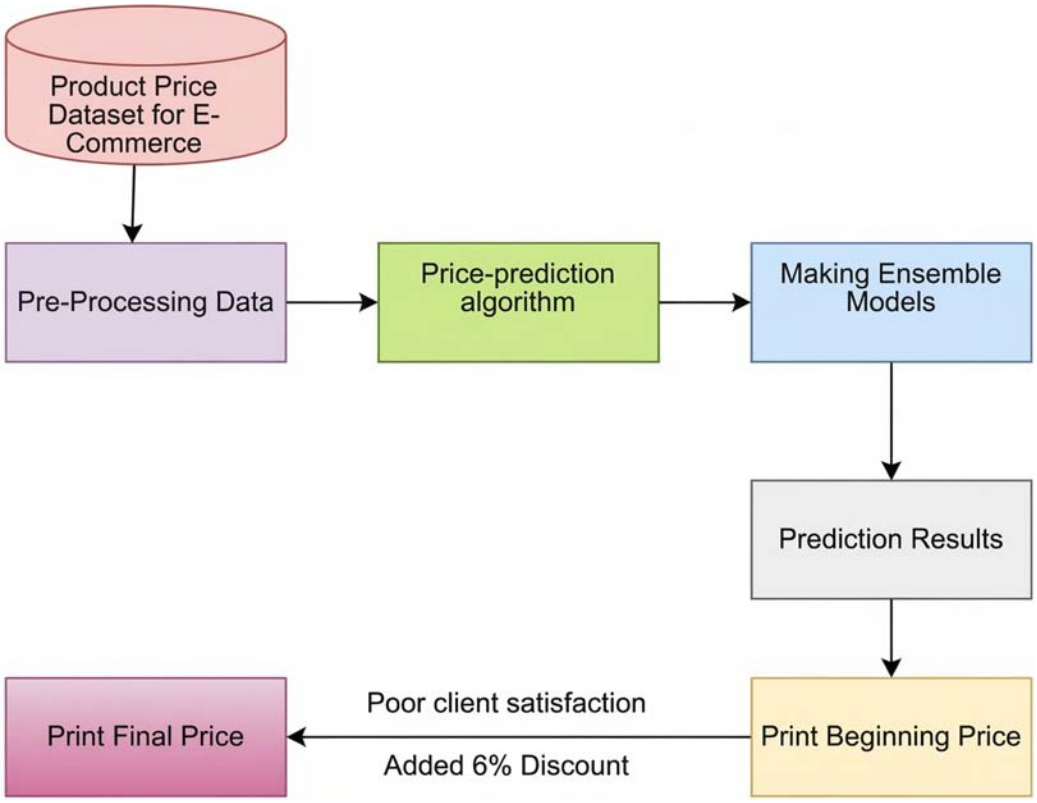

Fig. (1). Implementation method.

A chatbot is an artificial intelligence computer that converses with consumers in natural language *via* messaging, sites, mobile applications, or telephone [7]. It can manage most client concerns without human interaction. The chatbot utilizes natural language processing (NLP) techniques to comprehend user intent and provide accurate responses [8]. In addition, chatbots may automate e-commerce negotiations. With this approach, users may freely interact with the program, enter financial limits, and ask product-related inquiries for suitable replies. Chatbots in e-commerce, such as logistics and retail, may boost sales and user engagement, perhaps attracting more consumers with affordable items [9].

Conventional e-commerce platforms lack a mechanism for negotiating product costs, which is a significant drawback. The Chatbot uses machine learning techniques to enhance its replies to client requests over time, addressing this constraint. Machine learning chatbots can learn from interactions with users, grasp their intent, provide suitable replies, and adapt to different circumstances, contrasting with rule-based chatbots that employ pre-programmed responses [10]. A classification algorithm analyses input data and prospective outcomes to make predictions. Supervised learning algorithms use labeled data to predict or classify unlabeled information. The goal is to create a model that properly maps input to output variables, allowing for accurate predictions of new inputs. Typical supervised learning methods include K-nearest neighbours (KNN), support vector machines (SVM), and neural networks, as shown in Fig. (**2**). SVM is effective for dividing classes that cannot be linearly segregated by finding the optimum hyperplane in feature space. Instead, KNN predicts based on distances between new and older information facts in the training set. This non-parametric technique is frequently used for binary classification applications.

The study envisions an online purchasing app including user login, registering, chatbot negotiating, reading, order viewing, product searching, review publishing, and sentiment analysis. The chatbot collaborates with consumers to negotiate reasonable product pricing. The voice and text-based chat alternatives for selling produce cost. The research advocates for using SVM and KNN algorithms with collective learning to improve chatbot negotiating skills. The study presents a technically robust strategy that utilizes AI techniques, categorization algorithms, and chatbot-assisted negotiation in an online retail application.

CHAPTER 12

AIML-Based Language-Supported Online Shopping Assistance

Rama Devi P.[1,*], B. Amrutha Raju[2], M. Ravichand[3], Pramoda Patro[4], Anil Kumar N.[5] and **M. Sandra Carmel Sophia[1]**

[1] *Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India*

[2] *Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India*

[3] *Department of English, V. R. Siddhartha Engineering College, Siddhartha Academy of Higher Education, Vijayawada 520007, Andhra Pradesh, India*

[4] *Department of Mathematics, KLEF (Deemed to be University), Hyderabad 500045, Telangana, India*

[5] *Department of Electronics and Communication Engineering, School of Engineering, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India*

Abstract: Online marketplaces offer a global platform for a diverse range of items. To make online purchasing convenient for users, our suggested system offers a variety of features. Just as when buying in a physical store, users need product and system-specific instructions when making purchases on these sites. Our e-commerce platform offers limitless talking services, and we incorporate an artificial chatting engine to provide stuff like this online. Users have the option to ask questions in the system during initialization of the e-commerce site. To acquire answers, the e-commerce system uses a pattern-matching algorithm to transmit consumer queries to the AIML Knowledge Base System. The user is then redirected to the system after receiving this response. Also, to demonstrate the chat system's multilingual capabilities, we are working on a Bangla-supported shopping assistant.

Keywords: AIML, Artificial chatting engine, E-commerce, Physical store, Shopping.

INTRODUCTION

The term “online shopping” refers to the practice of buying products and services from a seller over the Internet [1, 2, 3]. The advent of the World Wide Web

[*] **Corresponding author Rama Devi P.:** Department of English, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India; E-mail: ramadevinaresh@gmail.com

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(WWW) has made it much easier for vendors to sell their wares online [4, 5]. Online shopping has several advantages that make it popular. Instead of spending time and energy physically searching for a product in several places, customers may locate what they are looking for by checking different internet retailers [6]. Meeting with a vendor is a great way for a buyer to learn about their goods and have their questions answered. Customers and vendors cannot meet due to time and distance constraints [7]. Human agents are sometimes enlisted to provide this service online, although they do not always deliver superior results every time [8], [9], [10]. They are irritated, confused, and unavailable at times, and may have trouble understanding what customers need. To address this issue, we created a unified platform for online purchasing that includes an AI chat feature [11]. Additionally, to facilitate multilingual capabilities, we are working on developing a Bangla conversational agent capable of chatting with users in Bangla [12].

PROPOSED SYSTEM

Chatbots have been widely used in several industries. A chatbot powered by Artificial Intelligence Machine Learning (AIML) will serve as an intelligent shopping assistant in our suggested system's interactive online store. Artificial Intelligence Markup Language (AIML) is a descendant of XML. Here, we will cover the basics of how a user can navigate the site and engage in a conversation with a smart shopping chatbot.

- An administrator (admin) and a consumer are the two main kinds of users.
- Keep the whole system running smoothly with the help of the admin. It is their job to introduce new products, revise existing ones, and remove old ones that are no longer relevant or valid. Information on customers saved in this system can be viewed and verified by them. In addition, they may see how customers rate the e-commerce site and products, which can guide the authority to make improvements.
- Customers can browse the products and their details by visiting the site. To their order list, they can add items that they want to purchase. To top it all off, they may share their thoughts about the e-commerce site and its items with the admin.
- Our e-commerce site features an artificial chatbot instead of a live customer care representative to answer questions about our products and services.
- To acquire answers to their questions, e-commerce sites submit queries to the Knowledge Base System (KBS). The files that make up the Knowledge Base System are based on AIML. Applying a pattern-matching algorithm to such files can help determine the answer to the following customer inquiry.
- After processing the user's inquiry, the result loops back to the online store.

- The user can ask more questions and generally interact more effectively in this manner.

RESULTS AND DISCUSSION

Fig. (**1**) shows the frameworks needed to build an e-commerce system: ASP.NET MVC 4 (Model View Controller) and Entity Framework 5. The product of this site is a variety of photocopying machines. In addition, this site offers a variety of solutions to meet the needs of viewers. We replace humans with an AI shopping assistant to handle online client management. Created with AIML files. The 50,000+ files that make up its category file were compiled over the course of many years, with each category sourced from a distinct site. We need to create 860 new product categories using the generic AIML files from the knowledge base system. To answer a question, each file is visited once. The number of words determines the time complexity, which is on the order of n. The location, kind, and capacity of its memory determine the space complexity. The general depiction of an AIML chatbot is shown in Fig. (**2**). There is a desktop app that works in tandem with the main online app.

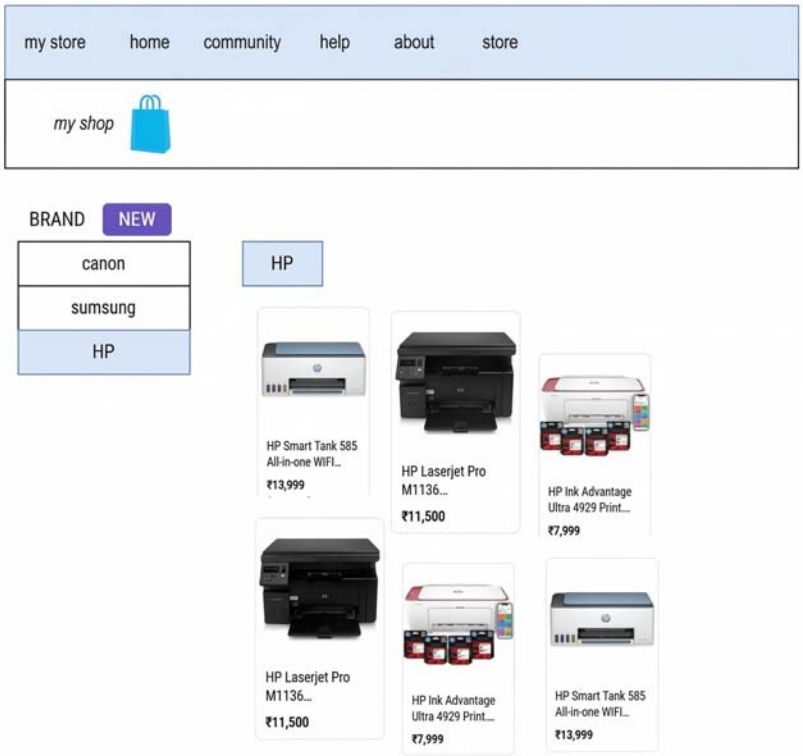

Fig. (1). Online shopping system.

CHAPTER 13

Impact of Adopting the AI Application: Private Sector Bank Financial Performance

Gaikar Vilas B.[1,*], **M. Parameswar**[2], **Ujwal Dhokania CA**[3], **Anil Kumar N.**[4] and **Pramoda Patro**[5]

[1] *Department of Economics, Smt. CHM. College, University of Mumbai, Mumbai 421003, Maharashtra, India*

[2] *Department of CSE (Data Science), CMR College of Engineering & Technology, Hyderabad 501401, Telangana, India*

[3] *Swayam Siddhi College of Mgmt and Research, University of Mumbai, Mumbai 421003, Maharashtra, India*

[4] *Department of Electronics and Communication Engineering, School of Engineering, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India*

[5] *Department of Mathematics, KLEF (Deemed to be University), Hyderabad 500045, Telangana, India*

Abstract: To increase client loyalty and satisfaction *via* digital transformation, banks are investing more in new technologies like artificial intelligence. This research uses CAMELS to examine how AI affects bank financial performance. The biggest bank in the private sector and a pioneer in AI technologies for customer experience, HDFC Bank, was chosen for the study. The authors have taken into account the four years preceding the adoption of AI (FY2013–2017), the four years following the adoption of AI (FY2019–2022), and 2018 as a transitional year for technological deployment. By comparing mean values, the research evaluates HDFC's financial performance before and after AI banking apps. Using SPSS and Excel, we tested a pair of sample t-tests on the secondary data we gathered. The results show that seven parameters—Tier 1 Capital Ratio, Business per employee, Dividend per share, Market price, Profit per employee, Cost-income ratio, and Expenses to Interest Earned Ratio—have improved noticeably. The positive effects of AI are becoming apparent, according to the authors, although major transformation may be delayed for some years.

Keywords: Adoption of AI, Financial performance, Private sector, Tier 1 capital ratio.

[*] **Corresponding author Gaikar Vilas B.:** Department of Economics, Smt. CHM. College, University of Mumbai, Mumbai 421003, Maharashtra, India; E-mail: gaikar_vilas@rediffmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Transformation and third-party ecosystems are growing in banks. Consequently, there has been a great deal of innovation in the banking industry, and banks are incorporating a lot of online features into their business operations [1]. This has led to the development of new digital solutions. Every organization, industry, and government relies on enormous data sets for productivity, efficiency, convenience, and scalability. AI improves bank efficiency, trust, and usability. Computers with artificial intelligence can work autonomously [2]. In the digital era, it helps contemporary banks compete. AI is expected to lower banking costs, enhance customer service, and automate processes [3, 4]. Digital transformation is a challenging yet lucrative path for banks to enhance their core banking services. Gartner expects that Indian banks and security firms will spend on IT systems in 2018. IT investment by banks and security organizations rose 11.8% in 2017 [5]. Financial services companies will invest more in AI and other developing technologies as digital banking grows. The largest private bank in India, by assets and market valuation, is HDFC Bank. Several use scenarios illustrate AI adoption [6]. OnChat, an AI-powered Facebook Messenger chatbot, was launched by HDFC Bank in 2017. Within a year, the Niki, an AI-developed chatbot, increased transactions by 160 percent month-over-month. According to HDFC Bank's annual audit report, over 3 lakh clients have used HDFC Bank OnChat to transact close to Rs. 250 lakhs. AI is commonly employed in customer service [7]. Eva, HDFC Bank's chatbot, has addressed over 50 lakh queries from more than one million consumers with an accuracy rate of over 86%. Eva has approximately 20,000 global customer interactions daily [8].

The bot handles bill payments, ticket bookings, and more. HDFC Bank unveiled IRA, India's first humanoid robot, serving 60 clients every day. The robot uses vision sensors to locate consumers and direct them to the closest counter. The HDFC Recruit Bot is another AI-powered operative recruiting tool [9]. This AI tool can identify candidates with the right functional and personal capabilities for large-scale recruiting. The solution reduces hiring time by 81%. Risk management, staff engagement, portfolio management, and credit scoring are HDFC Bank implementations [10]. AI assists with underwriting, credit score models, and the detection of credit payment default and fraud 11].

METHODS OF RESEARCH

Data Source

Audited HDFC Bank reports, Scopus-indexed papers, RBI reports, and other periodicals provide data and values for research.

Study Duration

According to secondary data, the bank began adopting AI tools in 2017-2018, leaving it as a gap year for AI implementation. The study considers eight years of economic data, spanning four years before and four years after AI adoption. The following logic is used to integrate AI technology with current systems, infrastructure, and data values in 2017-18:

- The 2018 study by Gartner indicates that banks invested heavily in IT. The deployment of new technology by banks is driving exponential company growth.
- According to the verified bank statement of affairs for FY 2017-18, HDFC Bank initiated applications of artificial intelligence in their job operations. Banks and other corporations are investing heavily in AI infrastructure, according to PWC Fintech Trends 2018.

Design of Research

Assuming no substantial bank changes occurred during this event that affected performance, other than the adoption of new technology, the authors analyzed the averages of the pre- and post-event periods. HDFC Bank is a pioneer in cutting-edge technology, accounting for 26% of India's banking operations. The authors limited the data to FY 2020-22; hence, the May 2023 HDFC combination with HDFC Bank was not considered.

Approach to Research

Statistics are done in SPSS and Excel. Financial performance is measured using CAMELS in this study. Financial performance changes were assessed by comparing the mean values of the CAMELS ratio. India devised this method to assess the bank's status. Mean ratios are compared before and after AI adoption. This research compares the mean values before and after AI adoption using a two-tailed paired t-test (Fig. **1**). The pre-post mean ratio difference is being tested for zero.

The CAMELS System

The CAMELS Model comprises capital, managerial efficacy, asset quality, liquidity, earning capacity, and sensitivity ratio. These six ratios help analyze bank performance. These six key indicators show the bank's financial health, operational efficiency, soundness, and regulatory compliance. In 1978, India implemented it and found it handy and effective. CAMELS evaluates bank performance using ratios.

CHAPTER 14

Advancements in Gender and Age Classification: Deep Learning Based Approach for Accurate Identification

Deepika Verma[1,*], **Kamal Dhanda**[1] and **Munish Kumar**[2]

[1] *Department of Computer Science and Engineering, School of Engg. & Technology, Om Sterling Global University, Hisar 125001, Haryana, India*

[2] *Department of Computer Science and Engineering, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India*

Abstract: Deep learning and Artificial Intelligence (AI) struggle to automatically determine gender and age from visual cues or other traits. Despite the improvements in age and gender detection algorithms resulting from large datasets and deep learning, numerous issues remain. The absence of variety in training data can lead to bias and poor performance, particularly among underrepresented groups. Deep learning for age and gender determination raises ethical considerations about discrimination and abuse. This study will evaluate precise algorithms for gender and age to address these issues. They strive to reduce prejudice and ensure fair and reliable results for everybody by stressing the diversity of training data and ethical model development. This study aims to enhance age and gender identification while promoting fairness, accuracy, and ethical practices. Our primary aim is to incorporate ethical considerations into age and gender identification model development and implementation, thereby benefiting underrepresented groups. We also seek to optimize these models for real-time marketing and security applications. This project aims to provide accurate, fair, and ethical gender and age identification systems. By emphasizing ethics, they want to design models that uphold justice, transparency, privacy, and dignity. These endeavors strive to advance technology in a manner that aligns with social ideals and benefits society.

Keywords: Computer vision, Ethical issues, Gender detection, Marketing, Seep learning.

[*] **Corresponding author Deepika Verma:** Department of Computer Science and Engineering, School of Engg. & Technology, Om Sterling Global University, Hisar 125001, Haryana, India; E-mail: deepika.ranolia15@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Research Background

Deep learning and visual computing researchers have long studied automated age and gender estimations [1]. Recent advances in deep learning and large datasets have improved age and gender classifications [2]. Traditional age and gender markers are a person's facial shape and texture. Visual data was analyzed using common classifiers [3, 4]. The diversity and complexity of these qualities made these procedures challenging. CNNs have changed deep learning thinking. These algorithms allow researchers to extract complex data properties, revolutionizing the field. CNNs significantly enhance age and gender detection by identifying complex patterns and traits that humans often overlook.

Gender and Age Recognition: CNNs and MTCNNs are novel deep-learning approaches for age and gender identification. In certain datasets, these algorithms outperform human-derived approaches [5, 6, 7]. Deep learning improves gender and age prediction, despite difficulties. Little training data might lead to bias and poor performance for underrepresented groups. The use of deep learning to forecast a person's gender and age gives rise to moral questions about potential exploitation and prejudice [8].

Deep learning is now seeing widespread usage in the field of gender and age recognition, but it also has the potential to be applied in a variety of other areas, including marketing, cybersecurity, social media, and many others. On the other hand, developers must understand the moral implications of modern technology and work to mitigate its adverse effects.

Problem Statement

A key issue that deep learning aims to address is the automated identification of a person's age and gender based solely on their appearance or other characteristics. Facial characteristics may vary over time, and different people's faces exhibit varying emotions, making it a complex process. The characteristics used in conventional approaches are often of poor quality and manually created, which limits their accuracy and adaptability [9, 10].

Objectives

- Accurate age and gender models from face characteristics or other factors are essential. This can be applied in marketing, security, and customized services.
- Data and model biases must be addressed to guarantee fairness, particularly for underrepresented populations. Datasets must be varied and representative, and

algorithms must be demographically robust.

- Considering ethics when creating and using face recognition models reduces the risk of misuse and prejudice. In model creation and implementation, openness, accountability, and permission may be required.
- In industries such as security and marketing, real-time data analysis is necessary; therefore, model optimization is essential. This demands efficient algorithms for low-resource situations.

METHODOLOGY

This chapter presents an approach to accurately determining a person's age and gender from a single facial photograph using a CNN algorithm and OpenCV libraries.

CNN

Convolutional Neural Networks (CNNs) are often utilized in Natural Language Processing (NLP) and image identification and processing since they were originally developed to provide age and gender detection for people. Often abbreviated as "ConvNet," a Convolutional Neural Network (CNN) has many convolutional hidden layers in addition to its input and output layers. CNNs have several similarities with regularized multilayer perceptrons. Fig. (**1**) depicts the three primary layers that constitute the architecture of a neural network based on convolution. This architecture comprises convolutional, pooling, and fully connected layers.

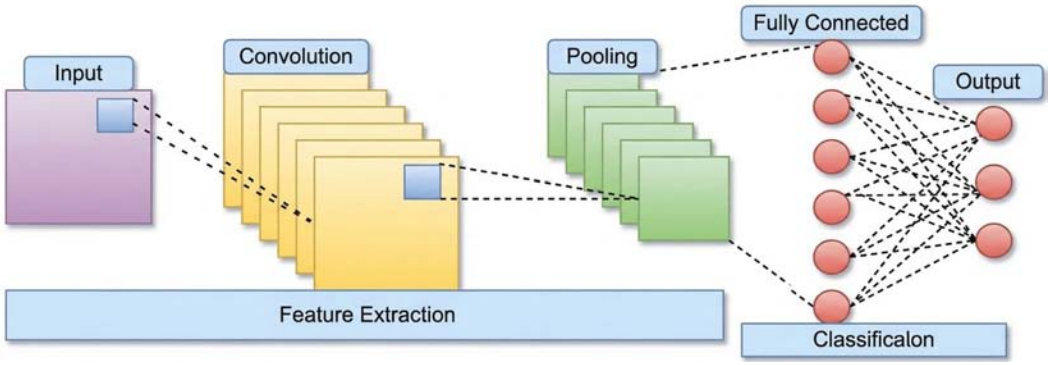

Fig. (1). Architecture of a neural network.

Layers for Convolution

Filtering the input image with a fingertip-shaped filter allows the first layer of the convolutional neural network to extract relevant features. The output is the sum of the elements from each picture, after filtering, for each sliding motion.

CHAPTER 15

Supervision of Water Distribution Using Android and IOT

M Nirmala[1,*], L. Bharathi[2], K. Sreenath[2], Dolores L Montesines[3], M. Rama[2], K. Ankababu[4] and **Saurav Das[5]**

[1] *Department of Computer Science and Engineering, New Horizon College of Engineering, Marathalli, Bangalore 560103, India*

[2] *Department of IT, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[3] *College of Computer Studies, University of Perpetual Help Systems DALTA, City of Bacoor 4102, Cavite, Philippines*

[4] *Department of MCA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[5] *Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: These days, the population in big cities is growing rapidly, along with the need for comfortable living, as more people move from rural to urban areas. The distribution interference with the supply, protection, utilization, and quality of water, as well as other water-related issues, has grown in importance as cities have expanded in tandem with their populations. Resolving water supply concerns requires an effective monitoring and control system. The system uses water pressure and ultrasonic wave sensors, a motorized electrical water valve, a GSM module, a Raspberry PI, and an Arduino UNO microcontroller. This article focused on IoT-based water distribution regulation and monitoring. The project aims to enhance the community's water infrastructure by utilizing a reliable and cost-effective approach. Prototypes mimicked water distribution. Pumping station monitoring and operation were done *via* a front-end web app. The prototype system makes scientific conclusions using fuzzy logic. In conclusion, the experiment met all requirements for monitoring and managing water delivery using an IoT model.

Keywords: Front-end web application, Fuzzy logic algorithm, GSM module, Internet of things, Quality of water.

[*] **Corresponding author M. Nirmala:** Department of Computer Science and Engineering, New Horizon College of Engineering, Marathalli, Bangalore 560103, India; E-mail: nirmal@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

A recent investigation found that municipal water distribution problems were directly attributed to population expansion. Insufficient quantities of water for daily requirements are a problem for many communities [1]. A major issue arises when water distribution is not monitored and controlled, resulting in unequal supply of water [2]. Consumers in high-ground regions or those distant from pumps or water tanks may not have access to water because of issues with the delivery line, such as pipeline damage caused by high or low water pressure. These problems with water distribution have their roots in the system's antiquated, manual methods of operation and the absence of a real-time monitoring and regulating mechanism [3].

Modern urban centers are undergoing a metamorphosis as they embrace smart technology to create more environmentally friendly neighborhoods [4]. They have made water a top priority in their pursuit of economic progress and the amenities that boost their vitality. Water sustainability can only be achieved *via* collaboration across many fields. Additionally, cutting-edge machinery is necessary to streamline operations and management, particularly in gathering and analyzing data to facilitate intelligent planning, decision-making, and management [5].

Developments are ongoing in the city of Ilagan, Isabela, with the goal of raising the standard of living. It aspires to be a smart city and is both the capital and the largest town in the area, with barangays [6]. The City of Ilagan Water District (CIWaD) oversees the provision of water across the city, especially to the barangays in the Poblacion region. An important consideration in the city's ongoing growth, which includes the construction of commercial structures, residential subdivisions, and businesses, is the provision of water [7]. Meeting the community's water demands is a top priority, and CIWaD is actively working to extend its service area to meet that need. Due to its reliance on human intervention, the ineffective method for monitoring and managing water supply has become a concern for management.

IoT technology is utilized to develop an intelligent water management system for CIWaD, which monitors water tanks, pumping stations, and water pressure, a topic also explored in this article [8]. The suggested system also includes a control mechanism to prevent the tanks from being filled to the brim and pipes from leaking due to excessive pressure. The development of a prototype allowed for testing and simulation. Specifically, the controlling and monitoring were carried out using Arduino micro-controllers and other Internet of Things devices. The operation's progress was tracked using a web application [9]. This article focuses

only on the distribution and management of water in CIWaD. The prototype alone was used to evaluate the research [10].

ARCHITECTURE OF THE SYSTEM

The Internet of Things (IoT) model utilized to monitor and run the water distribution system in this work includes ultrasonic sensors, pressure sensors, a motorized electrical water valve, a GPS module, an Arduino microcontroller, a Raspberry Pi, and a solid-state relay switch. Systems operations and interoperability are shown in Fig. (**1**).

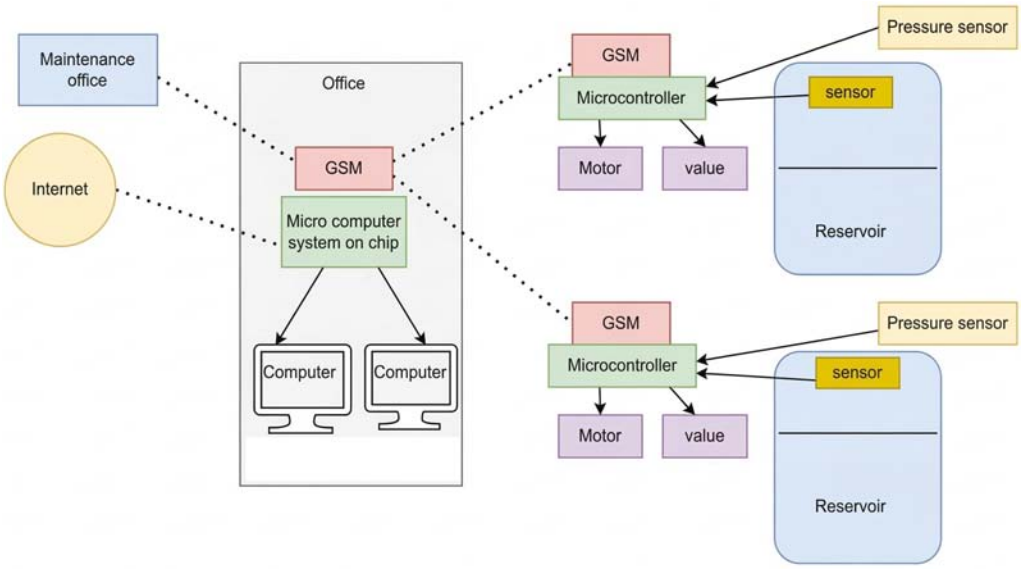

Fig. (1). System operations.

The tank's level of water is monitored by a sensor. For safety reasons, the microcontroller engages the water pump relay switch to turn it on or off when the water level reaches a set threshold, preventing the tank from overflowing or becoming empty. Water pressure is managed in the same way to avoid pipeline damage. The microprocessor can also monitor water pressure changes and rotate the motorized electric water valve to precisely regulate water flow. In this case, the microcontroller may also utilize GSM to notify the user of its actions. In order to keep the office updated on the current state of a certain reservoir of water or pumping station, an SMS is delivered *via* the GSM module. After receiving a report, the office's System-on-chip microcomputer can save the relevant information and notify the maintenance officer by SMS. The built web application enables management to monitor the status of multiple water reservoirs and

CHAPTER 16

Churn Prediction in the Telecom Sector Using Deep Learning Techniques

Jafar Ali Ibrahim Syed Masood[1], Ayain John[1,*], N.S. Kalyan Chakravarthy[2], David Asirvatham[3], Raja Kumar Murugesan[4], P. Adi Lakshmi[5] and **U. Prasad[5]**

[1] *Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India*

[2] *Center for Data Science, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[3] *Faculty of Innovation and Technology, Taylor's University, Subang Jaya 47500, Selangor, Malaysia*

[4] *School of Computer Science, Taylor's University, Subang Jaya 47500, Selangor, Malaysia*

[5] *Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: A consumer is said to have "churned" when they no longer connect with their usual service provider. An examination of customer churn is conducted to prevent the loss of existing clients. Churn prediction is becoming increasingly important in the telecommunications industry, as it involves analyzing the behaviors of various consumers to identify those who are on the verge of terminating their membership with a service provider. It is more cost-effective to keep current customers than it is to get new ones. This study focuses on several machine learning and Neural network approaches to forecast customer churn and identify customers who are closer to leaving their service from the relevant service provider. Specifically, the methods are used to identify customers who are more likely to leave the telecommunications service. Several machine learning techniques, including Logistic Regression, Support Vector Machines, Random Forests, AdaBoost, and Artificial Neural Networks, are employed in predicting the customer turnover rate. Data is obtained from the AT&T website, and learning models are assessed using two criteria: Accuracy and Area under the Curve. The accuracy criterion is given greater weight than the Area under the Curve criterion. We assess and measure the performance of several algorithms, and the one that ends up being the most accurate throughout all of the tests wins.

Keywords: Accuracy, Customer, Machine learning, Neural network, Transfer learning.

[*] **Corresponding author Ayain John:** Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India; E-mail: jafarali.s@vit.ac.in

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

Maintaining relationships with existing consumers and pursuing new clientele are two of the most pressing issues faced by modern organizations [1]. Companies that have been around for a long time prioritize maintaining relationships with their current clientele, whereas startups are more concerned with expanding their consumer base [2]. Suppose we want to expand our customer base. In that case, as Gaur and Dubey stated, we need to prioritize expanding our customer base while also maintaining strong relationships with our current clientele for an extended period of time [3 - 5]. Raza says that with the widespread use of the internet, customers are now empowered and no longer stick with a single service provider, which has increased the competition between companies [6]. When competition between service providers is just a click away [7], empowered customers now mostly contribute to improving the attrition rate of services. In the current scenario [8], with the emergence of e-commerce, there is a wide scope of information available to customers, enabling them to think and switch. In addition, empowered customers now mostly contribute to reducing the attrition percentage of services [9]. Because of this risk, service providers must maintain cutting-edge, up-to-date, and efficient methods for analyzing customer feedback [10], projecting potential customer behaviors in the future, and estimating the likelihood that they will switch providers [11].

As a result, Churn Prediction entails the development of procedures that help businesses keep their lucrative customers and foresee ways in which the consumers may churn. Consequently [12], Churn Prediction is also known as customer retention. The study's overarching goal is to develop a model for the mobile telecommunications industry's pre-paid segment that is both highly effective and accurate in predicting customer churn and retaining existing customers [13 - 15]. The Meaning of the Word “Churn” Churn was initially mentioned by Berson, who said that it refers to the process of pre-paid or post-paid clients switching from one service provider to another. The Churn might take any form, such as being intentional or active, accidental or rotational, involuntary or passive, *etc.* “Service providers might minimize the susceptibility of their consumers leaving if they had enough expertise in managing client relationships, which in turn would boost their productivity and revenues. A technique needs to be developed to examine the profits generated by the qualities; hence, churn prediction can be characterized as “a mechanism that assists in predicting the majority of potential churners in advance.”

RELATED WORK

According to S. Shumaly, P. Neysaryan [30], and Y. Guo's research, "The advent of internet commerce has expanded new methods for organizations to increase new ways for companies to respond to clients' expectations by the amount of information that is now accessible." In the meantime, customers have the opportunity to gain a deeper understanding of the market's possibilities. Their expectations become higher, and as a result, they are more inclined to move to a different provider. As a direct consequence of this, the word "churn" came into being. During the 1850s, the primary emphasis was placed on productive activities, and as a result, individuals sold whatever they had earned. At the beginning of the 1900s, as a result of increased consumer agency, service providers were required to present a justification for customers to subscribe to their services to remain in business. In the mid-20th century, a significant shift occurred, causing retailers to shift their focus from trying to convince consumers to purchase whatever they were selling to creating products that customers desired. The preceding change in marketing orientations led to a move toward a focus on the consumer in the 21st century. According to the research findings, this innovative customer-oriented strategy was able to take into account each of its clients on an individual basis, based on their requirements and preferences. In general, these days, due to the availability of production, businesses are able to categorize customers based on the similarity of their preferences and tastes. As a result, they can formulate marketing strategies to cater to customers who want to be treated in a manner that is specific to their requirements and preferences. According to S. Preetha and R. Rayapeddi, "Customer Relationship Management (CRM) requires both information technology and knowledge management." Customer Relationship Management (CRM) can be viewed as a more comprehensive approach to customer service, which involves the collection and management of a substantial amount of data, enabling companies to utilize that data for customer acquisition, retention, expansion, and even customer selection.

PROPOSED METHOD

AT&T's website is used to download the dataset, which is then formatted into 7044 rows and 19 columns of labelled data with sections such as "customer ID, gender, Senior Citizen, Partner Dependents, tenure, Phone Service, Multiple Lines, Internet Service, Online Security, Online Backup, Device Protection, Tech Support, Streaming TV, Streaming Movies, Contract, Monthly Charges, Total Charges and Churn where only customer ID, Numerical or continuous values, while the remaining columns include categorical data with various keywords; this categorical data need to be translated to numerical form before we can train our dataset. Our dataset does not lack null values; rather, it includes many blank

CHAPTER 17

Platform Development for Hawker and Peddlers

S Shivananda[1], Jafar Ali Ibrahim Syed Masood[2,*], N.S. Kalyan Chakravarthy[3], Pastor R Arguelles, JR[4], Sk. Sheema[5], D. Divya Kalpana[5] and **N. Hariharan[6]**

[1] *Department of ISE, M S Ramaiah Institute of Technology, Bangalore 560054, Karnataka, India*

[2] *Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India*

[3] *Center for Data Science, School of Computer Science and Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[4] *College of Computer Studies, University of Perpetual Help Systems Dalta, City of Bacoor 4102, Cavite, Philippines*

[5] *Department of CSE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[6] *Department of Mechanical Engineering, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: Developing a mobile app allows hawkers and peddlers to share their location in real-time. This could help customers easily locate hawkers in their area and get information about the products or services they offer. Overall, sharing the live location of hawkers can be a useful tool for supporting these small-scale businesses and helping them to reach new customers. It may also provide people with additional choices and boost a community's vitality and variety. Most mom-and-pop stores and other small enterprises are run by one person or a small team. Street corners, marketplaces, and retail districts are common places to find them. These types of companies offer a wide range of goods and services, including food stands, shops, barbershops, and more. The ability to respond quickly and effectively to changes in consumer tastes is a major strength of mom-and-pop stores and other types of small enterprises.

Keywords: Barbershops, Food stands, Hawkers, Marketplaces, Small-scale businesses.

INTRODUCTION

Suppliers can not conceal their products and services from app users [1]. Several options are available to ensure transparency and accessibility. One common

[*] **Corresponding author Jafar Ali Ibrahim Syed Masood:** Department of IoT, School of Computer Science and Engineering, Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India; E-mail: jafarali.s@vit.ac.in

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approach is to display a menu with descriptions and pricing. The menu can be organized using tabbed interfaces or scrolling lists [2]. Adding media files: Visuals would help users understand the app's products and services. Food and clothing vendors might use photos to attract consumers. If the merchant sells items via the app, it may involve placing orders. Possible steps include choosing products from a catalogue, entering payment details, and deciding whether to have them delivered or picked up [3]. Generally, for a hawker app to be successful, it must provide users with comprehensive and easy-to-understand product descriptions, enabling them to make informed purchases [4]. An aesthetically pleasing and intuitive user interface for the program can be built using an XML-rich collection of configurable widgets and tools [5]. It may include a menu or list of services or items, accompanied by pictures or videos of those items, and the ability to place an order or use a shopping cart, built withing server-side functionality, such as a database API using Java. Firebase may store and handle app purchases, orders, and customer data. APIs enable programs to retrieve and display location data. Apps use APIs to retrieve location data from the back-end server [6 - 8].

IMPLEMENTATION

Hawker's backend utilizes Java and Firebase. XML powers its front end. Commonly used by programmers, Java is ideal for creating sophisticated apps like the Hawker app. It offers a range of features and tools that make it easy to develop robust, scalable applications capable of handling large volumes of data and traffic. In the Hawker app, Java manages data storage, performs calculations, and executes complex algorithms to deliver a smooth and seamless user experience. The mobile application connects hawkers/street vendors with customers. The application consists of two parts: one for Hawker and the other for the user. Fig. (**1**) depicts the Hawker Flowchart.

Hawker/Vendor Mode

The Hawker/Vendor can share their live location, which will be visible to the customers, making it easy to access their location. - Using GPS for a long time can drain the battery of a vendor, so they have the option to lock their location (to set their location on a specific spot and switch GPS off). - A status feature that would be visible to the customers, which the vendor can update (example: will be on this location till 6 pm). - A profile section where the vendor can add photos, a menu, and a description of items they are selling, making these details visible to the customer.

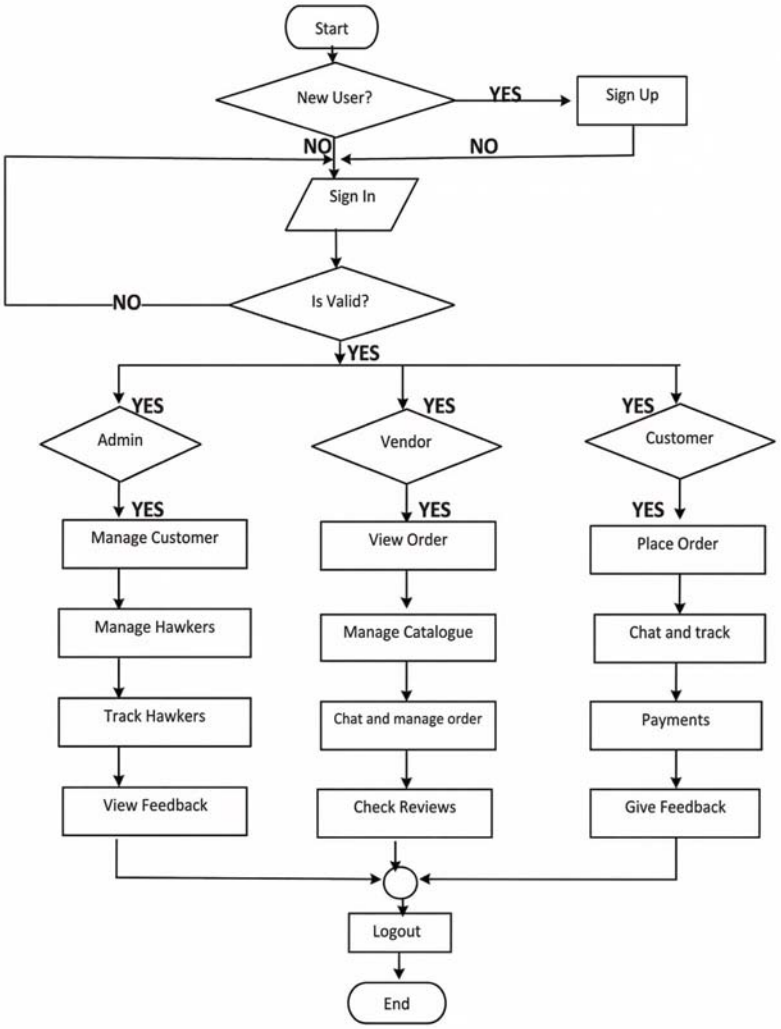

Fig. (1). Flowchart of Hawkers System.

Customer Mode

The customer would have access to all the street vendors' locations near them. The customer can view the status of the Vendor, profile, and vendor's menu. The customer can click on 'Directions,' which redirects to Google Maps to take the user to the hawker. The customers have an exclusive rating feature using which they can rate their experience with the hawker and also review them, which would reflect in the hawker's profile

CHAPTER 18

Usage of Mobile Phone Detection and Mailing System Using Deep Learning Techniques

L. Kanya Kumari[1,*], K. Bhanu Sree[1], K. Sai Charitha[1], K. Sunila Jasmin[1] and **B. Chaitanya[1]**

[1] *Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India*

Abstract: A spike in email filtering due to a large number of detected emails leads to yearly losses. One way to mitigate this loss is to categorize different types of suspicious emails, such as fraudulent or promotional messages from unknown senders. The first steps in identifying message categorization were based on simple approaches, such as word filters. More complex methods, such as language modeling based on deep learning, are already being used. The text classification problem is often addressed using Recurrent Neural Networks (RNNs), with Gated Recurrent Units (GRUs) being a popular variant due to their efficiency in capturing sequential dependencies.. Since classifying phishing emails is the focus of this study, GRU techniques were used. This study's results show that, in a dropout-free environment, GRU attained a high accuracy rate. A large amount of detection mail is created worldwide from several botnets, which impacts the limited mailbox capacity. They affect the security of private mail and the loss of communication space. The time required to identify and reply to detected emails is affected by them. Identifying suspicious emails is still considered a challenging job in the modern day. Due to email detection frequency, identification can be improved. The researcher constructs a Gated Recurrent Unit- Recurrent Neural Network (GRU-RNN) to identify emails. A new method was tested with a Detecting basis dataset. The procedure is 99.8% accurate. After considerable testing, the researcher concludes that the offered technique detects emails well.

Keywords: Deep learning, Detected emails, Dropout-free, GRU-RNN, Promotional messages.

INTRODUCTION

Electronic email detection is the process of monitoring a subscriber list for the delivery of commercial or damaging emails [1]. The recipient has not consented to receive unsolicited emails [2]. The issue of detection has risen in the world of

* **Corresponding author L. Kanya Kumari:** Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India; E-mail: kanyabtech@yahoo.com

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the internet. Spatial, temporal, and message delivery inefficiencies are identified. Even while automated email filtering can be the greatest defense against discovery, new detection methods may easily circumvent it. Most detections that originated from specific email addresses might have been manually disabled until about a year ago. The detecting process will make use of DL methods [3]. At the end of the email filtering period, three main strategies were implemented: "content analysis, white and bans of internet addresses, and community-based procedures." As a detection and prevention strategy, text analysis of messages is often used [4]. Considerations for both servers and buyers lead to a plethora of potential solutions. In most cases, users and organizations would prefer that no critical communications go missing [5]. It is quite probable that the blacklist method was the initial one employed to detect separation. This strategy's goal is to reply to all senders, except those using local or digital email addresses [6, 7]. Ever since modern areas joined the domain name detection category, this strategy has become less effective. Emails sent to publicly registered domains and email addresses are prioritized using the white category technique, while all other emails are sent to a far lower queue [8]. Senders who agree with confirmation requests sent by a "junk mail filtering system" will find this strategy to be the most effective [9 - 11].

Problem Statement

Sending unwanted ads, messages, or viruses to huge numbers of people online is called spam. It might be difficult to eliminate dubious emails from email due to their size and effort. Fraudsters may steal company data from these emails in addition to viruses and malware. Given these conditions, all organizations should implement spam filters on their messaging systems first. Deep learning algorithms outperform classical prediction approaches in categorizing texts for both multi-class and binary classification in NLP testing and verification.

METHODOLOGY

A method for detecting emails is proposed here by the researcher. The authors selected the RNN-GRU as the primary component of the module, relying on an anomaly detector. It is in the following module that the trained model is loaded. Statistical evidence supports its effectiveness. This component determines whether a certain email is an anomaly message. Using a mail-based dataset extracted from the UCI DL repository, the proposed method is tested. For a neural network to recognize emails, there are two steps: training and testing. Fig. (**1**) shows the process used to detect and identify phishing schemes using RNN. There are three stages to the proposed models. One of these steps is feature extraction, while another is RNN-GRU using SVM.

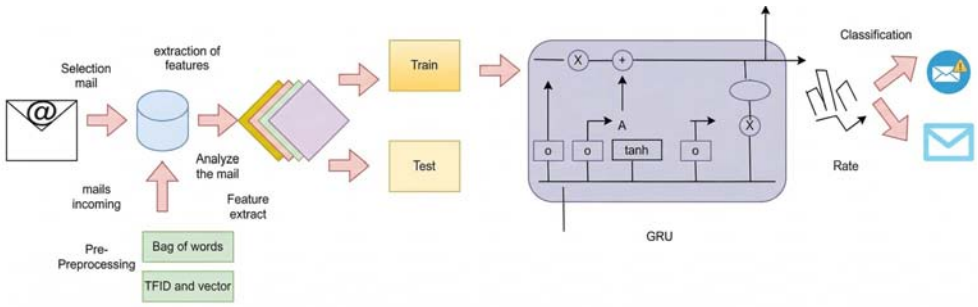

Fig. (1). Detect and identify phishing schemes process.

DESCRIPTION OF THE MODULE

The following modules are included in this system:

Preparing Datasets

The collected raw data from the website will be used to train DL models. Two columns were used to list the emails that Kaggle finally obtained. The first column, titled "type," had possible values for detection or messaging and was used to classify emails. The second column, labeled "e-mail Content," included several forms of email content.

Converting Tokens

Word tokenization is the process of converting a phrase's words into numerical indices. This process creates a word tokenizer from a predetermined set of intriguing lexical phrases. Following creation, a phrase's words are transformed into sequence information using a word tokenizer. Tokenization takes words and turns them into indexes, with the unknown phrases having their index set to 0.

Scrambling

Once the tokens have been produced, the next step is to stem them. Undoubtedly, stem is the method by which the data-derived phrases are transformed back into their original form. The underlying sentence is then stripped of any prefixes and suffixes. The stemming technique is then used to return the fundamental or stem words of both altered and misspelled words. Similarly, they have perfectly done the stemming operation for this step by using the NLTK Python Library. Words that are considered spam may be located rapidly once email content has been stopped.

CHAPTER 20

Indian Banks Utilize Artificial Intelligence for Financial Management

Thiruma Valavan A[1,*], C Barna A Naidu[2], Shabnam Siddiqui[3], Bilal Asghar[4], N Kirubasankar[5] and **Ajit Prasad Mahato[6]**

[1] *Training Department, Indian Institute of Banking & Finance, Mumbai 400005, Maharashtra, India*

[2] *School of Business & Management, Christ University, Pune 412112, Maharashtra, India*

[3] *Department of Commerce and Management, Faculty of Management Studies (FMS-WISDOM), Banasthali Vidyapith, Tonk 304022, Rajasthan, India*

[4] *School of Business, Al Fayha College, Al Jubail 31961, Saudi Arabia, AL Jubail Kingdom of Saudi Arabia*

[5] *Department of Business Studies, Sri Manakula Vingayagar Engineering College, Madagadipet 605107, Puducherry, India*

[6] *Department of commerce, NERIM Commerce College, Guwahati 781022, Assam, India*

Abstract: Indian banks have used AI technology in recent years. Banks are rapidly using AI to improve customer experience by exploiting their massive datasets. Farming, AI in banking focuses on client service and interaction, such as balance inquiries, micro statements, money transfers, etc.AI can leverage the massive quantity of organized and unstructured data to eliminate inefficiencies in the banking industry. It enhances customer experience, reduces operating costs and risks, detects fraud, streamlines lending facilities, and resolves customer issues promptly. The research examined AI's effects. With a structured questionnaire, the researcher collected a substantial amount of primary data from 50 respondents and analyzed it using Logistic Regression Analysis, F-test, and Descriptive Analysis. Through this investigation, the investigator will determine the influence over time.

Keywords: AI, Detects fraud, F-test, Indian bank, Logistic regression analysis.

INTRODUCTION

Banking is crucial to technological innovation in India. Banking operations are more cost-effective, productive, and efficient thanks to technology [1]. It has

[*] **Corresponding author Thiruma Valavan A:** Training Department, Indian Institute of Banking & Finance, Mumbai 400005, Maharashtra, India; E-mail: thirumavalavan63744@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

facilitated small-value transactions, offers many options, and helps develop new markets. Customer-centric and technologically compliant banks have emerged in recent years. Technological disruptions have impacted banking, insurance, financial services, automotive, legal services, education, and healthcare analytics center [2]. To make things easier for clients, these industries adopt new trends periodically. Most developments nowadays improve the user experience. Traditional banking in India faced several issues, including lengthy wait times, a lack of security, poor client retention, and excessive bank charges, a few decades ago [3]. The banking sector has automated and modernized to enhance the customer experience through the adoption of core banking solutions, no-frills accounts, mobile banking, demat accounts, net banking, automated teller machines, electronic banking services, electronic Know-Your-Customer (e-KYC) initiatives, and other similar advancements [4]. Banking has incorporated AI, chatbots, and RPA since 2020. Several Indian and international banks have utilized robots to improve worker efficiency and service delivery. SIA, an AI-enabled digital assistant, was initially launched in India by the State Bank of India to support clients with banking chores and inquiries [5]. HDFC launched “Eva,” an Electronic Virtual Assistant. Eva instantly delivers details regarding the bank's goods and services and addresses clients' questions to improve service. Moreover, ICICI Bank utilized software-assisted robotics in its business operations across various departments [6]. Bank of America developed two AI technologies, including “Erica” for smart customer solutions. “CashPro” predicts customers' cash situations using AI and ML [7]. Many financial institutions utilize AI-based solutions to streamline middle-end, front-end, and back-end processes, thereby enhancing functionality. JPMorgan Chase implemented COIN to streamline the management of complex contracts and staff IT access requests, resulting in over 360,000 man-hours saved. The bank can now do a lot more, including investigating and suggesting unrealized investment possibilities, managing large amounts of work, reducing operating expenses and error rates, and monitoring vulnerabilities [8 - 10].

RESEARCH GAP

Few studies have examined the impact of AI on primary data in Indian banking. This research examines the effect and consumer satisfaction of AI in Indian banking before and after adoption.

Goals of Research

- To assess the effect of AI on Indian banks.
- Analyze client satisfaction before and after AI installation.

HYPOTHESIS

The following Table **1** displays the hypothesis of the study:

Table 1. Hypothesis.

H10	AI does not affect Indian banking.
H1a	Indian banking is affected by AI.
H20	No change in customer satisfaction before and after AI installation.
H2a	Customer satisfaction changes before and after the deployment of AI.

PROBLEM STATEMENT

The use of IT in banking promises improved customer service and a competitive edge over competitors. It enhances proactive measures, including security, statements, and networking, for banks. This is to maintain customer contact. As consumers grow more tech-savvy and demanding, they have higher expectations than in previous years. It has both beneficial and harmful effects. This research explores the influence of technology advancements and AI adoption on the banking industry.

METHODOLOGY

The researchers utilized primary and secondary data. The researchers collected primary data from 50 clients through a structured survey and secondary data from websites, journals, and published papers. This research collected data *via* snowball sampling. Researchers analyzed and interpreted data using factor analysis, regression analysis, and the F-test.

ANALYSIS AND DISCUSSION

The 20 variables were dimensionally reduced to examine the influence of AI on Indian banking. We conducted an exploratory factor analysis for AI variables. The influence of Artificial Intelligence on the Indian banking industry, as measured by KMO, yielded the value of .860, suggesting a sufficient sample size. Bartlett's Test of Sphericity ($p < 0.000$) indicates that the variables are significant. The number of elements evaluated via factor analysis revealed three converging factors. Together, they explained 78.324% of the effect of AI on Indian banking (Tables **2** and **3**).

CHAPTER 21

Enhancement of a Cloud-Based Decision-Support System for Human Resource File Information

Vikas Roshan[1,*], Rashi[2], Sanjay Sharma[1], Vijay Singh Thakur[3], Abhishek Jain[4] and **Arpit Jain[5]**

[1] *Department of Applied Sciences and Humanities, Ajay Kumar Garg Engineering College, Ghaziabad 201009, Uttar Pradesh, India*

[2] *GL Bajaj Institute of Management and Research. PGDM Institute, Greater Noida 201310, Uttar Pradesh, India*

[3] *Department of Computer Science and Engineering, Hindustan College of Science and Technology, Mathura 281122, Uttar Pradesh, India*

[4] *Department of Computer Science and Engineering, Uttaranchal University, Dehradun 248007, Uttarakhand, India*

[5] *Department of Computer Science Engineering, KLEF (Deemed to be University), Guntur 522302, Andhra Pradesh, India*

Abstract: In today's fast-paced, technologically-driven world, managers need a way to collect massive amounts of high-quality data, and data mining is the way to go. A human resource archival information Decision Support System (DSS) is built for management and decision-making using cloud computing's scalability, stability, flexibility, and extensibility. The seven levels that make up this system are as follows: system application, data standards conversion, network support, cloud computing support, data collecting, and decision support layers. It examines the benefits of resource sharing and integration in cloud computing. The working mode is also discussed. The solution addresses shortcomings of conventional archive administration, including limited data resources, difficulty in achieving isomorphism, and insufficient standardization of processing data from diverse sources.

Keywords: Decision support, DSS, Network support, System application, System layer.

INTRODUCTION

Human and intellectual resources are vital to firms as science and technology improve, and their value indicates competitiveness. During the early stages of

* **Corresponding author Vikas Roshan:** Department of Applied Sciences and Humanities, Ajay Kumar Garg Engineering College, Ghaziabad 201009, Uttar Pradesh, India; E-mail: vikasroshan1@gmail.com

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computer information technology, huge organizations relied on manual calculations, which resulted in mistakes, waste of people, materials, time, and excessive costs [1]. A human resource management information technology system was created to address this issue. Advancements in information technology have led to the unification of human resource organization information system databases and linked data, creating an integrated material source [2] with a particular UI. For enterprise management, human resource information management collects, reports, and analyzes data in an automated and smart manner [3, 4]. HR management practices vary when HRM systems are studied and developed. HR efficiency affects the system. Traditional HR file management has limitations, including restricted resource sharing and an imbalance of information. Limited heterogeneous information sharing hinders meeting diverse human resource supply and demand patterns. Sharing information and resource information is crucial for solving this issue [5].

The authors investigate the design and application of a human resource archive material DSS using "cloud computing." Cloud computing refers to the on-demand purchasing of IT infrastructure resources over the network, allowing for easy expansion [6, 7]. Essentially, cloud computing involves on-demand, readily extendable service delivery and consumption across the network [8]. Software, information technology, the Internet, and other services may fall under this category. Desktop, distributed, centralized, and grid computing are all modeled after it [9, 10]. Cloud computing has more advantages than grid computing.

PLATFORM FOR HUMAN RESOURCE ARCHIVE DECISION SUPPORT CLOUD COMPUTING INFORMATION

Construction of Systems

Human resource management data is heterogeneous, making the development of a unified system challenging. Cloud computing can build an effective, scientific, and uniform management platform. Fig. (**1**) shows a cloud-based HR archive data decision support platform. In Fig. (**1**), the platform comprises 7 levels. The Dialectic data collection layer displays system element connections, causality, and mutual constraints. Archive data mining relies on data collecting as its raw material. To provide sufficient "quality" and "quantity" for future decision support, this layer ultimately imports traditional text data together with current images, audio, and other data in the necessary format. Inputting current graphics, photographs, music, and other data in the required format, together with traditional text data, is the objective of this layer, which will aid in future decision-making. Data transmission *via* network settings, developing hybrid convergence points for information collection, and establishing adaptive

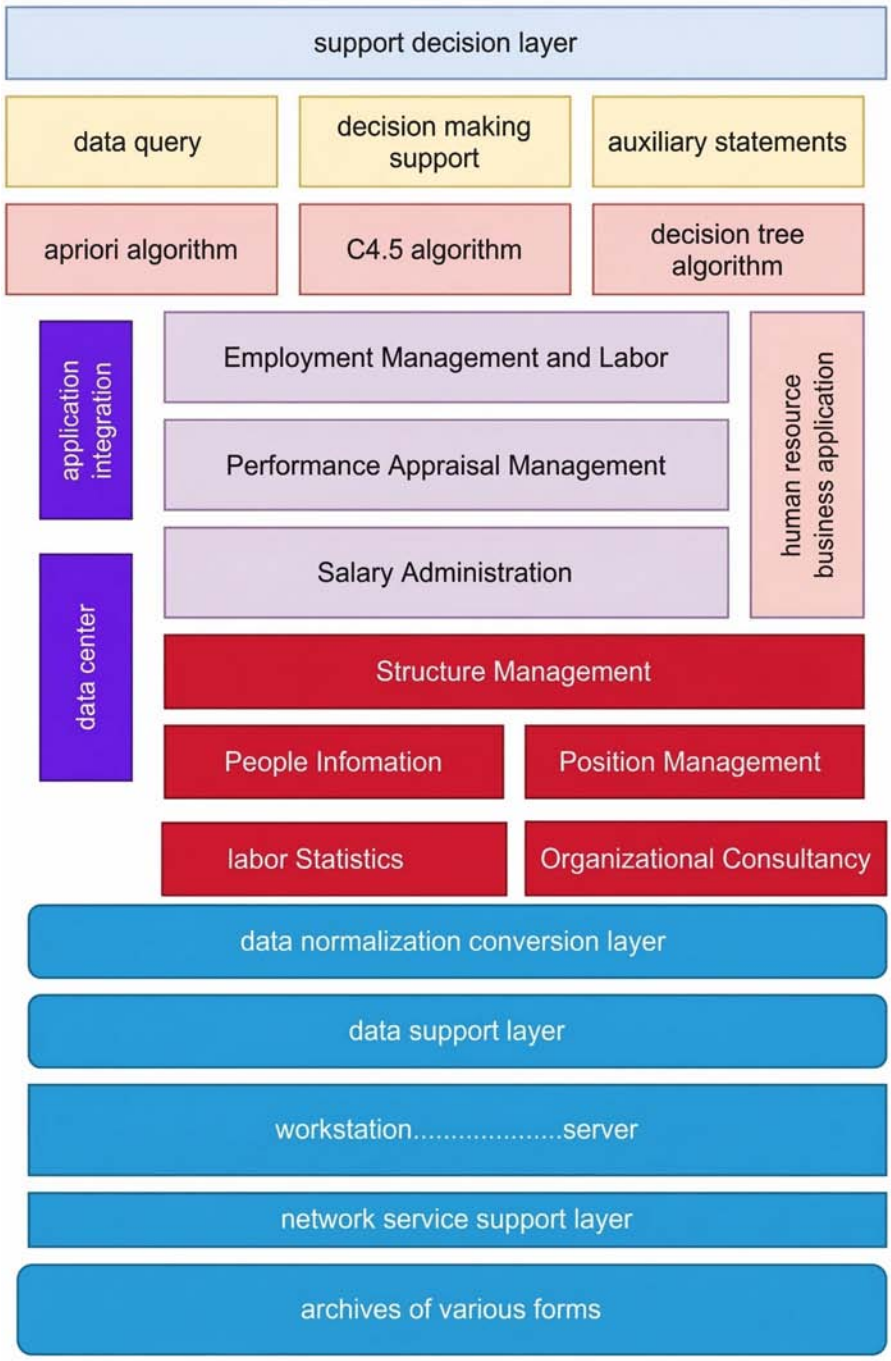

Fig. (1). HR file information DSS architecture.

CHAPTER 22

Monitoring and Web-Based Maintenance of Machines on the Shop Floor

B. Lakshmi[1,*], J Siva Ram Prasad[2], K Parish Venkata Kumar[3], Suresh Babu Chandolu[4], T. Suresh[3], U. Sireesha[3] and **K. Guru Surya Bharat Kumar[3]**

[1] Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India

[2] Department of Mathematics, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India

[3] Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India

[4] Department of CSE (AI & ML), Dhanekula Institute of Engineering and Technology, Vijayawada 521139, Andhra Pradesh, India

Abstract: Production management has traditionally focused on maintenance and expenses, as unexpected breakdowns reduce system dependability and asset return. Innovative maintenance methods that gather and handle shop-floor data may save costs and boost business sustainability. A machine monitor framework with condition-based preventative maintenance is presented in this study. To assist condition-based preventative maintenance, the latter analyzes shop-floor machine tool data *via* information fusion. The technique is implemented as a Cloud-based software service. The service determines component life based on machine tool and equipment operating data, such as process time and time spent machining per tool. Additionally, it notifies machine tool users and maintenance departments and allows mobile communication. A machining SME case study is used to demonstrate the application of the framework.

Keywords: Cloud-based software, Information fusion, Production management, Shop-floor data, SME.

[*] **Corresponding author B. Lakshmi:** Department of Computer Applications, Velagapudi RamaKrishna Siddhartha Engineering College, Siddhartha Academy of Higher Education (Deemed to be University), Vijayawada 520007, Andhra Pradesh, India; E-mail: itslakshmi.h@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

INTRODUCTION

The manufacturing lifecycle relies on maintenance, which accounts for 61–71% of its expenditures [1]. Industrial studies show that repairing worn-out components may account for 71% of maintenance costs. Existing maintenance solutions are utilized without addressing the true state of machine tools and equipment, notwithstanding their high cost [2]. Due to interconnected production systems, machine tool failures may cause supply bottlenecks in the company's and customers' value-added operations [3]. Advanced manufacturing systems utilize monitoring to assess equipment status and predict breakdowns. But there is still no connection between monitoring methods and maintenance solutions [4, 5].

Condition-based maintenance may result from real-time monitoring, visualization, and data analysis of machines, tools, and equipment [6]. Additionally, condition-based maintenance schedules maintenance without disrupting machine operations using condition measurements [7, 8]. Sensor readings assist Condition–Based Preventative Maintenance (CBPM). Mobile technologies and communication allow IT tool cooperation [9]. Production systems are increasingly seen as social structures with personnel acting as social machines to analyze data and distribute it between IT tools [10]. This research presents a real-time shop floor monitoring-based system for condition-based preventive maintenance of machines and cutting tools, improving teamwork between the maintenance department and machine tool workers through the use of cloud and mobile technology [11, 12].

CURRENT STATE

Customer pleasure is tied to a manufacturer's product quality. However, the condition of the equipment greatly affects quality. Thus, their upkeep is crucial to maintaining “like new” performance. Industry has not fully adopted modern maintenance methods that boost production system sustainability. Avoiding equipment breakdown is the goal of preventive maintenance. Degradation of equipment defines the requirement for preventative maintenance; hence, a machine learning maintenance planning framework has been developed. Taylor's tool life model is used for tool deterioration. Mean Time Between Failures is another preventative maintenance factor. MTBF is defined as the inverse of component failure rate λ and is considered a reliability criterion. Maintenance-free operating duration is a new reliability criterion.

Research emphasizes the importance of real-time machine tool monitoring in maintenance planning. Multiple monitoring methods have been used to assess tool wear and machine availability. Vibration, sound, and temperature sensors are utilized for monitoring. Installing current transducers as sensors is easy and provides accurate machine status information. Information fusion algorithms have

been employed to provide meaningful system information as diverse data sources proliferate. Sensor, feature, and decision-level information fusion methods exist. The Dempster-Shafer theory of data (DS) dominates decision-level fusion.

Web technologies improve data processing and automate maintenance in production. E-maintenance has been prevalent in maintenance research since the early 2000s. Product-service monitoring that sends email reminders for preventative remote maintenance. An improved framework uses the open and royalty-free industrial procedure for communication, MTConnect, to communicate with the machine controller. E-maintenance, which combines web-based services and agent technologies, may also provide intelligent industrial system features. Manufacturing requires collective intellect and dynamic adaptation. The e-maintenance strategy introduced by Cloud technology in manufacturing will enable data sharing across IT tools and provide universal access to information for different users and IT tools. Cloud technology enhances manufacturing by scaling to meet corporate size and demands, and providing ubiquitous network connectivity, according to another study.

Advanced maintenance systems have near-real-time monitoring capabilities, but the information is not completely used for predictive maintenance operations, according to the literature assessment. The advantages of Cloud and mobile monitoring and maintenance have not been fully realized. This research proposes a CBPM architecture using real-time monitoring service data. The monitoring service uses Dempster-Shafer evidence fusion to calculate the machine tool and equipment's total working hours. Mobile communication channels keep machine tool operators and maintenance specialists informed. With Infrastructure-as-a-Service (IaaS), the system is built on the Cloud.

PROPOSED FRAMEWORK ARCHITECTURE AND DESIGN

A machine tracking framework using CBPM is proposed in this article (Fig. **1**). This framework uses the multi-sensory systems and operator input to collect machine tool data. The hardware in the sensory system monitors all motor drive currents and spindle head RPMs. Mobile devices enable operators to submit machine tool status, job status, cutting tool availability, and any failures, and to calculate machine tool and cutting tool machining times based on operator and sensory system input. After data gathering, the data is analyzed to estimate the machine tool's rotation and the cutting tool's machining time. Information fusion is used to determine the state of the machine tool and machining time from monitoring data.

CHAPTER 23

Implementing the Microservice Framework by Integrating the IoT-Based

Aditya Sai Srinivas[1,*], Vishwa Priya V[2], R. Senthamil Selvan[3], Basi Reddy A.[4] and **J. Rameshkumar[5]**

[1] *Department of AIML, Jayaprakash Narayan College of Engineering, Mahabubnagar 509001, Telangana, India*

[2] *Department of computer science, Vels Institute of science, technology and advanced studies, Chennai 600117, Tamil Nadu, India*

[3] *Department of Electronics and Communication Engineering, Annamacharya Institute of Technology and Sciences, Tirupati 517520, Andhra Pradesh, India*

[4] *Department of Computer Science and Engineering, School of Computing, Mohan Babu University, Tirupati 517102, Andhra Pradesh, India*

[5] *Department of Electronics and Communication Engineering, K.S.R. College of Engineering, Namakkal 637215, Tamil Nadu, India*

Abstract: Modern Supply Chain Management (SCM) systems use several services to use IoT and cloud technology across delivery, distribution, and manufacturing. This article performs post-processing tasks such as supply chain tracking, item location analysis, and expected delays. It does this by presenting a comprehensive microservice design and implementation that consumes and semantically annotates feeds of information from online systems. The technique is evaluated *via* a set of deployment scenarios, and suitable application code is also inserted using easy workflow-programming-based structures.

Keywords: Cloud, Internet of things, Online systems, SCM, Supply chain.

INTRODUCTION

New possibilities for the real-time tracking, administration, and improvement of supply chains and the distribution of commodities have arisen with the introduction of the IoT [1]. Cloud services, software as a service product management scheme, and other new capabilities allow for the definition of conditioned rules that alert stakeholders when certain events occur, as well as the enforcement of product monitoring of Things through embedded smart devices

[*] **Corresponding author Aditya Sai Srinivas:** Department of AIML, Jayaprakash Narayan College of Engineering, Mahabubnagar 509001, Telangana, India; E-mail: taditya@jpnce.ac.in

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that can be scanned to provide information like humidity, location, and temperature [2]. For commercial and agricultural use cases, the status of sensitive items may be monitored, and problems with distribution can be addressed using mixtures of technologies such as smart sensing, communications, and central, cloud-based analysis [3]. One of the most important features is data centricity [4]. By using these technologies, businesses may improve their supply chain management strategies and risk assessments by gaining a better understanding of their intricate supply networks. From a more pragmatic standpoint, however, these combinations present significant challenges due to the heterogeneity of the relevant IT systems and the current state of technological capabilities or data merging and effective semantic reasoning [5]. The rivalry among suppliers has intensified thanks to globalization, which should lead to improved supply conditions for businesses. However, the difficulty, adaption requirements, and danger involved with maintaining an international supply chain might make these advantages disappear [6]. One of the most important factors in improving supply chain management is achieving agility *via* integrating processes and information [7]. Other important factors include adapting to the demands and procedures of the manufacturing and incorporating new technology [8].

In Section 2, the AffectUs framework is introduced as a microservice-based system design and implementation that aims to integrate and deploy different essential components of a system for supply chain management, described in Section 3, with ease. External IoT platforms provide baseline information feeds; semantic services, which are decoupled from the end user but enhanced with specialized ontologies, annotate received data; and Artificial Intelligence (AI) devices detect abnormalities in the annotated feeds. Section 4 details the operational metrics, and Section 5 concludes the work.

DESIGN AND MODEL OF THE SYSTEM

Fig. (**1**) shows the system architecture. There are three primary parts to it: the front end, which implements the user interface and the modules for coordination and adaptation; the back end, which implements subsystems like the Semantic service & data storage and the artificial intelligence subsystem; and finally, the Node-RED middleware. RabbitMQ, a messaging layer for non-REST-based interactions, including asynchronous alerts to monitoring users for infractions, data feeds, *etc*., links all system pieces vertically.

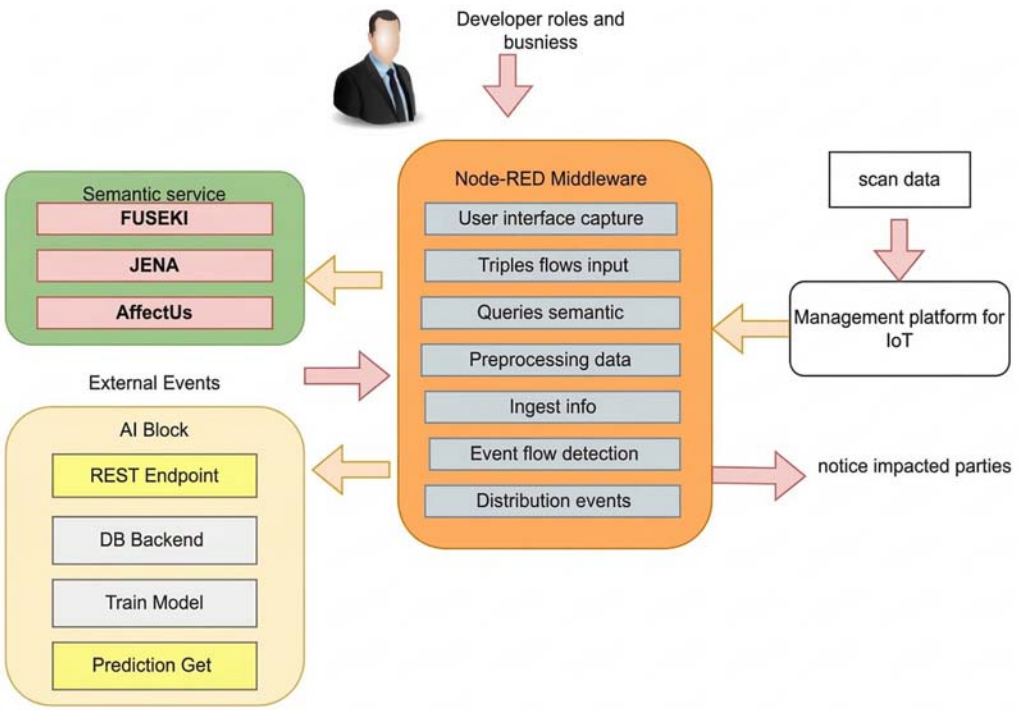

Fig. (1). System blocks and architecture.

Layer for Node-RED

Node-RED allows flow development of adaptability, net services, UIs, and middleware logic. It serves these objectives in AffectUs:

- As a UI application layer with graphic interfaces, actors may specify product consumption, dependencies, and supply chain features like locations and phases. They also provide API keys for connection to other IoT systems.
- As a plugin to current IoT management systems to broadcast product and notification feeds based on smart sensor scan data.
- The middleware and connection layer enable data source adjustments and adaptations, as well as the implementation of application-specific logic, within a user-friendly software design approach. It utilizes the Semantic service to improve supply chain annotations to incoming data streams and transfer them to the data management blocks for AI processing.

CHAPTER 24

Detection of Cervical Diseases Using CNN Algorithm with Digital Colposcopy Images

L. Kanya Kumari[1,*], Lakshmi Prasad[1], K.Om Sathvik[1], K. Satya Sai Bhuvanesh[1] and **Y. Yaswanth Kalyan[1]**

[1] *Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India*

Abstract: The accuracy of traditional cervical cancer screening methods is low since they rely heavily on the pathologist's subjective experience. Preventing cervical cancer requires regular colposcopy screenings. Over the last half-century, colposcopy has been an important part of the effort to reduce cervical cancer incidence and death rates, in addition to pre-cancer screening and therapy. Unfortunately, visual screening leads to increased effort, which in turn promotes poor diagnostic efficiency and increases the likelihood of misdiagnosis. When it comes to deep learning for medical image processing, the Convolutional Neural Network (CNN) method is better for cervical cancer. The CYENET and VGG19-TL methods represent two deep-learning CNN architectures suggested in this research for detecting cervical cancer utilizing colposcopy pictures. For the research, VGG19 is used as a transfer learning in the CNN structural design. To automatically categorize cervical malignancies using colposcopy pictures, an original method called the Colposcopy Ensemble Network (CYENET) was created. The constructed model is evaluated for its specificity, accuracy, and sensitivity. For classification, VGG19 achieved a score of 74.4%. The findings for VGG19 (TL) are deemed satisfactory. The VGG19 model seems to fall into the intermediate categorization group based on its kappa score. The suggested CYENET demonstrated excellent performance in the experiments, with a sensitivity of 93.5%, a specificity of 97.3%, and a kappa value of 89%. The CYENET method outperforms the VGG19 (TL) model by 10% in terms of classification accuracy, achieving 93.4%.

Keywords: Cervical cancer, CNN architecture, Colposcopy, CYENET, VGG 19.

INTRODUCTION

Medical professionals consider cervical cancer the second most common cause of cancer-related deaths among women, following breast cancer [1]. Unfortunately, the disease is sometimes thought to be incurable, especially in its advanced stages

[*] **Corresponding author L. Kanya Kumari:** Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India; E-mail: kanyabtech@yahoo.com

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[2]. There have been a lot of recent developments in the field of image-based illness identification [3, 4]. Cervical cancer accounts for 8.6% of all female cancer fatalities, ranking it as the fourth most common malignancy worldwide, according to statistics published by the World Health Organization [5, 6]. The early detection of cervical cancer may save lives since the disease is responsible for around 86% of cervical cancer-related fatalities in lower and intermediate-income countries each year. An estimated 6% of females with cervical cancer are associated with HIV, and the risk of cervical cancer is six times greater in positive HIV compared to negative HIV [7]. Screening efficacy is influenced by factors such as equipment access, test uniformity, monitoring, treatment, and identification of discovered lesions [8, 9]. Although scientific and medical advances have been made, this condition remains incurable, especially if identified in a developing stage. Smear PAP and HPV checks are expensive and have poor sensitivity. However, colposcopy is often utilized in poor nations. Colposcopy screening addresses limitations in smear Pap imaging and HPV testing. Early treatment is favored for cervical and extra-cervical cancers, although the absence of symptoms limits early detection 10].

Successful cervical cancer screening programmes may reduce illness and mortality [11]. In countries with low or middle incomes, cervical cancer screening facilities are few due to workforce shortages and inadequate funding for screening programmes [12].

Colposcopy is a common cervical cancer prevention surgery. Classification and Early detection of this type of cancer might help develop patient treatment. Different methods have been employed to extract information from digital colposcopy images. The primary goal of this research is to offer healthcare providers tools for colposcopy examinations, regardless of their expertise. Studies have used computer-aided systems for diagnosis, including quality image improvement, regional splitting up, identifying pictures, unstable region identification, zone transition classification type, and classification of cancer risk. CAD devices enhance cervical colposcopy images, highlighting areas of concern and irregularities. These strategies aid physicians in diagnosis, but they need sufficient experience and competence for accurate diagnosis. Pathological lesions may indicate neoplasms, making colposcopy analysis essential for their detection. Abnormal regions include act white, vascularization, mosaic, and punctures. The majority of literature assessments suggest identifying irregular regions in traditional colposcopy pictures. Typical efforts include zone segmentation, cervix segmentation, act white field division, mosaic area detection, vasculature and puncturing, and classification.

The vision of computers, forecasting, Natural Language Processing (NLP), and battery fitness monitoring are just a few of the many areas where deep learning has produced impressive results. Classification, identification, segmentation, and registration are all aspects of medical image processing that are crucial in the diagnosis of diseases. The bulk of the picture data handled is related to medical imaging, including Magnetic Resonance Imaging (MRI), Computed Tomography (CT), blood smear images, and ultrasound. Traditional medical CAD systems are known to have problems, but deep learning's multi-layered neural network's perception mechanism can understand more abstract picture attributes. Having a large database to support the deep learning methods is crucial, particularly for positive examples. Several methods for resolving this problem have been covered in prior research, including transfer learning and collaborative learning. In a smart city's effective Computer-Aided Diagnostic (CAD) architecture, Convolutional Neural Networks (CNNs) detect MI signals. To identify arrhythmia and increase performance by utilizing numerous tiers, a unique feature extraction procedure is suggested, which is then followed by a genetic algorithm. Here is the paper structure: The second section explores the details of the CYENET architecture in the context of cervical screening. The following section presents an analysis of the implementation results. Finally, Section 4 offers conclusions and discusses the future implications of the study.

METHODS AND MATERIALS

Colposcopy images are very helpful for early cancer diagnosis. Using the results of a Transition Zone colposcopic examination (TZ), doctors may determine if patients with irregular cytology need further treatment or screening. Another crucial component of this research is the TZ's title. It has been found that there is a fair amount of intra- and interobserver variability in how different people perceive different properties during colposcopy. However, there is much less research on how different people evaluate the visibility of TZ forms and Squamous Column Junctions (SCJs), and how to quantitatively calculate the similarities and intra-observer variability in TZ contour tracing. Due to the absence of any endocervical part, a TZ has been classified as type 1. The endocervical space remains a transitional zone between Types 2 and 3. Once the latest SCJ became completely apparent in TZ, it was categorized as category 2. Type 3 new SCJs were not completely apparent even when utilizing external equipment. Although not conclusive, it is useful for evaluating patients undergoing pathological cytology. The same colposcopy or different colposcopies might provide different results. The level of competence and experience of the treating physician is the most significant limitation of colposcopy as a diagnostic tool. The accuracy and sensitivity of colposcopy in diagnosing invasive and preinvasive cervical lesions were shown to be poor in several investigations. The Hyperspectral Image (HSI)

CHAPTER 25

Determining Lung Cancer Using Convolutional Neural Networks

Md. Imran[1,*], R. Deepika[1], E. Pradeepthi[1], K. Sahithi[1] and **Kuchikar Aneeque Ahmed[1]**

[1] *Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India*

Abstract: This study investigates the effectiveness of Convolutional Neural Network (CNN) architectures in lung cancer classification. By applying deep learning techniques, it evaluates various CNN models for the accurate identification of pleural cancer using medical imaging representations of healthy tissue. Through extensive experimentation and confirmation, the effectiveness of CNNs in accurately diagnosing pleural cancer and revealing their potential as healthy textures for medical image recognition in oncology is demonstrated. Today, lung cancer remains the leading cause of cancer-related deaths globally. As urbanization and industrialization advance, air pollution continues to rise, contributing significantly to the disease's prevalence. Early detection is crucial, as treatment for lung cancer is far more effective in its initial stages. However, early lung cancer stages generally lack symptoms and are difficult to detect. This work classified lung nodules using SPIE AAPM-Lung CT imaging data. Deep Learning (DL) has been a prominent categorization method in recent years. DL methods, such as Transfer Learning (TL), reduce training costs and enable deep learning with less data. Researchers are experimenting with deep learning approaches to enhance the efficiency of CAD in lung cancer screening using computed tomography. Neural network models, including AlexNet, ResNet18, GoogleNet, and ResNet50, are used in this research for training purposes. The networks are employed for training and categorising CT images. By utilizing Convolutional Neural Networks (CNNs) and Transfer Learning (TL), we can achieve accurate and efficient detection of lung cancer on CT images. The method used to test the model includes the confusion matrix, recall, accuracy, specificity, and F1-score.

Keywords: CAD, Convolutional neural network, Deep learning, Transfer learning.

[*] **Corresponding author Md. Imran:** Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India; E-mail: imran02.md@gmail.com

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INTRODUCTION

Image recognition and deep learning have made significant progress in recent years, particularly with the development of convolutional neural networks [1]. Initially, it outperformed standard machine learning algorithms and won the ImageNet large-scale picture identification competition, drastically decreasing error rates [2]. Unfortunately, deep learning algorithms are mostly used in natural picture identification and have limited applicability in medical image diagnostics [3, 4]. Deep learning technology may enhance the diagnosis of lung cancer using CT imaging. By reducing diagnostic time for doctors and improving hospital efficiency, early diagnosis and treatment may address medical resource shortages, ultimately saving lives [5, 6]. Deep learning can be applied to medical image identification in two ways: by utilizing medical images or by developing models of convolutional neural networks from scratch. Second, transfer learning extracts features using a convolutional neural network that has been trained with the model and weight parameters [7, 8]. This work suggests and performs trials on a transfer learning technique for the diagnosis of lung cancer using CT images. Experiments confirm that the transfer learning strategy yields happy outcomes [9, 10]. By learning, the model picks accurate characteristics from training data to make proper conclusions when testing fresh data. Therefore, deep learning is vital for medical image processing. Deep learning has advanced significantly in recent years, driven by increased processing power, enhanced data availability, and the development of improved models and algorithms. Numerous convolutional Neural Network topologies have emerged to address previous issues [11]. The suggested CNN architectures in this study are AlexNet, ResNet-18, GoogleNet, and ResNet-50.

METHODOLOGY

Dataset

Lung cancer diagnosis involves the use of clinical databases. The LIDC-IDR dataset is the most widely used dataset for this purpose. The dataset includes screening and CT scans. Additionally, it organizes contests to enhance the accuracy of categorization. The SPIE-AAPM Lung Challenge dataset, supported by the American Academy of Physicists in Medicine (AAPM) and the National Cancer Institute (NCI), is a subset of the medical imaging session at SPIE. To accurately detect benign or malignant pulmonary nodules, a standard dataset is suggested for testing competition. Using the SPIE-AAPM dataset in this study. The collection contains 70 patient CTs. Ten of these examples were utilized for training, while the rest 60 were tested. In this case, the augmentation approach

was employed to create hundreds of CT images from a limited dataset. Fig. (**1**) provides dataset examples.

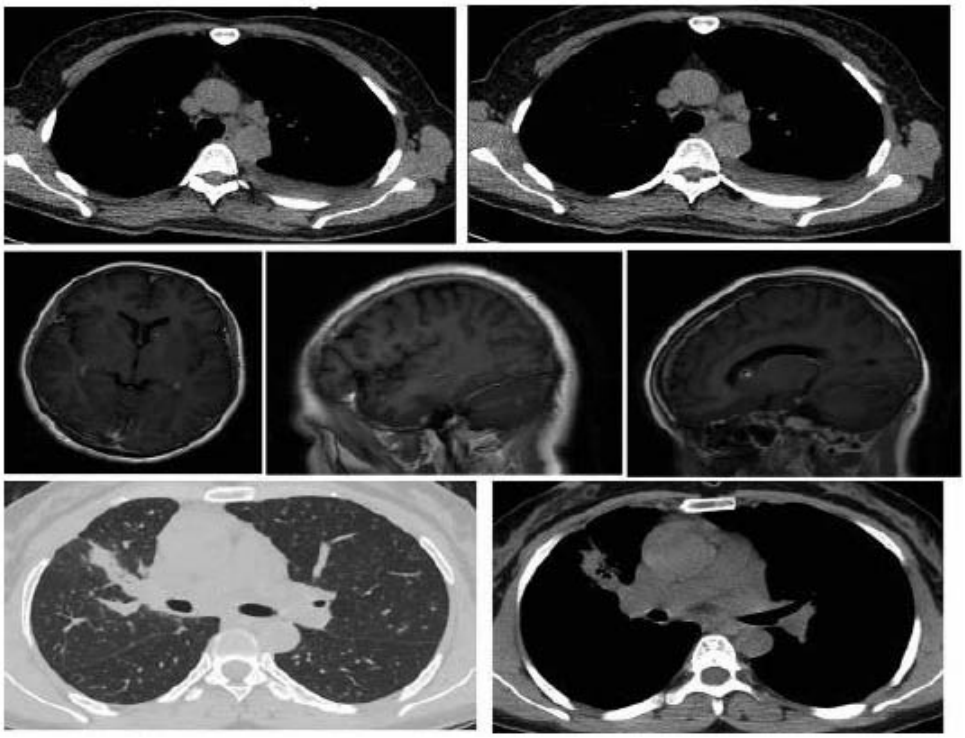

Fig. (1). Cases of lung cancer and healthy controls.

CNN/Transfer Learning Architectures

Transfer learning is a popular approach in computer vision due to its ability to create accurate models in less time. Starting with transfer learning is wrong. Consider starting from a learnt model for addressing issues instead of starting from scratch. This enables us to build upon past learning outcomes instead of starting from scratch. The current study uses deep CNNs. They provide innovative solutions to aid with categorization issues. Limited training data is a common problem for deep CNN models, which require a substantial amount of data for optimal performance. However, collecting a large dataset is a time-consuming and ongoing process. The transfer learning technique is often used to address inadequate data collecting. Transfer learning involves training CNN models on large datasets and fine-tuning them for a smaller dataset. Transfer learning involves modifying a pre-trained system, such as AlexNet, ResNet18, GoogleNet, and ResNet50, to adapt to new applications by refining the network design. See

CHAPTER 26

Utilizing Deep Neural Networks for Image Noise Reduction

KVJ. Bhargav[1,*], Thanapal Pandi[2], Janardhana Rao[3], P. Narendra[4], Y. Kalyana Krishna[5] and **Boppudi Lingarao[6]**

[1] *Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[2] *School of Computer Science and Engineering and Information Systems, Vellore Institute of Technology, Vellore 632007, Tamil Nadu, India*

[3] *Department of MBA, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[4] *Department of EEE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[5] *Department of ME, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

[6] *Department of S&H, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India*

Abstract: Image denoising is an area where deep learning algorithms have shown promise, but researchers have also identified significant differences between various methods. Discriminative learning, particularly effective against Gaussian noise, and deep learning-based optimization enable real-world noise estimation. However, the diversity of methods has hindered research comparing deep learning in image denoising. By classifying photos into four categories based on the type of Convolutional Neural Network (CNN) used, this research evaluates several deep image-denoising algorithms. The CNNs in question include those trained on incremental white noise, real noise, blind wavelet transform, and composite noisy images. It compares state-of-the-art methods by analyzing common aims and principles and by doing quantitative and qualitative evaluations on denoised datasets that are publically accessible. The study concludes by outlining the obstacles identified and providing recommendations for future research.

Keywords: CNN, Deep learning, Image denoising, MATLAB software.

[*] **Corresponding author KVJ. Bhargav:** Department of ECE, QIS College of Engineering & Technology, Ongole 523272, Andhra Pradesh, India; E-mail: bhargav.k@qiscet.edu.in

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INTRODUCTION

Image use has increased in recent years, yet noise often infiltrates photos during capture, compression, and transmission [1]. Noise, which distorts images, is caused by a variety of factors, including transmission irregularities, environmental factors, and others [2]. Unpredictable signal strength makes it difficult to extract colours and brightness from captured images. Its presence could impede image analysis, video synthesis, and segmentation [3]. Denoising images is crucial for understanding image processing [4].

Noise interference during the recording, processing, and transmission of images has grown in tandem with the proliferation of image use [5]. Environmental factors and the intricacy of transmission mechanisms skew visual data. Signal oscillations produce picture noise, which hinders the ability to extract colours and brightness from visual input [6]. More than only eyesight is affected by noise invasion [7]. Diagnoses are thrown off, and picture analysis becomes a nightmare due to noise interference [8]. Video segmentation and synthesis are crucial to analysis, but noise may hinder them. Essential picture denoising is a result of the disruptive effects it has on these processes [9].

Picture denoising reduces noise, improving image processing. Specific algorithms and methodologies remove noise to restore image fidelity in denoising. These approaches maintain visual elements and minimize noise. Their goal is to reduce noise and increase visual data quality. Denoising images is fundamental to app-wide image processing. Image-based medical diagnosis and industrial operations need noise reduction. Denoising enhances visuals and analysis across disciplines [10].

As companies and sectors seek high-quality visual data, image denoising methods become increasingly important. These denoising algorithms must evolve and be refined to combat noise and improve image processing. Picture denoising enhances image processing understanding and is crucial for accurate, dependable, and relevant visual data analysis 11].

Due to the improvement in low-light digital image capturing, image-denoising methods have become crucial to computer-aided studies. This situation makes the extraction of clean data from noisy images crucial. Denoising methods can enhance picture details while also removing noise. Distinguishing between noise and edges, as well as textures, during picture denoising is challenging for their high-frequency components [12].

Discussions about the various forms of visual noise frequently occur within the academic community. For example, AWGN, impulse, quantization, Poisson, and

speckle noise all fall within this category. Analogue circuitry is the source of AWGN, while manufacturing flaws, intrinsic data mistakes, inadequate photon levels, and speckle/impulse/Poisson noise are the usual culprits.

Picture denoising techniques are essential in computer-aided analysis due to the growing use of digital imagery, particularly in low-light conditions. Visual data analysis precision depends on extracting correct and unaltered data from noisy pictures. Denoising enhances and refines picture information for thorough analysis and interpretation, beyond noise reduction.

The intricacy of picture denoising resides in both removing noise and distinguishing it from crucial components like edges and textures. To identify these elements, advanced algorithms and methods are needed due to their common high-frequency components.

Many forms of picture cacophony have been well-discussed in academic literature. One common, somewhat cacophony that may be encountered while achieving and transmitting concepts is AWGN, which is created from analogue circuits. However, skills are a variety of determinants that enable the production of impulsive sound, dotted sound, Poisson sound, and quantization sound. These contain manufacturing mistakes, dossier errors, and photon-level shortfalls, among other issues. Denoising algorithms face singular obstacles in each of these beginnings of a crash, calling for distinguished methods to reduce their influence on picture integrity and value. Essentially, countenance-denoising algorithms are an essential part of the computational study because they improve the quality and stability of representation. Denoising methods must be developed and refined as digital metaphors become increasingly prevalent in various areas and disciplines. In addition to reconstructing the optical content, the ability to extract a clean dossier from noisy pictures ensures the authenticity and effectiveness of studies conducted in various contexts. The development of photo-denoising methods is crucial to achieving improvement. In healthcare and modern decision-making, accurate and up-to-date imaging is crucial. The honour and stability of visual dossier study in a digital and representation-compelled atmosphere depend on learning picture-denoising algorithms. Image denoising is being used in medical, military, law enforcement, farming, transportation, and similar applications. In biological depiction and interpretation, denoising plans are essential. These methods are essential for removing dot, Rician, and nanoscale healing noise in demonstrative images. Reducing noise artifacts helps improve the quality of interpreters and imaging results. Remote belief requests utilize denoising algorithms to reduce certain forms of noise. The “Salt and pepper” commotion—isolated dark and bright pixels—challenges detached belief in photography. Effective denoising methods are needed to maintain remote sensing

CHAPTER 27

Detecting Malicious URLs Using Machine Learning

Md. Imran[1,*], Uppada Bhaskar[1], Kodavalla Jeevan Krishna[1], Mulugu Prudhvi Sriram[1] and **Mohammad Shukur[1]**

[1] *Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India*

Abstract: In recent years, one of the major risks has been web-based attacks. Criminals posing a threat often trick consumers into visiting malicious websites to conduct attacks. To identify harmful URLs, various methods have been implemented, including blacklisting. Along with these untrustworthy methods arose the tedious task of keeping a database of blacklist URLs up to date. In recent years, there has been an exploration into using machine learning algorithms to identify dangerous URLs. To train a prediction model, this technique examines several aspects of URLs and utilizes a dataset comprising both normal and malicious URLs. To reliably identify harmful URLs, this study proposes a MUD (Malicious URL Detection) model that utilizes three supervised machine learning classifiers: logistic regression, support vector machine, and one additional classifier. Preliminary findings show that the algorithm exceeded the comparison group.

Keywords: Algorithm, Harmful URL, Machine learning, Malicious URL logistic regression.

INTRODUCTION

Research suggests that nearly half of the world's population is online [1]. People using computers at home are susceptible to external harm and danger due to a lack of education and protection [2]. These individuals struggle to distinguish between legitimate and dangerous websites due to their similar content [3]. Threat actors use their creativity to generate hazardous online content and lure customers into accessing these URLs. Raising user awareness and identifying dangerous URLs may help prevent malicious website attacks [4]. Researchers have proposed many methods for identifying rogue URLs. Machine learning algorithms are effective in

[*] **Corresponding author Md. Imran:** Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India; E-mail: imran02.md@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

detecting bogus URLs. The efficacy of algorithms based on machine learning in detecting dangerous URLs has been studied [5].

The MUD (Malicious URL Detection) model outlines the steps to identify malicious URLs and compares the performance of three distinct machine learning methods [6]. It tests several algorithms and builds a prototype that may identify harmful URLs by looking for specific characteristics associated with such URLs [7]. Due to their inability to identify newly dangerous URLs, earlier attempts to detect harmful URLs *via* blacklisting or algorithms were found to be unreliable [8 - 10].

The following is an outline of the article's structure: The suggested Malicious URL Detection (MUD) model is defined in depth in Section 2 [11]. In Section 3, the outcomes of the experiments are presented, showing how various classifiers performed. In Section 4, the paper presents its main points and provides suggestions for further studies in this field [12].

METHODOLOGY

Suggested Malicious URL Detection (MUD) System

Created based on the characteristics of known malicious URLs, the suggested model utilizes machine learning to identify new malicious URLs. A total of fifteen characteristics are chosen for each given URL and then classified as lexical, host-based, or content-based. For this project, the classifiers were trained on the dataset and then utilized to determine whether a URL is dangerous or not. The following procedures were followed to construct and train the suggested MUD system (Fig. **1**) to identify harmful URLs: (a) information collection; (b) information preparation; (c) categorization; (d) testing and training; and (e) assessment.

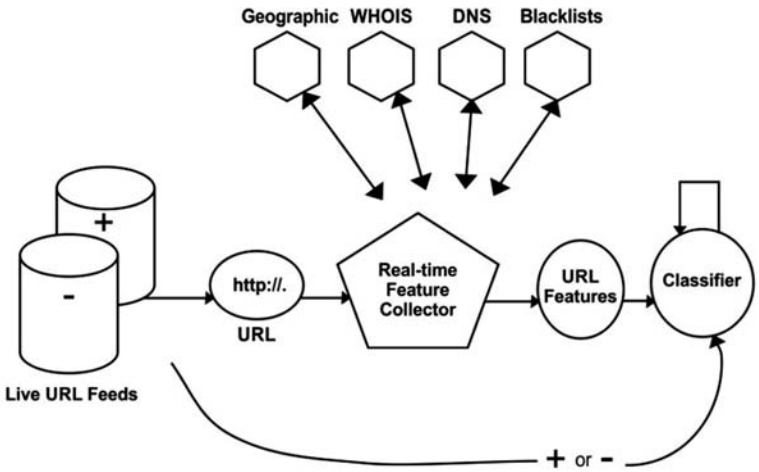

Fig. (1). The MUD model categorizes URLs.

Data Gathering

Before beginning to work with URLs, it is important to have a thorough understanding of what an internet address is and how it is generated (Fig. **2**). A Universal Resource Locator (URL) is the web address displayed in a web browser's address bar. URLs often include a protocol. HTTP, which makes it smooth to guide along route, often over water websites, HTTPS, which provides a supplementary coating of freedom to HTTP, File Transfer Protocol, which permits the transmission of the data betwixt calculations and admits for the giving of files, and Domain Name System (DNS), which is administrative of registering rule names, are few of ultimate conspicuous obligations that are used contemporary. Malicious cyberattacks often target URLs that have been hacked. To start the process of gathering URLs, you need to first survey websites that hold links to both injurious and good URLs.

Fig. (2). URL Mechanisms.

CHAPTER 28

Deep Facial Depth Map Learning for Obstructive Sleep Apnea Prediction

G. Durvasi[1,*], D. Joseph Reethika[1], T. Nikitha[1], B. Sravani[1] and **K. Gideon[1]**

[1] Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India

Abstract: The condition known as Obstructive Sleep Apnea (OSA) occurs when the airway becomes frequently blocked during sleep due to the relaxation of the airway muscles and tongue. Snoring, disturbed sleep (from choking or gasping for breath), and lack of energy upon awakening are common symptoms of Obstructive Sleep Apnea (OSA). Diagnosing OSA is time-consuming and expensive. Many people go undiagnosed or misdiagnosed for this reason. The correlation between OSA and face shape has been shown in earlier studies. Using a depth map of scanned faces, this study explored the potential of deep learning for medical diagnosis. Deep maps provide a wealth of additional information on face morphology when contrasted with the more simplistic 2-D colour picture. They can obtain around 69% validation accuracy by using transfer learning, even when working with a small sample size. They are making predictions for people who have either above moderate OSA (>16) or below moderate OSA (≤ 16). In conclusion, the results of the simulations showed that the suggested VGG 19 outperformed the current method.

Keywords: Deep learning, Disturbed sleep, Face morphology, Obstructive sleep apnea, VGG 19.

INTRODUCTION

Lack of sleep has a major impact on personal and social activity [1]. There are several forms of sleep problems, and each one has its own unique cost [2]. OSA is the leading cause of all sleep disorders. When humans sleep, the muscles that line the throat relax just enough to keep the airway open [3 - 5]. However, with OSA, the airway may get repeatedly blocked for various reasons; each blockage lasts longer than 10 seconds; this deprives the lungs of oxygen, prompts the individual to wake up, and eventually restores the airway. It is possible to diagnose OSA if

[*] **Corresponding author G. Durvasi:** Department of IT, Andhra Loyola Institute of Engineering and Technology, Vijayawada 520008, Andhra Pradesh, India; E-mail: Kiran.durvasi@gmail.com

D. Arul Pon Daniel, T. Rajasanthosh Kumar & Satya Prakash Yadav (Eds.)

there are more than 16 apneas [6, 7]. To diagnose OSA, diagnostic imaging, a Polysomnography (PSG) test, a physical examination, and a patient history are used. As far as diagnostic tests go, the PSG test is crucial. This kind of sleep therapy requires the patient to remain in a hospital bed while sensors monitor their vitals, including their breathing, heart rate, and movement [8]. While there are technologies that may assist patients in completing these tests at home, their accuracy and reliability are still debated compared to PSG. The evaluation is completed by calculating the Apnea-Hypopnea Index (AHI). Sleep apnea is classified according to its severity using these criteria [9]. Many people with Obstructive Sleep Apnea (OSA) get misdiagnosed until they have serious symptoms because of the time and money needed to do the PSG, the intrusiveness of the procedure, the generalizability of OSA symptoms, and the scarcity of sleep clinics. In the past, there have been several efforts to use questionnaires as a predictor of OSA [10]. Some risk assessments utilize indicators such as snoring, fatigue, body mass index, and Blood Pressure (BP) to make predictions, while others, like the Epworth Sleepiness Scale, measure drowsiness in various contexts throughout the day [11, 12]. They have limitations in correctly identifying afflicted persons when administered self-administered and are expensive [13, 14].

METHODOLOGY AND DATASET

Genesis Sleep Care patients who attend for various sleep disorders and who participate in home or laboratory sleep tests have their sleep data and 3D images taken. The ECU Human Research Ethics Committee granted permission for the research, and to date, forty men and thirty-one women have participated.

Data Sets

Two categories, like “Abnormal and normal,” are present in the dataset. Both the normal and abnormal categories include 111 photos, with the former offering 100. Genesis Sleep Care patients who visit for various sleep disorders and who undergo in-home or in-lab sleep testing provided the information and 3D scans used in this study. So far, the project, which has received approval from the ECU Researchers Ethics Committee, has included a total of forty male and thirty-one female participants. Fig. (**1**) shows an outline of the stages in all of the processes. Artec Eva takes the 3D scans with the help of Artec Studio. The changes in posture and added artefacts are the result of these scans being captured by separate groups at different locations. Examples of 3D raw photos from the dataset as depicted in Fig. (**2**).

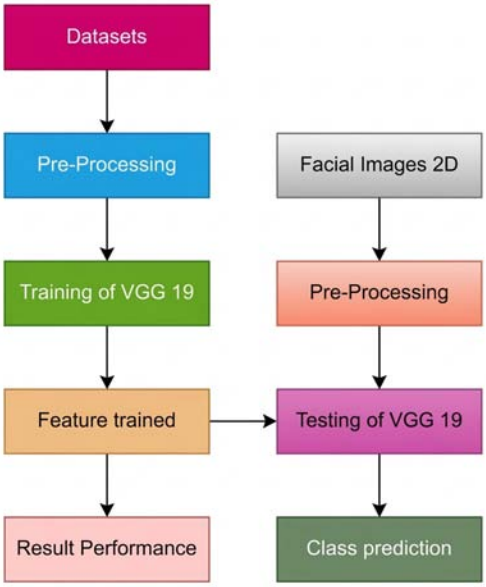

Fig. (1). Outline of the Stages (Process).

Fig. (2). Examples of 3D raw photos from the dataset.

Reducing these undesired differences is the objective while transforming these 3D images into frontal 2D depth maps. Every one of the 3D scans had its flaws fixed using Artec Studio. Sample raw and pre-processed pictures from Fig. (**2**) as demonstrated in Fig. (**3**).

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D. Arul Pon Daniel

D. Arul Pon Daniel is a Deputy Principal and Assistant Professor of Computer Science (AI & Data Science) at Jayarani Arts & Science College for Women, Salem, Tamil Nadu, India. He earned his PhD in Computer Science from Periyar University in 2018 and has received notable honors, including the Elsevier Outstanding Reviewer Award (2017) and the Institute of Scholars' Research Excellence Award (2020). A prolific academic, he has authored eight books, published in 25 journals, and holds a patent. He has served as a book series editor, contributed extensively to international editorial and review boards, and delivered numerous faculty development webinars and workshops. His research interests include data science, data preparation, feature engineering, pattern recognition, data visualization, blockchain, IoT, and breathomics.

T. Rajasanthosh Kumar

T. Rajasanthosh Kumar is a technology-driven professional focused on transforming traditional mechanical industries into smart, innovative systems. He has authored over 35 research publications, holds 25 granted national and international patents, and has contributed to two textbooks, reflecting a strong commitment to applied innovation and knowledge dissemination. His expertise lies in smart industry transformation, process optimization, intelligent system design, and integration of advanced technologies. With a prolific research and intellectual property portfolio, he consistently translates ideas into practical, scalable solutions and continues to drive technological advancement across both traditional and emerging industrial domains.

Satya Prakash Yadav

Dr. Satya Prakash Yadav (FIETE, SMIEEE) is an Associate Professor of Computer Science and Engineering at Madan Mohan Malaviya University of Technology, Gorakhpur, with over 18 years of academic and research experience. He holds a PhD from Dr. A.P.J. Abdul Kalam Technical University and completed postdoctoral research in Brazil. A prolific scholar, he has authored four books, published extensively in Web of Science–indexed journals, and holds six patents. His expertise spans image processing, information retrieval, and feature extraction, alongside contributions to industrial projects in SAP, railway traffic management, and metro rail systems. He also serves in senior editorial roles with leading international publishers, including CRC Press, Taylor & Francis, Elsevier, De Gruyter, Bentham Science, Tech Science Press, and MAT Journals.