B.M.S. COLLEGE OF ENGINEERING

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

Department of Information Science and Engineering

ISE NEWS-BITES

A newsletter from ISE Student Club - A techno-cultural Club under the aegis of ISE Department

Annual Edition 2021 Issue 1

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Mr. Gururaja H.S.
Assistant Professor

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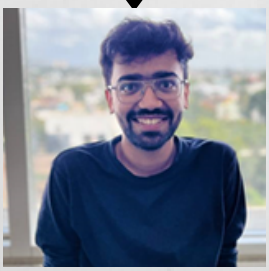

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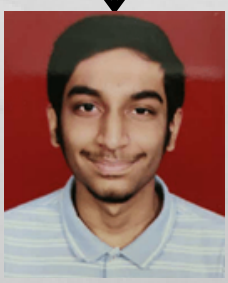

Mohit Jain
IBM21IS095

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Sri B. M. Sreenivasaiah
Founder,
BMS Educational Trust

Sri B. S. Narayan
Donor Trustee,
BMS Educational Trust

INSTITUTE VISION

Promoting Prosperity of mankind by augmenting Human Resource Capital through Quality Technical Education & Training**.**

INSTITUTE MISSION

Accomplish Excellence in the field of Technical Education through Education, Research and Service needs of society.

DEPARTMENT VISION

Promote Quality Human Resource Capital by inculcating in every student the art of Creativity and Productivity in the field of Information Technology.

DEPARTMENT MISSION

Offer High Quality Graduate, Post Graduate Programme in Information Technology to prepare students for higher studies and professional career in industry.

Provide good Teaching and Research environment for Quality Education in the field of Information Technology.

UNDER GRADUATE PROGRAMME
INFORMATION SCIENCE & ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Excel as IT Professional with Proficiency in designing solutions to Information Engineering problems.

PEO2: Pursue higher studies with the sound knowledge of basic concepts and skills in science and IT disciplines.

PEO3: Exhibit professionalism, team work and expose to current trends towards continuous learning.

PROGRAMME OUTCOMES (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Apply and Analyze the concepts of Computer Networks to provide solution for evolving needs in Information Technology

PSO2: Demonstrate knowledge of Software Engineering with competence in programming languages to solve real-world problems.

PSO3: Apply principles of information systems in the field of engineering for proficient solutions

POST GRADUATE PROGRAMME
COMPUTER NETWORK ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Excel in their Professional career in computer network engineering and allied disciplines

PEO2: Achieve Proficiency in Industry to Academia and Research for Development

PEO3: Exhibit professionalism, team work and adapt to the latest technologies through continuous learning

PROGRAMME OUTCOMES (POs)

PO1: An ability to independently carry out research / investigation and development work to solve practical problems

P1A1: Activity-I: Conducting experiments to investigate/validate / analyze the identified research (paper/Thesis);

P1A2: Activity-II**:** Apply research methodologies / techniques / modern tools to provide practical solution to benefit an identified community

P1A3: Activity-III**:** Engage in critical analysis to arrive at a valid conclusion through research (theoretical/practical/ policy) to provide an alternate/optimal solution to an identified problem;

P1A4: Activity-IV**:** Ability to independently carry out study and present results (expected or otherwise) for a defined problem

PO2: **An ability to write and present a substantial technical report / document**

P2A1: Activity-I**:** Engage in independent study to prepare a technical document/make an oral presentation to address engineering concepts

P2A2: Activity-II**:** Engage in independent study to prepare a Poster presentation of the identified work/task;

P2A3: Activity-III**:** Prepare a technical document for the identified product / system;

PO3: **An ability to demonstrate mastery in the domain of the specialization of the program**

P3A1: Activity-I**:** Ability to demonstrate In-depth knowledge/Scholarship of knowledge in the identified domain;

P3A2: Activity-II**:** To demonstrate scholarship of knowledge through performing in a group to identify, formulate and solve a problem that requires multiple skills

P3A3: Activity-III**:** To demonstrate scholarship of knowledge to arrive at a mathematical model to effectively represent the given system/device

P3A4: Activity-IV**:** To demonstrate scholarship of knowledge through developing applications /conducting experiments / performing mathematical analysis / simulation study to arrive at the solution for the domain specific problems

P3A5: Activity-V**:** Nurture analytical and critical thinking abilities for data /requirements-based decision making

P3A6: Activity-VI**:** Comprehend management theories and practices to arrive at a business model for an engineering solution

Moments from around the Department

January 2, 2021:

Dr. M. Dakshayini, Professor and Head, Department of Information Science & Engineering along with Under-Graduate students Mr.N.S. Akhilesh, Mr.M.N. Aniruddha and Mr. Ghosh Anirban published paper titled "Government Document Approval and Management Using Blockchain" as a chapter in Springer Lecture Notes on Data Engineering and Communications Technologies book series (LNDECT), volume 56, pp 387-40, SCOPUS Indexed.

January 4, 2021:

Meeting of the College Council was convened to discuss regarding conduction of SEE for 3rd semester students and starting of classes offline.

January 9, 2021:

Sri. H.S. Gururaja, Faculty, Department of Information Science & Engineering was invited to deliver a Web Seminar on "Use of AI/ML in Cyber Security" by E&ICT Academy, NIT Warangal.

January 27, 2021:

Departments of Information Science & Engineering and Computer Science & Engineering organized Hands-on Faculty Development Programme (online) on "Blockchain& Decentralized Application Development" from January 27- February 2, 2021 under TEQIP-III.

February 4, 2021:

Department of Information Science & Engineering organized Three Day e-Workshop on "Fundamental Principles of Quantum Computing" on February 4th, 11th & 18th, 2021 under TEQIP-III. Resource persons were IBM Quantum Ambassador Team.

February 10, 2021:

Dr. B. R. Shambhavi, Faculty, Department of Information Science & Engineering was invited to deliver a Webinar on "Learn to Code-Get skilled to get hired" by Christ College of Science & Management, Bengaluru.

February 28, 2021:

Department of Information Science & Engineering organized Student Training on Future Skill technologies (online) under TEQIP-III and offered 60 hours duration course on "Data Science and Data Analytics" from February 1-24, 2021.

March 6, 2021:

Dr. M Dakshayini, Professor & Head and Smt. R. Rashmi, Faculty, Department of Information Science & Engineering published research paper titled "Hierarchical cooperative-peers fog caching strategy to improve the performance of content centric networking" in the International Journal "Multimedia Tools and Applications", SCOPUS and WoSSCIE Indexed Q2 Journal, IF 2.313, ISSN/eISSN 1380-7501 / 1573-7721, DOI: 10.1007/s11042-021-10733-2

March 8, 2021:

International Women's Day was celebrated in the College.

March 8, 2021:

Dr. M. Dakshayini, Professor & Head, Department of Information Science & Engineering was invited to deliver sessions on "Formation of various Committees" and "Various activities to be performed" in connection with Accreditation for PG Programmes by Bangalore Institute of Technology, Bengaluru.

March 10, 2021:

Hon'ble Vice Chancellor, Visvesvaraya Technological University, Belagavi addressed on Affiliation Process 2021-22.

March 10, 2021:

Dr. P. Jayarekha, Professor, Department of Information Science & Engineering was invited to deliver a session on “CO-PO Mapping” by MVJIT, Bengaluru.

March 13, 2021:

Department of Information Science & Engineering organized workshop on “Various activities that could be taken by our students” for the students of 6th semester. Resource person was from Discussion Class Association an NGO Bangalore.

March 18, 2021:

Department of Information Science & Engineering conducted Basic Programming Skills to non IT students for placements activities.

March 20, 2021:

Dr. B. R. Shambhavi, Faculty, Department of Information Science & and Engineering was invited to deliver a session on “Language Modelling” in the Four Day Workshop on Natural Language Processing for Beginners by Vidyavardhaka Institute of Technology, Mysuru.

March 27, 2021:

NINAAD - The Indian Music Club of BMSCE conducted auditions to induce new members to the club. Out of 40 participants, 24 enthusiastic and talented musicians were selected to the Club.

April 2, 2021:

Department of Information Science & Engineering organized 2nd hands-on e-Technical session on "Building an API using Postman" for Under-Graduate and Post-Graduate students. Resource persons were Mr. Sharath Iyengar, Team Head, Special Initiatives and Mr. Ali Mustafa India from Postman.com.

April 10, 2021:

Department of Information Science & Engineering organized Pre Thesis-submission colloquium of Research Scholars Mr.P. Suresh and Mrs.M.K.Nalini under the guidance of Dr. Radhika K R, Faculty of the Department.

April 29, 2021:

Department of Information Science & Engineering organized a lecture on "Context Free Grammar". The lecture was delivered by Prof. Anitha Sandeep, Assistant Professor, Department of CSE, RVCE, Bengaluru.

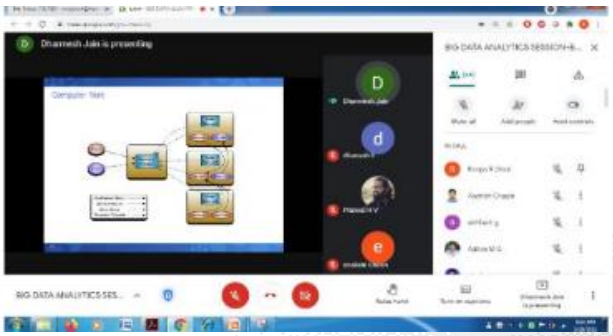
May 18, 2021:

Department of Information Science & Engineering organized an open seminar in respect of research scholar Ms. Lakshmishree on her research work under the guidance of Dr. Ashok Kumar, Faculty of the Department.

May 22, 2021:

Department of Information Science & Engineering organized an e-session on "Building APIs using the tool postman".

Resource persons were Mr. Sharth Iyengar and Mr. Ali Mustafa, Head of Special initiatives, India, Postman.com and free Certification was also provided by postman.com team to all the students of 6th semester.

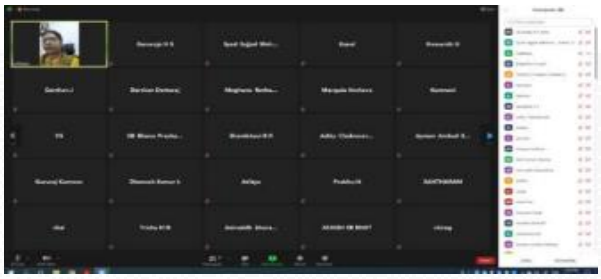


May 28, 2021:

Department of Information Science & Engineering organized an e-session on "Big Data Analytics" for the students of 6th & 8th semester. Resource person was Mr. Dharmesh Jain, IBM SME.

May 28, 2021:

Student Club of the Department of Information Science & Engineering organized an online talk on "COVID-19: What to do? What not to do?" The talk was delivered by Dr. S. M. Sadhana, CAO, BMS Hospital.



June 5, 2021:

IEEE-BMSCE organized 24-hour cryptic hunt (online) for the students from June 5-6, 2021.

June 11, 2021:

Dr. B. R. Shambhavi, Faculty, Department of Information Science & Engineering was invited to Chair a Session in the 3rd National Conference RTCSIT 2021 by Sri Krishna Institute of Technology, Bengaluru.

June 11, 2021:

IEEE-BMSCE in collaboration with CyberMotion Technologies Pvt. Ltd organized a tutorial on mastering the skills of automation using Proteus Design Suite. Resource person was Mr. Anand Jambolkar, Managing Director, CyberMotion Technologies, Hyderabad.

June 19, 2021:

BMSCE IEEE PES Students Chapter organized a Webinar on "ML with Python". Resource person was Mr. Mudassir Zain, General Manager, Skill vertex.

June 19, 2021:

IEEE-BMSCE organized a webinar on "How to select the correct sensor for real-world application?". Resource person was Mr. Ravi Shiroor, Co-founder, Stellapps Technologies.

June 22, 2021:

Dr. R. Ashok Kumar, Faculty, Department of Information Science & Engineering was invited as Chairperson and power judge for the Toycathon-021 Grand Finale by Ministry of Education's Innovation Cell and AICTE.

June 23, 2021:

Dr. P. Jayarekha, Professor, Department of Information Science & Engineering along with post-Graduate student Ms. Renuka B Ayyajjanavar published paper titled "Traffic sign recognition using SVM and convolutional neural network", 1st Edition, Smart Computing in the Proceedings of the 1st International Conference on Smart. Machine Intelligence and Real-Time Computing (SmartCom 2020), 26-27 June 2020.

June 26, 2021:

BMSCE IEEE PES Students Chapter organized Sudocode - Coding Competition from June 26-27, 2021.

June 30, 2021:

Smt. Preetha, Faculty, Department of Information Science & Engineering along with Ms. Nischala Prasad, Ms. Kushagra Galundia and Mr. Daksh Gupta, students of 8th semester published paper titled "A Complete Perspective on Speech Recognition" in IJSER, Volume 12, Issue 6, June 2021 Edition.

June 30, 2021:

Ms. P. Lalasa and Mr. R. Pradeepa, students of 8th semester, Information Science & Engineering published paper titled "A Comprehensive Overview on Cybersecurity: Threats and Attacks" in the International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-10 Issue-8, June 2021.

June 30, 2021:

Smt. Preetha, Faculty, Department of Information Science & Engineering along with Mr. Arvindh S Kumar, Ms. B. N. Nishitha and Mr. S. Guru Darshan, students of 8th semester published paper titled "Secure NFT Framework for Media Tokens Using Steganography" in the International Journal of Scientific & Engineering Research.

June 30, 2021:

Smt. V. Nalina, Faculty, Department of Information Science & Engineering along with Ms. H. Anarghya, Ms. Lalithasree R Hegde, Mr. M. L. Pannaga Sharma students of 8th semester published paper titled "Face Mask Detection using MobileNetv2" in the Wutan Huatan Jisuan Jishu journal, Volume XVII, issue VI,June 2021.

Students' participation in IEEE Events

January 9, 2021: Annual General Meeting for the year 2021

The Annual General Meeting for the year 2021 was held on 9th January. The immediate Execom members presented the activity and financial reports for the year 2019-2020. The new Execom was introduced in this meeting and there was a transfer of responsibilities. The newly appointed execom shared their vision and laid out a road map for the new term.

January 15, 2021: 30-hour Ideathon on "Awareness Regarding Digitization"

BMSCE IEEE in collaboration with the NSS unit of BMSCE, conducted a 30 hour Ideathon on "Awareness Regarding Digitization". The teams worked together to come up with solutions to spread digital awareness in our country.

January 19, 2021: Webinar on EFFECTIVE DECISION MAKING

A webinar was conducted by BMSCE IEEE on "Effective Decision Making". The speaker of this webinar, Mr. Subash Hegde discussed the day-to -day challenges that one faces in decision making. With the help of flowcharts, he gave the students handy tips on how to make better choices and decisions.

January 23, 2021: Talk on "How to use freshman year effectively?"

BMSCE IEEE organized a talk on "How to use freshman year effectively?". The event was led by Mr. N.V Sreekanth, Assistant Professor in the Mechanical Engineering Department of BMSCE. The speaker addressed all the problems faced by students in their first year. He gave the students some useful pointers on how to balance academics and co-curriculars.

February 10, 2021: ROLE OF URBAN MOBILITY MANAGEMNET IN ROAD SAFETY

BMSCE IEEE hosted a series of events on international women's day. The events included an in-campus walkathon and painting competition among many others. The local authorities also spread awareness about the importance of women's safety.

March 8,2021: BMSCE IEEE WIE WOMEN'S DAY ACTIVITIES

BMSCE IEEE hosted a series of events on international women's day. The events included an in-campus walkathon and painting competition among many others. The local authorities also spread awareness about the importance of women's safety.

March 12, 2021: IOT WORKSHOP

BMSCE IEEE in collaboration with Ed Gate Technologies organized a two-day IoT workshop. The workshop covered fundamentals of microcontrollers and its application in IoT. The students also got to execute basic programs on microcontrollers on Energeia. This workshop gave the participants a better understanding of IoT.

April 23, 2021: Webinar on "Lifecycle of an infrastructure CPU"

A webinar on "Lifecycle of an infrastructure CPU" was organized by BMSCE IEEE. The speaker, Mr. Harish Dixit gave the audience an insight on the way the processors evolved from being book-sized to their current micro size. He also explained the basic hardware and software design, the structure of a CPU, its components and functions among other topics in detail. Challenges faced in the development of an infrastructure CPU were also discussed.

May 03, 2021: Online webinar on PURSUING MASTERS ABROAD

BMSCE IEEE in collaboration with College Pond conducted a free online webinar which resolved various queries revolving around pursuing masters abroad. The speaker of the event was Mr. Jimeet Sanghavi who explained the different branches and their derivatives that one can pursue.

May 17, 2021: INDUCTION PROGRAM-II

BMSCE IEEE conducted a weeklong series of extremely informative webinars which covered topics ranging from resilience in crisis to healthy diet and exercise. The webinar even consisted of topics such as how to dream big. This webinar series not only taught about how one must protect oneself and their family in times of crisis but also taught them how to achieve their goals despite the uncertain circumstances.

May 29, 2021: HANDS-ON GIT WORKSHOP

BMSCE IEEE and BMSCE IEEE WIE conducted an online workshop on git. The workshop explained what git was but also gave a brief idea as to how it is being used in the IT industry and then explained how networking across git made programming easy.

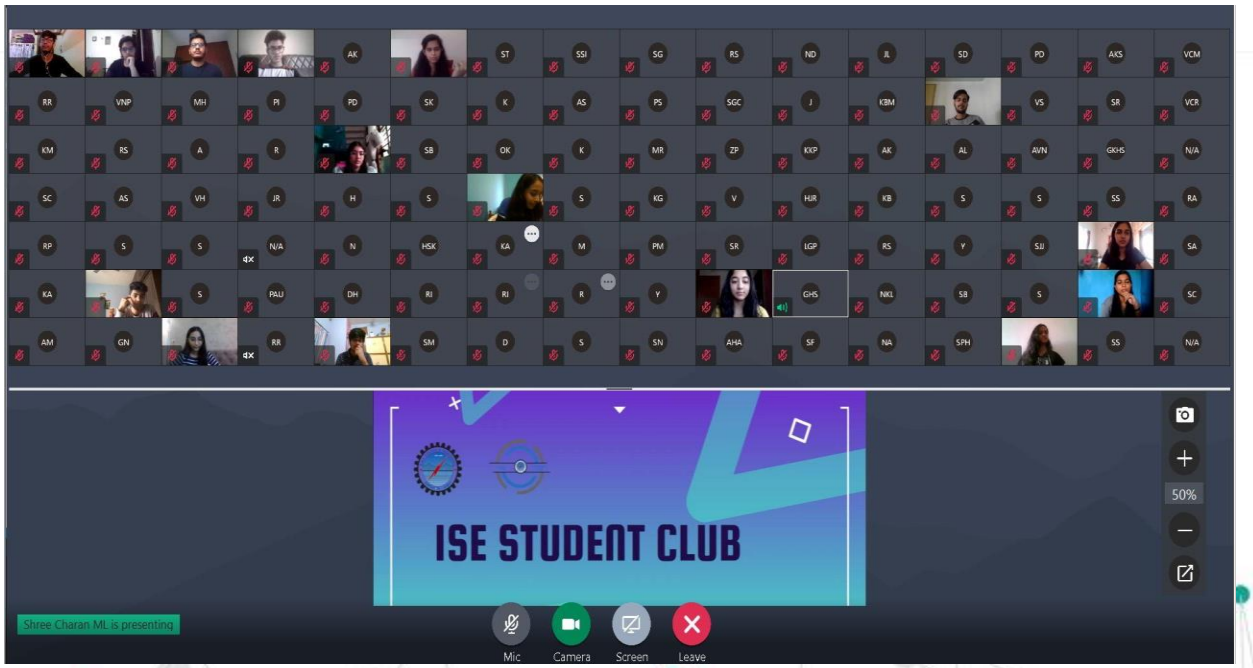
ISE Student Club Activities

May 12, 2021: CLASH OF CODES

An event organized by the club for the coders in the house. It was a coding competition along with lots of learning fun and laughter.

May 22, 2021: ORIENTATION

An orientation was organized by the members of the club to introduce the club to the students, mainly the freshers, for them to interact with the seniors and showcase their talent.



Students' participation in Pentagram Events

March 14, 2021: Encipher

The event Encipher was conducted on the 14th of March to celebrate Pi Day. Because of the pandemic, this event was conducted online. This event had 2 rounds. It was an individual Participation. In the 1st round, a google form was floated that had 14 questions and contestants were to solve those and submit the answers after which they were to report back to their allotted coordinators for the verification of answers using WhatsApp. As we required all 14 to be the right answers for the next round i.e., the decryption round. In round 2 we provided the contestants a KEY and a HINT using which they were to decrypt the round 1 answers into a 14 letters word which were scrambled. Once that was obtained, a Paragraph was provided using which they had to unscramble the jumbled word and would get a meaningful word.

April 28, 2021: Action2Auction

The event was conducted on 28th of April, 2021. It was an online event, eventuated on Discord. Action2Auction was planned in collaboration with IEEE BMSCE PES Council and IEEE PES on the occasion of PES Day. The event started at 4 o'clock. Initially, a total of 35 teams registered for the event. Round 1 was an online clocked test on google forms to filter out top 25 most promising teams. Round 2 intended the same and was executed similarly but was aimed to filter of top 15 teams, out of 25. Questions in round 2 were based on reverse BODMAS whereas in round 1, they were logic and mathematics based. After round 2, the main and final event started, the Auction round.

June 6, 2021: Maximize It

The event was conducted on the 6th of June, 2021. It was an online event, eventuated on Discord. Maximize it was an internal event organized for members of Pentagram. The organizing committee comprised of members from the 2nd year whereas the participants were from all three years (1st, 2nd, and 3rd). The event was split into two parts: five sub-events and the main event. The names of sub-events were: Deadly Red, Schulte Table, Tic-tac-toe, Crypto Crack, Minesweeper.

Conferences and Journals by the Faculty

January 8, 2021:

Sindhu K, H.S. Guruprasad "Performance Improvement of Mobile Device using Cloud Platform", International Conference on Inventive Systems and Control (ICISC 2021), Jan 07-08th 2021, JCT College of Engineering and Technology, Coimbatore.

Authors: Sindhu K, H S Guruprasad

April 28, 2021:

"Location Analysis using Ensemble Approach for Warehouses: A Study During COVID 19" in the 3rd International Conference on Computational Intelligence in Pattern recognition (CIPR 2021) Springer, organized by Institute of Engineering and Management Group, Kolkata.

Authors: Ashok Kumar R, Lakshmishree K

April 28, 2021:

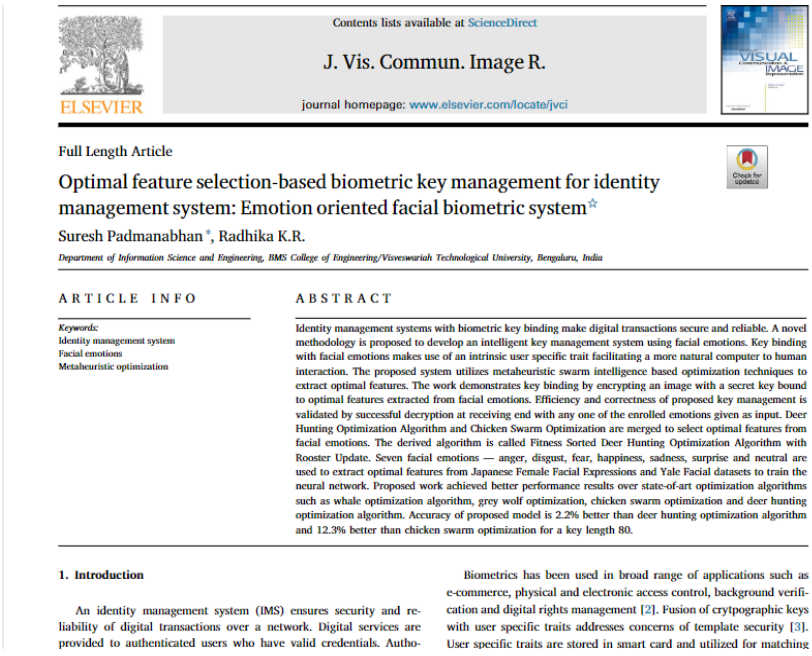
Sreelatha R and Dr. Roopa Lakshmi R, "A novel Framework for Detecting Slow Moving Vehicles in Urban Traffic Using Robust Visual Features, SSRN PROCEEDINGS-International Conference on Smart Data Intelligence (ICSMDI-2021), 29th -30th April 2021

Authors: Sreelatha, Dr. Roopalakshmi

January 1, 2021:

Optimal feature selection-based biometric key management for identity management system: Emotion oriented facial biometric system, Elsevier Journal of Visual Communication and Image Representation, Vol. 74, pp. 103002:1-13, January 2021. ISSN: 1047-3203. Impact Factor: 2.479. Indexed in DBLP, Google Scholar, Scopus and WoS.

Authors: Suresh P, Radhika K R



Contents lists available at ScienceDirect

J. Vis. Commun. Image R.

journal homepage: www.elsevier.com/locate/jvci

Full Length Article

Optimal feature selection-based biometric key management for identity management system: Emotion oriented facial biometric system☆

Suresh Padmanabhan *, Radhika K.R.

Department of Information Science and Engineering, BMS College of Engineering/Visveswariah Technological University, Bengaluru, India

ARTICLE INFO

Keywords:
Identity management system
Facial emotions
Metaheuristic optimization

ABSTRACT

Identity management systems with biometric key binding make digital transactions secure and reliable. A novel methodology is proposed to develop an intelligent key management system using facial emotions. Key binding with facial emotions makes use of an intrinsic user specific trait facilitating a more natural computer to human interaction. The proposed system utilizes metaheuristic swarm intelligence based optimization techniques to extract optimal features. The work demonstrates key binding by encrypting an image with a secret key bound to optimal features extracted from facial emotions. Efficiency and correctness of proposed key management is validated by successful decryption at receiving end with any one of the enrolled emotions given as input. Deer Hunting Optimization Algorithm and Chicken Swarm Optimization are merged to select optimal features from facial emotions. The derived algorithm is called Fitness Sorted Deer Hunting Optimization Algorithm with Rooster Update. Seven facial emotions — anger, disgust, fear, happiness, sadness, surprise and neutral are used to extract optimal features from Japanese Female Facial Expressions and Yale Facial datasets to train the neural network. Proposed work achieved better performance results over state-of-art optimization algorithms such as whale optimization algorithm, grey wolf optimization, chicken swarm optimization and deer hunting optimization algorithm. Accuracy of proposed model is 2.2% better than deer hunting optimization algorithm and 12.3% better than chicken swarm optimization for a key length 80.

1. Introduction

An identity management system (IMS) ensures security and reliability of digital transactions over a network. Digital services are provided to authenticated users who have valid credentials. Authorization

Biometrics has been used in broad range of applications such as e-commerce, physical and electronic access control, background verification and digital rights management [2]. Fusion of crytpographic keys with user specific traits addresses concerns of template security [3]. User specific traits are stored in smart card and utilized for matching

February 15, 2021:

Title: An ensemble of grapheme and phoneme-based models for automatic English to Kannada back-transliteration Source: International Journal of Intelligence and Sustainable Computing, Inderscience Publishers DOI: 10.1504/IJISC.2020.10034358

Authors: Sowmya Lakshmi, Shambhavi B R

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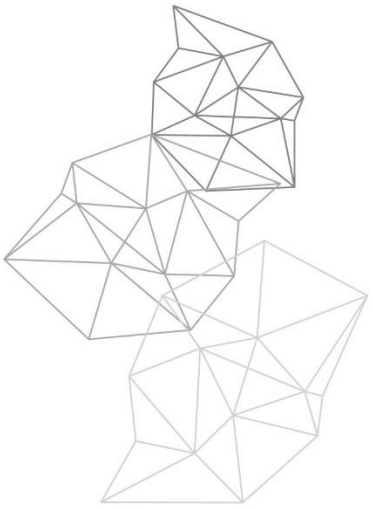
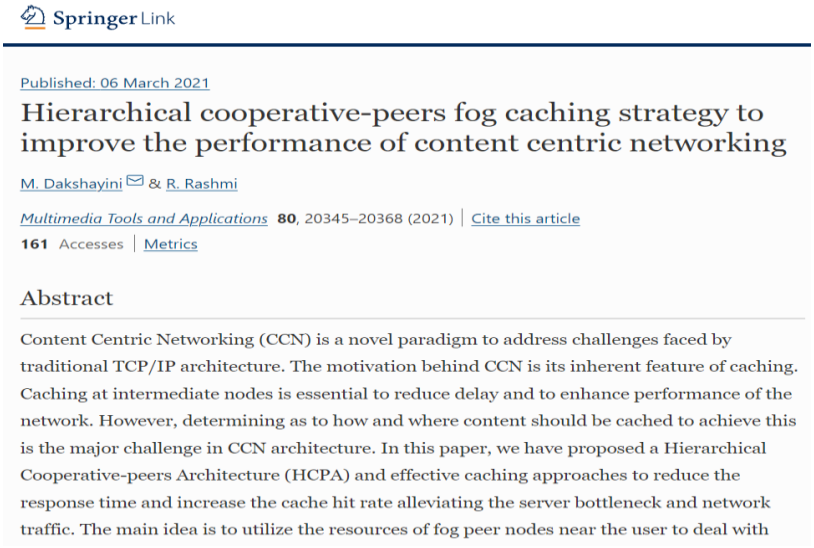


March 6, 2021:

"Hierarchical cooperative-peers fog caching strategy to improve the performance of content centric networking ", in the Int. Journal "Multimedia Tools and Applications", SCOPUS and WoS-SCIE Indexed Q2 Journal, IF 2.313, ISSN/eISSN 1380-7501 / 1573-7721.
Authors: M Dakshayini, R Rashmi



Springer Link

Published: 06 March 2021

Hierarchical cooperative-peers fog caching strategy to improve the performance of content centric networking

M. Dakshayini & R. Rashmi

Multimedia Tools and Applications **80**, 20345–20368 (2021) | Cite this article
161 Accesses | Metrics

Abstract

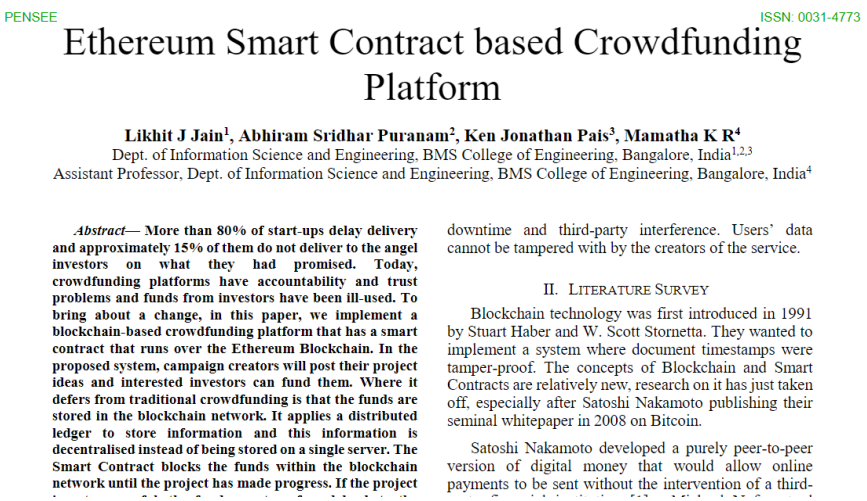
Content Centric Networking (CCN) is a novel paradigm to address challenges faced by traditional TCP/IP architecture. The motivation behind CCN is its inherent feature of caching. Caching at intermediate nodes is essential to reduce delay and to enhance performance of the network. However, determining as to how and where content should be cached to achieve this is the major challenge in CCN architecture. In this paper, we have proposed a Hierarchical Cooperative-peers Architecture (HCPA) and effective caching approaches to reduce the response time and increase the cache hit rate alleviating the server bottleneck and network traffic. The main idea is to utilize the resources of fog peer nodes near the user to deal with

April 1, 2021:

Sowmyashree A, H S Guruprasad, "Impact of Artificial Super Intelligence in Human Life", International Journal of Innovative Research in Applied Sciences and Engineering [IJIRASE], Volume 4, Issue 10, April 2021, pp 913 - 917. ISSN: 2456-8910, DOI: 10.29027/IJIRASE. v4.I10.2021.913-917.
Authors: Sowmyashree A, H S Guruprasad

April 26, 2021:

"Ethereum Smart Contract based Crowdfunding Platform", PENSEE, Volume 51, Issue 4 - 2021, S. No.123, Pages:1431-1433, ISSN:0031-4773,2021.
Authors: Mamatha K R, Likhith J Jain, Abhiram Sridhar Puranam, Ken Jonathan Pais



PENSEE ISSN: 0031-4773

Ethereum Smart Contract based Crowdfunding Platform

Likhit J Jain[1], Abhiram Sridhar Puranam[2], Ken Jonathan Pais[3], Mamatha K R[4]
Dept. of Information Science and Engineering, BMS College of Engineering, Bangalore, India[1,2,3]
Assistant Professor, Dept. of Information Science and Engineering, BMS College of Engineering, Bangalore, India[4]

***Abstract*— More than 80% of start-ups delay delivery and approximately 15% of them do not deliver to the angel investors on what they had promised. Today, crowdfunding platforms have accountability and trust problems and funds from investors have been ill-used. To bring about a change, in this paper, we implement a blockchain-based crowdfunding platform that has a smart contract that runs over the Ethereum Blockchain. In the proposed system, campaign creators will post their project ideas and interested investors can fund them. Where it defers from traditional crowdfunding is that the funds are stored in the blockchain network. It applies a distributed ledger to store information and this information is decentralised instead of being stored on a single server. The Smart Contract blocks the funds within the blockchain network until the project has made progress. If the project**

downtime and third-party interference. Users' data cannot be tampered with by the creators of the service.

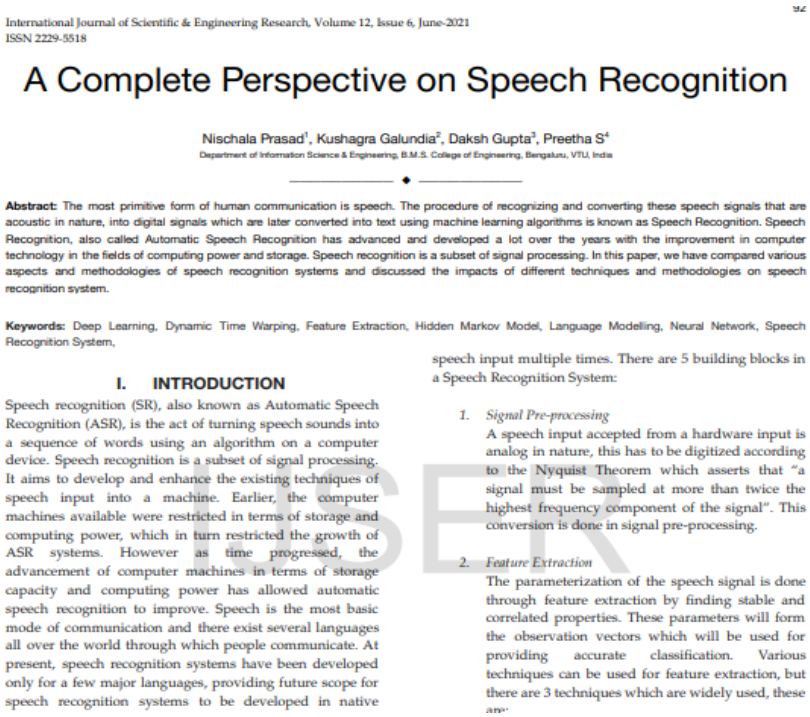
II. Literature Survey

Blockchain technology was first introduced in 1991 by Stuart Haber and W. Scott Stornetta. They wanted to implement a system where document timestamps were tamper-proof. The concepts of Blockchain and Smart Contracts are relatively new, research on it has just taken off, especially after Satoshi Nakamoto publishing their seminal whitepaper in 2008 on Bitcoin.

Satoshi Nakamoto developed a purely peer-to-peer version of digital money that would allow online payments to be sent without the intervention of a third-

June 17, 2021:

"A Complete Perspective on Speech Recognition" International Journal of Scientific & Engineering Research, Volume 12, Issue 6, June-2021 ISSN 2229-5518
Authors: Nischala Prasad, Kushagra Galundia , Daksh Gupta , Preetha S



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ISSN 2229-5518

A Complete Perspective on Speech Recognition

Nischala Prasad[1], Kushagra Galundia[2], Daksh Gupta[3], Preetha S[4]
Department of Information Science & Engineering, B.M.S. College of Engineering, Bengaluru, VTU, India

Abstract: The most primitive form of human communication is speech. The procedure of recognizing and converting these speech signals that are acoustic in nature, into digital signals which are later converted into text using machine learning algorithms is known as Speech Recognition. Speech Recognition, also called Automatic Speech Recognition has advanced and developed a lot over the years with the improvement in computer technology in the fields of computing power and storage. Speech recognition is a subset of signal processing. In this paper, we have compared various aspects and methodologies of speech recognition systems and discussed the impacts of different techniques and methodologies on speech recognition system.

Keywords: Deep Learning, Dynamic Time Warping, Feature Extraction, Hidden Markov Model, Language Modelling, Neural Network, Speech Recognition System,

I. INTRODUCTION

Speech recognition (SR), also known as Automatic Speech Recognition (ASR), is the act of turning speech sounds into a sequence of words using an algorithm on a computer device. Speech recognition is a subset of signal processing. It aims to develop and enhance the existing techniques of speech input into a machine. Earlier, the computer machines available were restricted in terms of storage and computing power, which in turn restricted the growth of ASR systems. However as time progressed, the advancement of computer machines in terms of storage capacity and computing power has allowed automatic speech recognition to improve. Speech is the most basic mode of communication and there exist several languages all over the world through which people communicate. At present, speech recognition systems have been developed only for a few major languages, providing future scope for speech recognition systems to be developed in native speech input multiple times. There are 5 building blocks in a Speech Recognition System:

1. *Signal Pre-processing*
   A speech input accepted from a hardware input is analog in nature, this has to be digitized according to the Nyquist Theorem which asserts that "a signal must be sampled at more than twice the highest frequency component of the signal". This conversion is done in signal pre-processing.

2. *Feature Extraction*
   The parameterization of the speech signal is done through feature extraction by finding stable and correlated properties. These parameters will form the observation vectors which will be used for providing accurate classification. Various techniques can be used for feature extraction, but there are 3 techniques which are widely used, these are:

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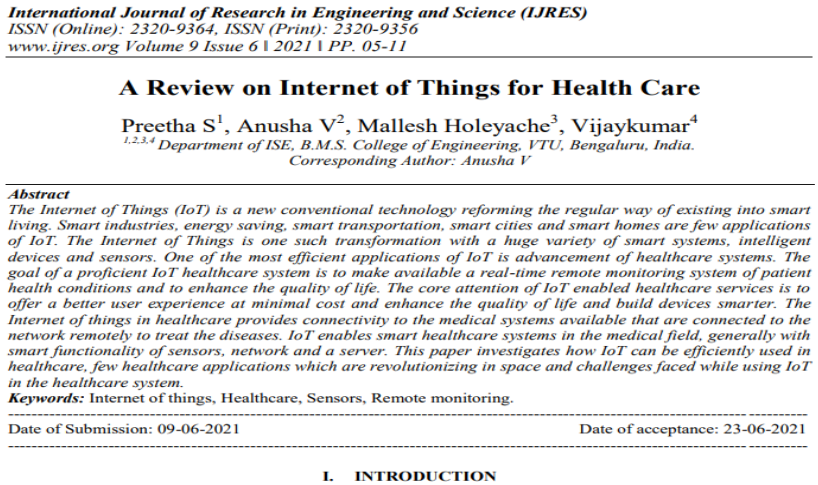
International Journal of Research in Engineering and Science (IJRES) ISSN (Online): 2320-9364, ISSN (Print): 2320-9356 www.ijres.org Volume 9 Issue 6, 2021, PP. 05-11
Authors: Preetha S , Anusha V , Mallesh Holeyache , Vijaykumar



International Journal of Research in Engineering and Science (IJRES)
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A Review on Internet of Things for Health Care

Preetha S[1], Anusha V[2], Mallesh Holeyache[3], Vijaykumar[4]
[1,2,3,4] *Department of ISE, B.M.S. College of Engineering, VTU, Bengaluru, India.*
Corresponding Author: Anusha V

Abstract
The Internet of Things (IoT) is a new conventional technology reforming the regular way of existing into smart living. Smart industries, energy saving, smart transportation, smart cities and smart homes are few applications of IoT. The Internet of Things is one such transformation with a huge variety of smart systems, intelligent devices and sensors. One of the most efficient applications of IoT is advancement of healthcare systems. The goal of a proficient IoT healthcare system is to make available a real-time remote monitoring system of patient health conditions and to enhance the quality of life. The core attention of IoT enabled healthcare services is to offer a better user experience at minimal cost and enhance the quality of life and build devices smarter. The Internet of things in healthcare provides connectivity to the medical systems available that are connected to the network remotely to treat the diseases. IoT enables smart healthcare systems in the medical field, generally with smart functionality of sensors, network and a server. This paper investigates how IoT can be efficiently used in healthcare, few healthcare applications which are revolutionizing in space and challenges faced while using IoT in the healthcare system.
Keywords: Internet of things, Healthcare, Sensors, Remote monitoring.

Date of Submission: 09-06-2021 Date of acceptance: 23-06-2021

I. INTRODUCTION

Health is one of the important concepts in the growth and well-being of humans, also in the terms of technology. Monitoring patients' health is one of the major concerns. To provide a smarter way of monitoring health, the Internet of things (IoT) enabled health monitoring system is one solution for it.

Internet of Things (IoT) has been extensively recognized as a solution to relieve the pressure in the healthcare domain. A significant amount of such study looks at observing patients remotely. Few applications to

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Authors: Preetha S, Arvindh S Kumar, Nishitha B N, Guru Darshan S A

International Journal of Scientific & Engineering Research Volume 12, Issue 6, June-2021 1048
ISSN 2229-5518

Secure NFT Framework For Media Tokens Using Steganography

Preetha S, Arvindh S Kumar, Nishitha B N, Guru Darshan S A
Department of ISE, B.M.S. College of Engineering, VTU, Bengaluru, India

Abstract

Non-Fungible Tokens (NFTs) have advanced significantly and have attracted investor's attention. Non-fungible tokens are also known as crypto collectibles. Analysis of cryptocurrencies and block chain technology recommends the importance and working of non-fungible tokens. Unlike bitcoin, where one coin is the same as another, NFTs are distinctive, each with diverse attributes. NFTs may be sold, gifted, bought, displayed and destroyed. The article provides a detailed understanding of concept, working of non-fungible tokens and its applications. An insight into various pros and cons of non-fungible tokens and viable solutions to some of the major challenges of the application are also discussed. This paper aims to address the security issue of imitation. We have proposed a secured NFT framework for media tokens using steganography.

Keywords: Block chain, cryptocurrency, crypto collectible, Non-Fungible Tokens, NFT, Steganography, Ethereum

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International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075 (Online), Volume-10 Issue-8, June 2021 https://www.ijitee.org/download/volume-10-issue-8/
Authors: Preetha S, P. Lalasa, Pradeepa R

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ISSN: 2278-3075 (Online), Volume-10 Issue-8, June 2021

A Comprehensive Overview on Cybersecurity: Threats and Attacks

Preetha S, P. Lalasa, Pradeepa R

***Abstract:** In the world of evolving technologies, we are being driven by online transaction, AI technologies and automated processes. With the increased use of technologies in our life, the cybercrimes have amplified. Various new attacks, tools and techniques have been developed which allow the attackers to access more complex and well-managed systems, creating damage and even remain untraceable. The statistics about cyber crime tell that as of 2021 January, google has registered around 2 million phishing websites. In 2019 around 93.6% of observed malware was polymorphic, which means it changes the code continuously to evade detection. According to FBI and internet crime complaint center 2020crime report has doubled compared to 2019. International Data Corporation predicts that global spending on cybersecurity solutions will reach $133.7 billion by 2022 as cyber threats continue to increase. Governments around the world have acknowledged to growing cyber-attacks by providing directions to organizations implementing efficient cybersecurity practices. Cybersecurity protects computer systems and networks from*

network or organization for the purpose of damaging, disrupting, or stealing IT assets, computer networks, intellectual property, or other types of confidential information. In the year 1820, the first cybercrime was recorded. In 1978 over Arpanet, the first spam email was sent. In 1982, an apple computer was installed with the first virus. Data breach incidents cost the U.S. 8.64 million dollars, the highest globally, followed by the Middle East at 6.52 million dollars, as per the "2020 Cost of a Data Breach Report" published by IBM. The Cisco Cyber Security Reports show that 50 percent of large organizations, with a workforce of more than 10,000, spend at least $1 million on security every year. The report also found that 43 percent spend between $250,000 and $999,999, while 7 percent spend less than $250,000.

Cybersecurity is also a set of technologies, processes, and methods designed to protect unauthorized access to various

Student Publications in National/International Conferences/Journals

Publication Title: A Survey Paper on Blockchain Technologies in Supply Chain Management
Name of Conference/Journal: International Journal of Research in Engineering and Science (IJRES)
Name of Contributors: Nalini MK, Rahul Raman R, Sushmitha J

International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 9 Issue 6 ǁ 2021 ǁ PP. 79-86

A Survey Paper on Blockchain Technologies in Supply Chain Management

Rahul Raman R[*1], Sushmitha J[#2], M K Nalini[^3]
1. Student, Dept. of Information Science Engg.
B.M.S College of Engineering, Bangalore
Karnataka-India
2. Student, Dept. of Information Science Engg.
B.M.S College of Engineering, Bangalore
Karnataka-India
3. Assistant Professor, Dept. of Information Science Engg.
B.M.S College of Engineering, Bangalore
Karnataka-India

Abstract
The supply chain connects organisations, resources, activities, people, and information in order to transform natural resources and raw materials into a finished product for delivery to the ultimate client. The complexity of supply chains and value networks has increased over time. These complexities add a huge cost to the participants of supply chain, which is ultimately borne by the customer. The existing infrastructure also fails to provide desired amount of transparency and traceability into the supply chain. The blockchain technology is a revolutionary concept that can overcome the problems in the existing infrastructure to build trust, provide transparency and traceability across the supply chain value network. This paper is a survey of various blockchain based solutions that have been proposed to be implemented in various fields of supply chain management. This paper also briefly discusses the application of this technology in various sectors.

Keywords
Blockchain, Supply Chain, Hyperledger fabric, Hyperledger Sawtooth, Ethereum.

Date of Submission: 09-06-2021 Date of acceptance: 23-06-2021

Publication Title: Face Mask Detection using MobileNetv2
Name of Conference/Journal: Wutan Huatan Jisuan Jishu Journal
Name of Contributors: Nalina V, Anarghya H, Lalithasree R Hegde, Pannaga Sharma M L

Publication Title: Facial Recognition using OpenCV
Name of Conference/Journal: International Journal of Advanced Research in Science, Engineering and Technology
Name of Contributors: Sowmya K S, Aditi K Gowda, Chandan H R, Diya Krishnakumar

Publication Title: Analysis of Machine Learning Algorithms for Breast Cancer Prediction
Name of Conference/Journal: International Research Journal of Engineering and Technology (IRJET)
Name of Contributors: Sindhu K, Dev Prakash

International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 03 | Mar 2021 www.irjet.net p-ISSN: 2395-0072

Analysis of Machine Learning Algorithms for Breast Cancer Prediction

Dev Prakash[1], Sindhu K[2]

[1]*Student, Dept. of Information Science, BMS College of Engineering, Bangalore, Karnataka, India*
[2]*Assistant Professor, Dept. of Information Science, BMS College of Engineering, Bangalore, Karnataka, India*

Abstract - *Breast cancer represents one of the diseases that makes many deaths every year. Breast cancer accounts for the second major cause of death in women. Several machine learning algorithms have been used to develop a prediction model. Among them Logistic Regression, Decision Tree, KNN, SVM are the most used techniques. However, there have been very few studies about the performance of SVM based on kernel functions used in the breast cancer prediction. Apart from these, classifier ensemble which is a powerful technique can also be employed in this scenario. Therefore, the aim of this paper is to fully assess the prediction performance of these algorithms in breast cancer prediction considering accuracy score, precision score, recall score and f1 score in the evaluation metrics. The experimental results show an ensemble of Logistic regression + Decision tree + KNN outperforms all the other classifiers. Individual models of*

suited algorithm for breast cancer prediction is identified. The focus of this study is the SVM algorithm since accuracy of an SVM model depends largely on kernel functions used. These Kernel functions include Linear, RBF (Radial Basis Function), Poly and Sigmoid functions.

Section 2 of the paper discusses the algorithms used in the proposed work. Previous research work is discussed in Section 3. The experimental methodologies are presented in Sections 4. The results of the work are highlighted in Section 5 while Section 6 gives the concluding remarks.

2. BACKGROUND

All the algorithms used in this study have been discussed below:

STUDENT PROJECTS

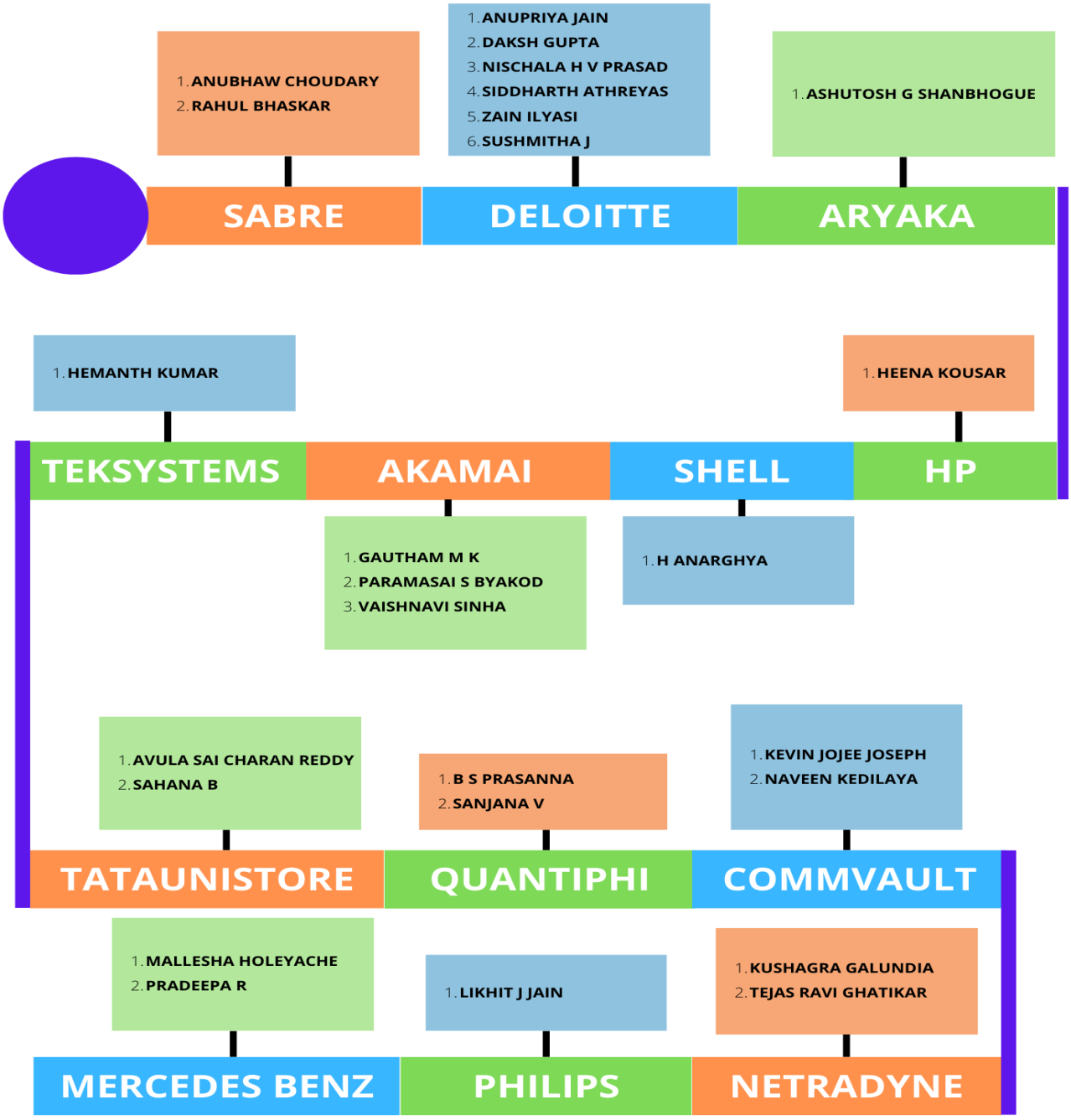
Student Names: Vikram Karthikeyan, B Shrikara Varna, Amogh Hegde, Govind Satwani
Project Title: Name Entity Popularity Determination (NEPD)
Project Outcome:

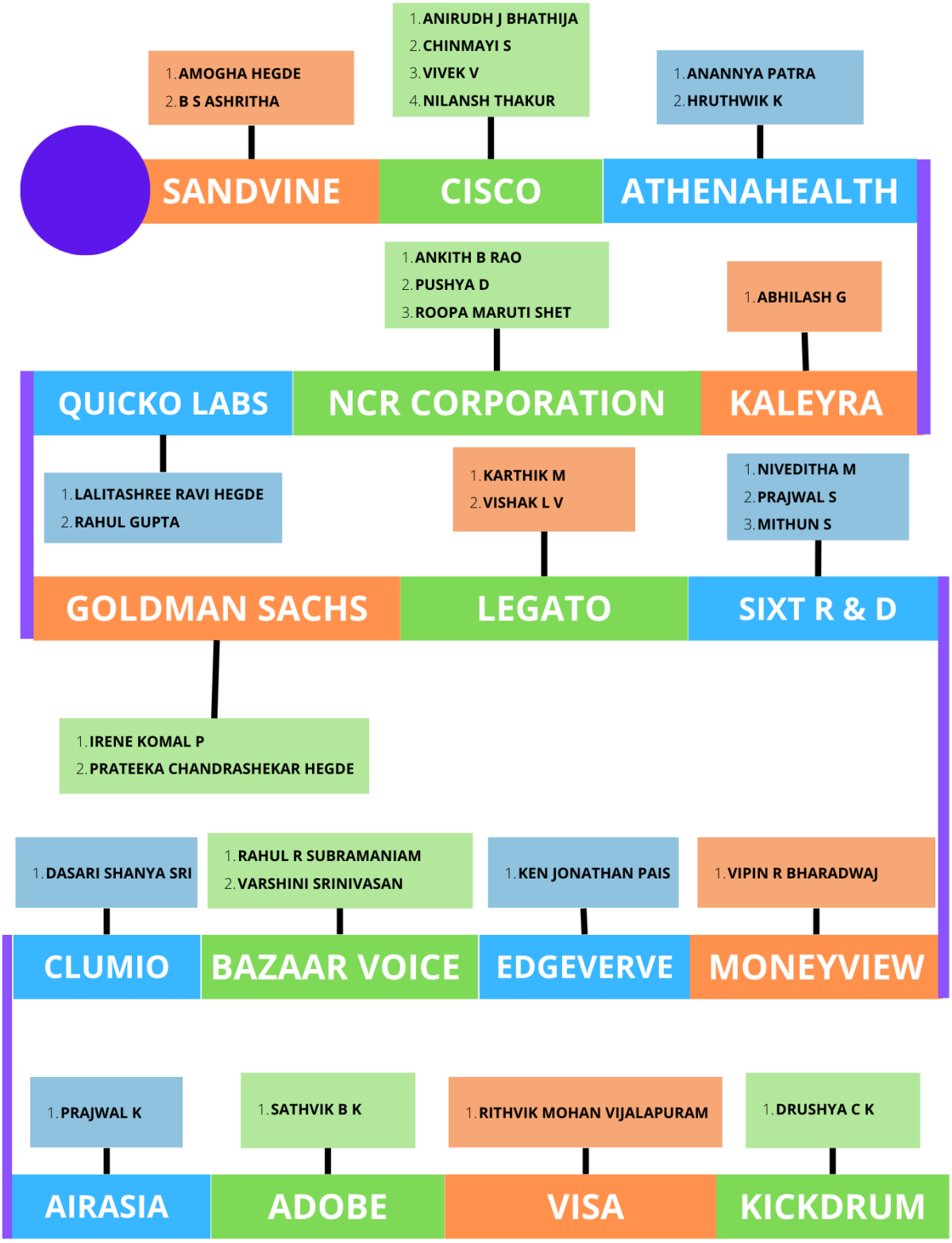
- Received Certificate of Excellence
- Published Paper titled “Named Entity Popularity Determination using Ensemble Learning” in the International Workshop on Joint NLP Modelling for Conversational AI @ ICON 2020

Student Names: Pradeep Bhat, Aditya V S M, B Shrikara Varna
Project Title: AI ML / Translate Helper
Project Outcome:

- Received Certificate of Excellence

2017 - 2021 UG Batch Placements

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1. ANANNYA PATRA
2. HRUTHWIK K
SANDVINE
CISCO
ATHENAHEALTH
1. ANKITH B RAO
2. PUSHYA D
3. ROOPA MARUTI SHET
1. ABHILASH G
QUICKO LABS
NCR CORPORATION
KALEYRA
1. LALITASHREE RAVI HEGDE
2. RAHUL GUPTA
1. KARTHIK M
2. VISHAK L V
1. NIVEDITHA M
2. PRAJWAL S
3. MITHUN S
GOLDMAN SACHS
LEGATO
SIXT R & D
1. IRENE KOMAL P
2. PRATEEKA CHANDRASHEKAR HEGDE
1. DASARI SHANYA SRI
1. RAHUL R SUBRAMANIAM
2. VARSHINI SRINIVASAN
1. KEN JONATHAN PAIS
1. VIPIN R BHARADWAJ
CLUMIO
BAZAAR VOICE
EDGEVERVE
MONEYVIEW
1. PRAJWAL K
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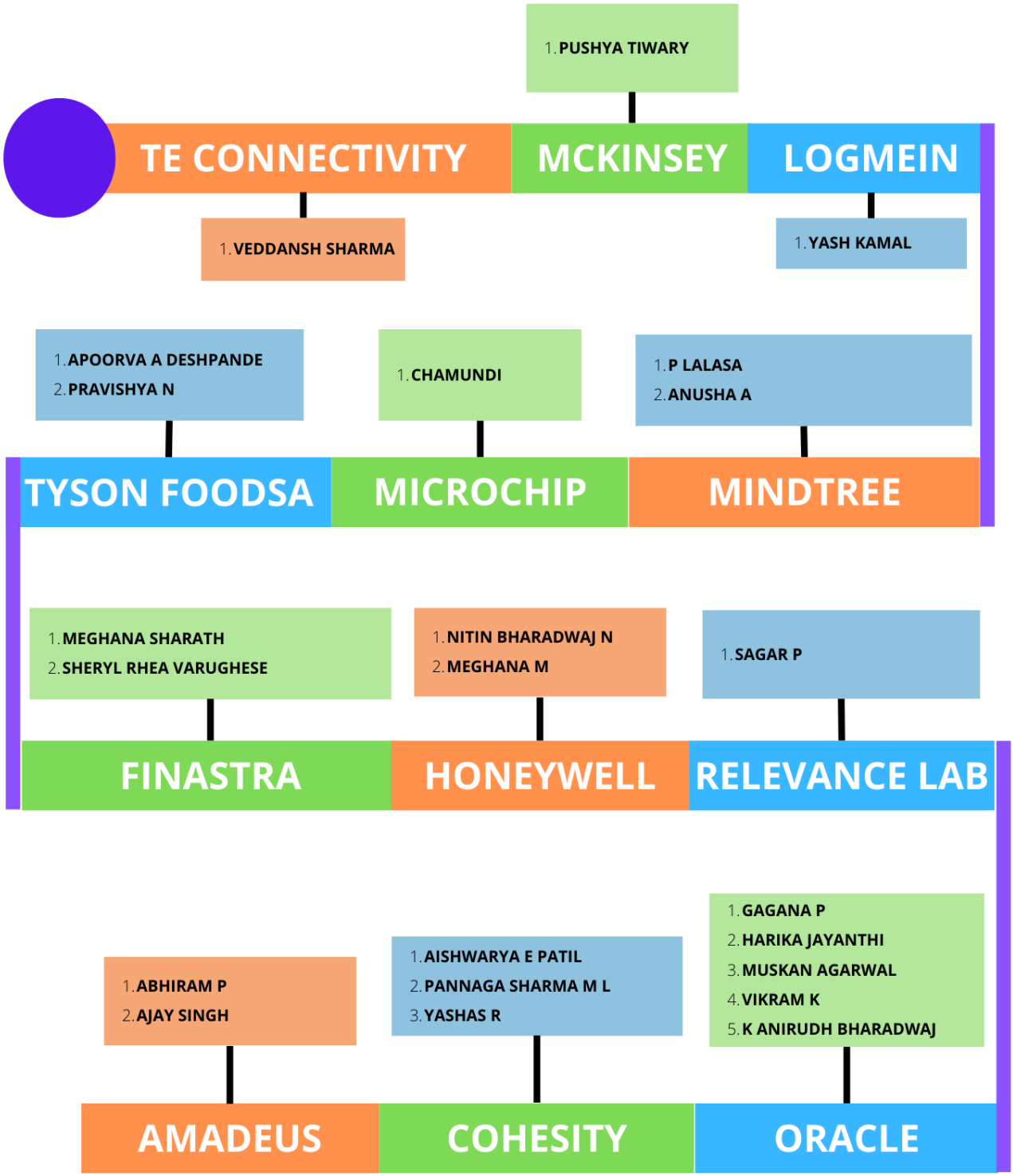
1. RITHVIK MOHAN VIJALAPURAM
1. DRUSHYA C K
AIRASIA
ADOBE
VISA
KICKDRUM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1. CHAMUNDI
1. P LALASA
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TYSON FOODSA
MICROCHIP
MINDTREE
1. MEGHANA SHARATH
2. SHERYL RHEA VARUGHESE
1. NITIN BHARADWAJ N
2. MEGHANA M
1. SAGAR P
FINASTRA
HONEYWELL
RELEVANCE LAB
1. ABHIRAM P
2. AJAY SINGH
1. AISHWARYA E PATIL
2. PANNAGA SHARMA M L
3. YASHAS R
1. GAGANA P
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3. MUSKAN AGARWAL
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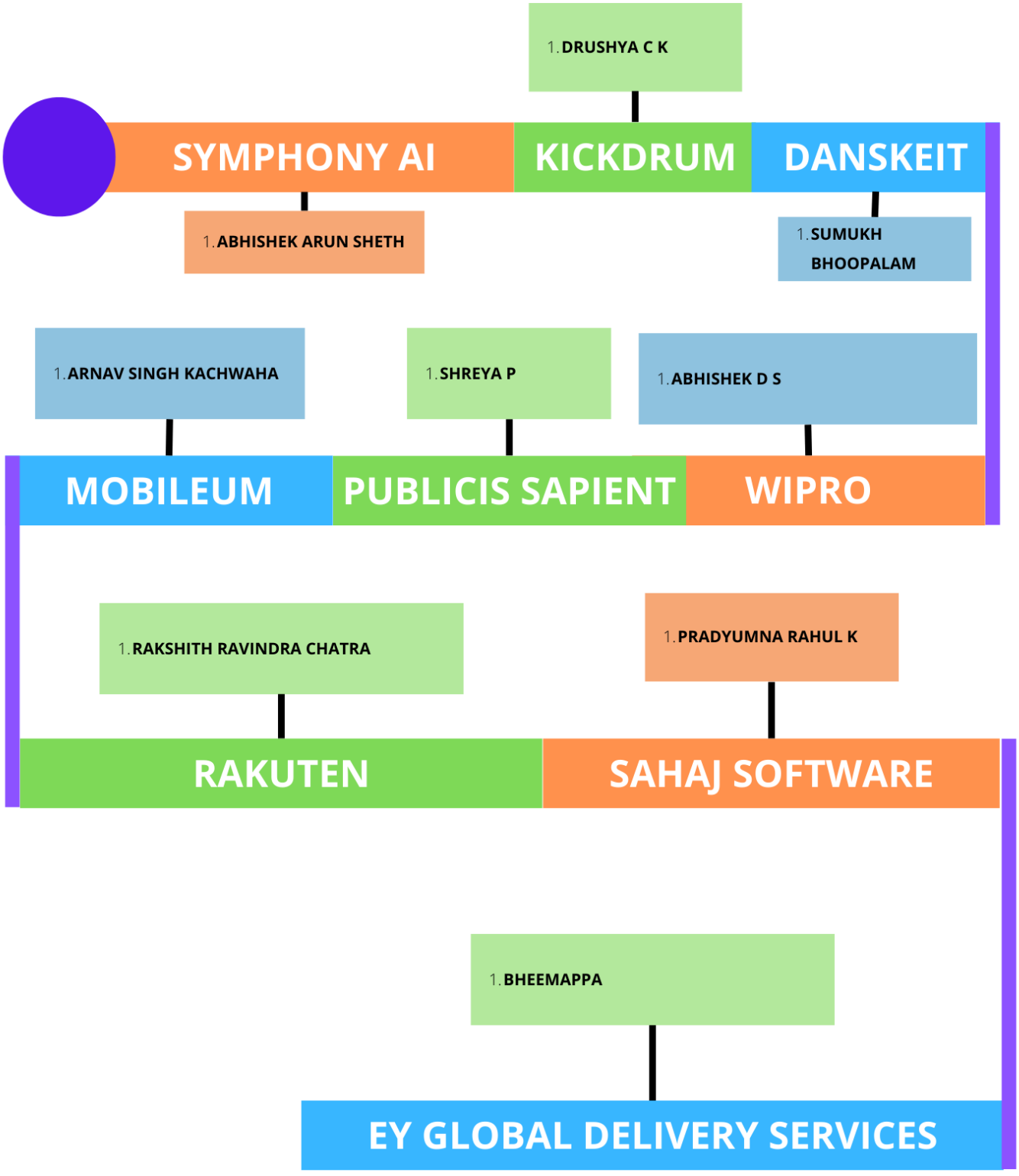
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1. SUMUKH BHOOPALAM
1. ARNAV SINGH KACHWAHA
1. SHREYA P
1. ABHISHEK D S
MOBILEUM
PUBLICIS SAPIENT
WIPRO
1. RAKSHITH RAVINDRA CHATRA
1. PRADYUMNA RAHUL K
RAKUTEN
SAHAJ SOFTWARE
1. BHEEMAPPA
EY GLOBAL DELIVERY SERVICES

ARTICLES

COMPUTER VISION BASED FRAMEWORK FOR DETECTING PHISHING WEBPAGES

One of the most dangerous threats on the internet nowadays is phishing attacks. This type of attack can lead to data breaches, and with it to image and financial loss in a company. The most common technique to exploit this type of attack is by sending emails to the target users to trick them to send their credentials to the attacker servers. If the user clicks on the link from the email, then good detection is needed to protect the user credentials. Computer vision is the field of computer science that focuses on replicating parts of the complexity of the human vision system and enabling computers to identify and process objects in images and videos in the same way that humans do. Until recently, computer vision only worked in limited capacity. Thanks to advances in artificial intelligence and innovations in deep learning and neural networks, the field has been able to take great leaps in recent years and has been able to surpass humans in some tasks related to detecting and labelling objects.

Computer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects — and then react to what they "see". Computer vision is one of the most remarkable things to come out of the deep learning and artificial intelligence world. The advancements that deep learning has contributed to the computer vision field have really set this field apart.

Phishing is a cyber-attack that uses disguised email as a weapon. Phishing is a type of social engineering attack often used to steal user data, including login credentials and credit card numbers. It occurs when an attacker, masquerading as a trusted entity, dupes a victim into opening an email, instant message, or text message. Phishing is an attack which attempts to trick the user to send the credentials to the attacker server. The vast majority of the phishing attacks try to trick the user to click links sent through emails and send the user to fake websites where sensitive data are collected from the victim. The fake website looks exactly like the original website in order to trick the victim to share his credentials. For an attacker it is very easy to create a fake copy of a site, because there are many tools that offer this functionality. The attacker sends the attack in such a way as to attract the victim's attention and make her curious to enter the fake site, so that the victim must authenticate himself in order to be able to reach the information provided by the attacker.

The sophisticated variant of these attacks is called “spear-phishing”. It is more sophisticated because the attacker collects data about the victim, the organization works and sends personalized attacks to the victim he is attacking. Spear-Phishing is the fraudulent practice of sending emails ostensibly from a known or trusted sender in order to induce targeted individuals to reveal confidential information. In a company, spear- phishing targets people who have access to financial data. When the attack targets senior executives, it falls into another category of whaling. Other types of phishing attacks can be Cat-phishing, Clone phishing, Voice phishing, SMS phishing, etc.

First of all, they did not identify any challenges with solutions that are based on URL blacklists. Blacklists is a good technique to eliminate some of the attacks with very big accuracy and low false positive rate, but cannot deal with newly phishing websites. On the other hand, the biggest concern with the other solutions is that one may have the same web application installed multiple times in different environments and under different domains. This problem could result in lots of false positives in those detection tools. A good example would be WordPress. What if one has a detection tool which takes the DOM and CSS to look for visual similarities and scans multiple WordPress websites and will find those similarities with a higher score. WordPress CMS is present on 16% websites among top 10 million websites around the world. So, it will find multiple matches and the victim cannot distinguish what page is the attacker page and which is the real one. Another problem would be with the web applications from a big company, which has the same web application installed on multiple environments, between different domain names.

Why use computer vision for security and safety?

The applicability of computer vision methods in network security is not straight forward. More organizations take the right approach to applying computer vision for security AI to keep their employees, customers, and assets safe. Computer vision is a subdomain of artificial intelligence that is concerned with how computers “see” digital images and videos. The goal of computer vision is to give machines a high-level understanding of visual imagery in a way that approaches or simulates human understanding. In recent years, sophisticated computer vision algorithms and techniques have been able to equal or even beat human performance on tasks such as object recognition. As cameras and sensors proliferate, computer vision provides insights into public spaces and workplaces, airports and industrial sites, so that security and safety officers can make sense of a flood of images and data from both remote and high-traffic areas. Phishing attacks are an ongoing problem in the internet. Attackers are using many sophisticated methods such that even the most tech-savvy users struggle to distinguish phishing attempts from legitimate web pages. According to Phish labs report, phishing attacks grew 40.9% in 2018, while targeting 83.9% of industries that offers financial, email, cloud, payment, and SaaS services. Overall, 98.9% of these attacks target corporate users for credential theft or email scams. Many high-profile network breaches such as iCloud celebrity pictures, Sony hack, Bangladesh Bank heist, and eBay data breach have been traced back to attackers infiltrating the network using a well-researched and

crafted phishing attacks misguiding employees to enter their credentials. Overall, 90% of the data breaches occurred globally in 2017 were results of phishing attacks. Recent reports also indicated that 75% of the organizations faced at least one phishing attack in 2017, and the average click rate of the targets is an eye-opening 9%.

According to FBI's Internet Crime Complaint Centre, Global Business Email Compromise (BEC) losses exceeded 12 billion US dollars in 2018. In 2017, these scams cost organizations almost 700 million dollars. It is essential to detect phishing attempts before users click a malicious URL to minimize damages. As the fundamental characteristic of a phishing page is its visual similarity to a legitimate target page turning into computer vision method appears as a natural alternative to consider.

MULTILAYER PERCEPTRON

Why is Deep Learning a Game Changing?

In traditional Machine Learning anyone who is building a model either has to be an expert in the problem area they are working on, or team up with one. Without this expert knowledge, designing and engineering features becomes an increasingly difficult challenge. The quality of a Machine Learning model depends on the quality of the dataset, but also on how well features encode the patterns in the data. Deep Learning algorithms use Artificial Neural Network as their main structure. What sets them apart from other algorithms is that they don't require expert input during the feature design and engineering phase. Neural Networks can learn the characteristics of the data. Deep Learning algorithms take in the dataset and learn its patterns, they learn how to represent the data with features they extract on their own. Then they combine different representations of the dataset, each one identifying a specific pattern or characteristic, into a more abstract, high-level representation of the dataset. This hands-off approach, without much human intervention in feature design and extraction, allows algorithms to adapt much faster to the data at hand. Neural Networks are inspired by, but not necessarily an exact model of, the structure of the brain. There's a lot we still don't know about the brain and how it works, but it has been serving as inspiration in many scientific areas due to its ability to develop intelligence. And although there are neural networks that were created with the sole purpose of understanding how brains work. Deep Learning as we know it today is not intended to replicate how the brain works. Instead, Deep Learning focuses on enabling systems that learn multiple levels of pattern composition.

It all started with a Neuron!
In the early 1940 Warren McCulloch, a neurophysiologist, teamed up with logician Walter pits to create a model of how brains work. It was a simple linear model that produced a positive or negative output, given a set of inputs and weights.

Perceptron

Although today the Perceptron is widely recognized as an algorithm, it was initially intended as an image recognition machine. It gets its name from performing the human-like function of perception, seeing and recognizing images.

Each neuron has a cell that receives a series of pairs of inputs and weights. The major difference in this model is that inputs are combined in a weighted sum and, if the weighted sum exceeds a predefined threshold, the neuron fires and produces an output. Threshold T represents the activation function. If the weighted sum of the inputs is greater than zero the neuron outputs the value 1, otherwise the output value is zero.

Perceptron for Binary Classification

With this discrete output, controlled by the activation function, the perceptron can be used as a binary classification model, defining a linear decision boundary. It finds the separating hyperplane that minimizes the distance between misclassified points and the decision boundary. To minimize this distance, Perceptron uses Stochastic Gradient Descent as the optimization function. If the data is linearly separable, it is guaranteed that Stochastic Gradient Descent will converge in a finite number of steps. The last piece that Perceptron needs is the activation function, the function that determines if the neuron will fire or not. Initial Perceptron models used Sigmoid function, and just by looking at its shape, makes a lot of sense! The sigmoid function maps any real input to a value that is either 0 or 1, and encodes a nonlinear function. The neuron can receive negative numbers as input, and it will still be able to produce an output that is either 0 or 1. But if you look at Deep Learning papers and algorithms from the last decade, you'll see the most of them use the Rectified Linear Unit as the neuron's activation function. The reason why ReLU became more adopted is that it allows better optimization using Stochastic Gradient Descent, more efficient computation and is scale-invariant, meaning, its characteristics are not affected by the scale of the input. The neuron receives inputs and picks an initial set of weights at random. These are combined in weighted sum and then ReLU, the activation function, determines the value of the output. But you might be wondering, Doesn't Perceptron actually learn the weights. It does! Perceptron uses Stochastic Gradient Descent to find, or you might say learn, the set of weights that minimize the distance between the misclassified points and the decision boundary. Once Stochastic Gradient Descent converges, the dataset is separated into two regions by a linear hyperplane. Although it was said the Perceptron could represent any circuit and logic, the biggest criticism was that it couldn't represent the XOR gate, exclusive OR, where the gate only returns 1 if the inputs are different. This was proved almost a decade later by Minsky and Papert, in 1969 and highlights the fact that Perceptron, with only one neuron, can't be applied to non-linear data.

Multilayer Perceptron

The Multilayer Perceptron was developed to tackle this limitation. It is a neural network where the mapping between inputs and output is non-linear A Multilayer Perceptron has input and output layers, and one or more hidden layers with many neurons stacked together. And while in the Perceptron the neuron must have an activation function that imposes a threshold, like ReLU or sigmoid, neurons in a Multilayer Perceptron can use any arbitrary activation function. Multilayer Perceptron falls under the category of feeding-forward algorithms, because inputs are combined with the initial weights in a weighted sum and subjected to the activation function, just like in the Perceptron. But the difference is that each linear combination is propagated to the next layer. Each layer is feeding the next one with the result of their computation, their internal representation of the data. This goes all the way through the hidden layers to the output layer. If the algorithm only computed the weighted sums in each neuron, propagated results to the output layer, and stopped there, it wouldn't be able to learn the weights that minimize the cost functions. If the algorithm only computed one iteration, there would be no actual learning.

Backpropagation

Backpropagation is the learning mechanism that allows the Multilayer Perceptron to iteratively adjust the weights in the network, with the goal of minimizing the cost function. There is one hard requirement for backpropagation to work properly. The function that combines inputs and weights in a neuron, for instance the weighted sum, and the threshold function, for instance ReLU, must be differentiable. These functions must have a bounded derivative, because Gradient Descent is typically the optimization function used in Multilayer Perceptron. In each iteration, after the weighted sums are forwarded through all layers, the gradient of the Mean Squared Error is computed across all input and output pairs. Then, to propagate it back, the weights of the first hidden layer is updated with the value of the gradient. That's how the weights are propagated back to the starting point of the neural network! This process keeps going until gradient for each input-output pair has converged, meaning the newly computed gradient hasn't changed more than a specified convergence threshold, compared to the previous iteration.

Where to find us?

Dept. of Information Science and Engineering
B.M.S. College of Engineering
Bull Temple Road
Bangalore - 560019
Email: hod.ise@bmsce.ac.in
Phone: +91-80-26622130
Ext: 132