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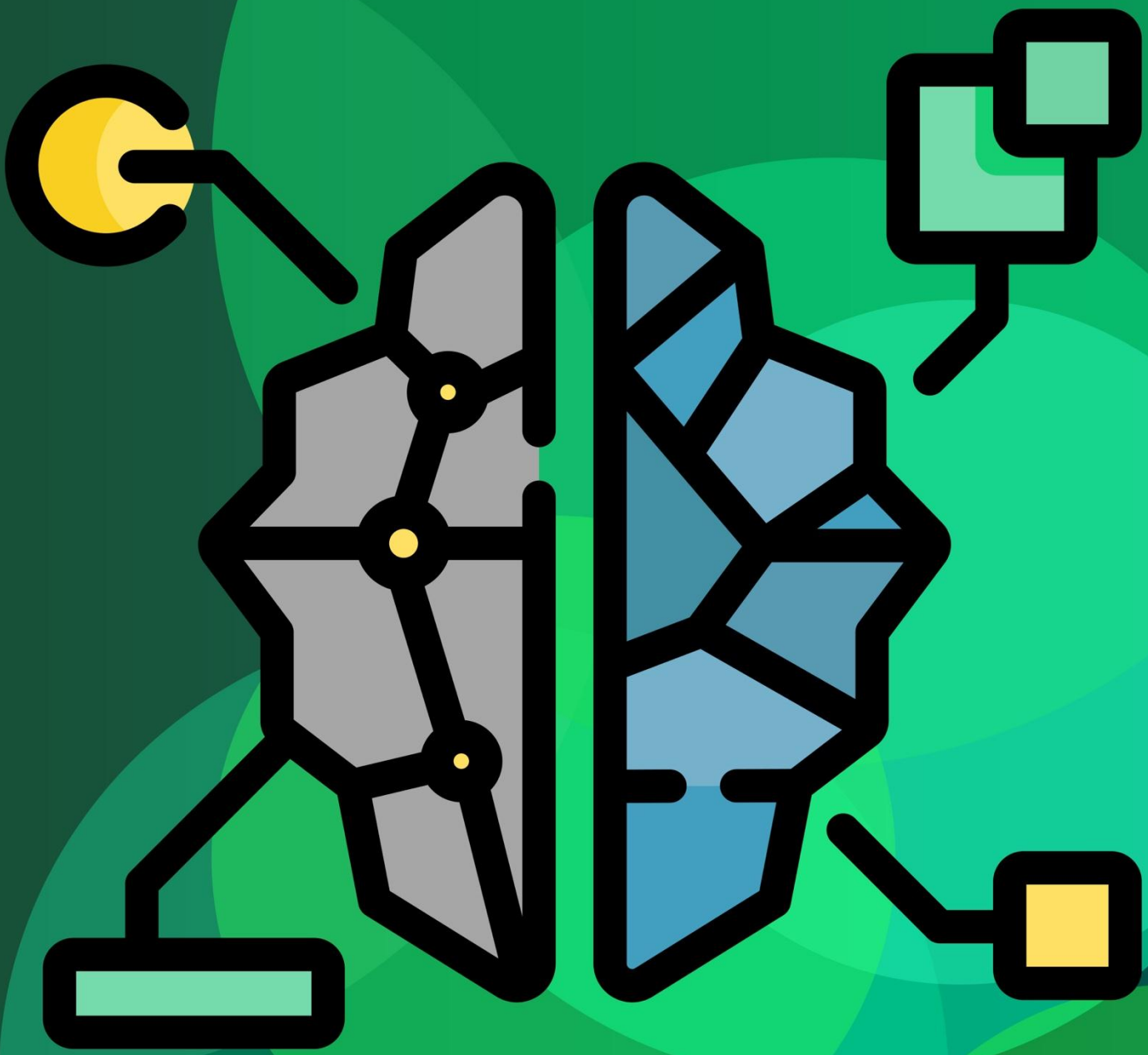
Exploring digital world

JANUARY 2020



Technical Magazine

Maharaja Agrasern Institute of Technology

Department of Computer Science and Engineering

VISION

To produce "Critical Thinkers Of Innovative Technology".

MISSION

To provide excellent learning environment across the computer science discipline to inculcate professional behavior, strong ethical values, innovative research capabilities and leadership abilities which enable them to become succesful enterpeneurs in this globalized world.

To nurture an excellent learning environment that helps students to enhance their problem solving skills and to prepare students to be lifelong learners by offering a solid theoritical foundation with applies computing experiences and educating them about their professional and ethical responsibilities.

To establish Industry - Institute Interaction, making students ready for the industrial environment and be successful in their professional lives.

To promote research abilities who can look technical aspects of an engineer solution therby setting a ground for producing successful enterpreneur.

Technical Magazine Committee

MATES
उद्यमेन हि सिध्यन्ति
कार्याणि न मनोरथैः

MAHARAJA AGRASEN TECHNICAL EDUCATION SOCIETY
New Delhi

Dr. Nand Kishore Garg
Founder & Chief Advisor

Message from Founder & Chief Advisor's Desk

I am extremely happy to know that Department of Computer Science and Engineering, MAIT is releasing 3rd Volume of the Technical Magazine in month of March, 2020.

The magazine, I understand is designed to provide broad range of information focusing on application of existing technology, research, practical explanations and developments in latest trends and techniques.

I acknowledge Dr. Namita Gupta (HOD CSE) and the department for their sincere efforts in release of this magazine.

I also congratulate the Editorial team in getting the magazine printed.

I wish them all success in life.

Dr.Nand Kishore Garg
Founder & Chief Advisor, MATES

MATES
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MAHARAJA AGRASEN TECHNICAL EDUCATION SOCIETY
Registration No. (S-33205 Of 1998)

Founder & Chief Advisor
Dr. Nand Kishore Garg
Keshav Kunj,
7/41 West Punjabi Bagh,
New Delhi-110026

Chairman
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H-7 Ashok Vihar-I
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BP-7 (West) Shalimar Bagh
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BP-40 Shalimar Bagh
Delhi-110088

Prof. (Dr.) M. L. Goyal

Message

I am happy to know that the Department of Computer Science and Engineering, Maharaja Agrasen Institute of Technology is bringing out a Technical magazine containing research papers of the faculty members and students, technical articles on current topics and the projects carried out by the students in the department.

The technical magazine is an appropriate forum for recognizing the talent and contributions made by the pers faculty members and the students of the department.

I am sure that the magazine will be very informative on the state-of-the-art technology and will be useful for one and all. I appreciate the efforts of the HoD of Department of Computer Science and Engineering and the Editorial team for their efforts in bringing out this magazine and wish them all the best.

Prof. (Dr.) M.L. Goyal
Vice Chairman (Academics)
MATES

Regd.Office
Keshav Kunj
7/41, West Punjabi Bagh
New Delhi-110026
Email : mates@mait.ac.in
Web: www.mait.ac.in

Delhi Office
Maharaja Agrasen Institute of Technology
Sector-22, Rohini, Delhi-110086
Ph: 8448186935
Fax : 011-27582095 | Email : mait@mait.ac.in
Web: www.mait.ac.in

Himachal Office
Maharaja Agrasen University
Atal Shiksha Kunj, Kallujhanda, Distt, Solan,
Himachal Pradesh-174103
Ph :093180 -10786 | Email: maitbaddi@gmail.com
Web: www.mau.ac.in

MESSAGE FROM HEAD OF THE DEPARTMENT

On behalf of Computer Science and Engineering Department, Maharaja Agrasen Institute of Technology, I am pleased to announce the launching of the Third volume of Technical Magazine of Computer Science and Engineering Department and to make it available to everyone.

This Technical Magazine aims to disseminate achievements in research and developments, while featuring new break-through in the field of Computer Science Engineering and Technology.

The entire Editorial team did their best to provide a platform for distinguished faculties, researchers, industry experts and students to share the latest accomplishments with fellow researchers, faculties, Industry experts and students whereby disseminating the knowledge gained from their technical endeavors.

As Editor-in-Chief, I am open to exploring the opportunities for making this Technical Magazine an exciting and definitive forum for attracting and publishing high impact research contributions that are innovative and transformative, and for making this technical magazine serve as a forum for disseminating timely and exciting on-going research that can stimulate innovation.

At the end, I would like to thank editorial board members, faculties, Industry experts and students and hope that our collective efforts stimulate further progress in this domain of activity with strong determination at both national and international levels.

Dr. Namita Gupta

Editor-in- Chief

Technical Magazine

Department of Computer Science and Engineering

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FACULTY CORNER: TECHNICAL ARTICLES

HEART FAILURE DETECTION USING AI IN A SINGLE HEARTBEAT

Mool Chand Sharma
Department of Computer Science & Engineering, MAIT, Delhi.

Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. The primary goal is to improve computer behaviour so that it can be called intelligent. It is a field of study based on the premise that smart thought can be regarded as a form of computation one that can be formalized and ultimately mechanized. The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning.

***The success of AI*:** Artificial Intelligence has revolutionized the diagnosis of cancer. The supercomputer of IBM Watson is already able to see deviations in the health of the individual. Statistically, it is found that about 30 % of cases Watson puts patients with an additional diagnosis which is generally missed by medical people. Even more impressive results achieved by AI at the Houston Methodist Research Institute in Texas. Artificial intelligence is used to explore the millions of mammograms (the speed of analysis is 30 times more than human) and gives on solutions with 99% accuracy. A driver in the US, who suffered a pulmonary embolism while driving was saved by the Tesla Autopilot system to drive him to a nearby hospital. Microsoft has demonstrated that AI caught up with the man in the efficiency of automatic speech recognition. The company used the so-called high-precision with recurrent neural networks to achieve result.

Congestive Heart Failure: Nearly 10 %of adults with age above 65 suffer from some congestive heart failure (CHF). There are a variety of different causes for CHF but the fundamental chronic condition generally results from the heart being unable to pump blood effectively through the body. X-rays, blood tests, and ultrasounds all offer clinicians useful ways to diagnose CHF, but one of the more common methods involves using electrocardiogram (ECG) signals to determine heart rate variability over several minutes or even multiple measurements over days. An impressive new approach has now been demonstrated, using a convolutional neural network (CNN) that can identify CHF nearly instantly by checking ECG data from just one heartbeat.

How it can be detected using AI: Applying artificial intelligence to the electrocardiogram (ECG) enables early detection of left ventricular dysfunction and can identify individuals at increased risk for its development in the future. The research published in Nature Medicine found that the accuracy of the AI/ECG compares favourably to other standard screening tests like prostate-specific antigen for prostate cancer and mammography for breast cancer. Asymptomatic left ventricular dysfunction (ALVD) is characterized by the presence of a weak heart pump with a risk of heart failure. It is present in 3% to 6% of the general population and is associated with reduced quality of life and longevity. However, it is treatable when found. Currently, there is no inexpensive, non-invasive, painless screening tool for ALVD available for diagnostic use. To address this, Paul Friedman and colleagues tested whether ALVD could be reliably detected in the ECG by a properly trained neural network. The team used paired 12-lead ECG and echocardiogram data, including the left ventricular ejection fraction (a measure of contractile

function), from 44,958 patients at the Mayo Clinic, and trained a convolutional neural network to identify patients with ventricular dysfunction, defined as ejection fraction less than 35 %, using the ECG data alone. "This suggests the network detected early, subclinical, metabolic or structural abnormalities that manifest in the ECG," says Friedman. He trained and tested the CNN model on large publicly available ECG datasets featuring subjects with CHF as well as healthy, non-arrhythmic hearts. As Massaro proposes, the team's system is currently reporting an incredible 100 % accuracy rate, but the research is not without some limitations. Most importantly, the data used in the current study only consisted of ECG readings from either severe CHF patients or healthy subjects.

DATA SCIENCE

Dr. Deepak Gupta
Department of Computer Science & Engineering, MAIT, Delhi.

Data science is a multidisciplinary blend of data inference, algorithm development, and technology to solve analytically complex problems. At the core is data. Troves of raw information, streaming in and stored in enterprise data warehouses. Much to learn by mining it. Advanced capabilities we can build with it. Data science is ultimately about using this data in creative ways to generate business value:

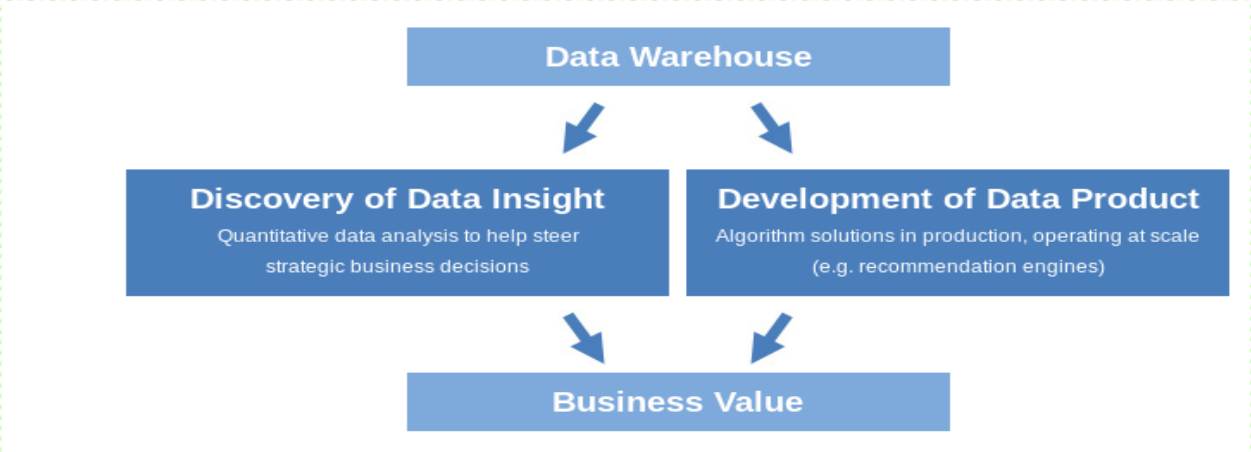


Fig. 1: Data science – the discovery of data insight

This aspect of data science is all about uncovering findings from data. Diving in at a granular level to mine and understand complex behaviours, trends, and inferences. It's about surfacing hidden insight that can help enable companies to make smarter business decisions. For example:

• Netflix data mines movie viewing patterns to understand what drives user interest, and uses that to make decisions on which Netflix original series to produce.

• Target identifies what are major customer segments within its base and the unique shopping behaviours within those segments, which helps to guide messaging to different market audiences.

• Proctor & Gamble utilizes time series models to more clearly understand future demand, which helps plan for production levels more optimally.

How do data scientists mine out insights? It starts with data exploration.

When given a challenging question, data scientists become detectives. They investigate leads and try to understand patterns or characteristics within the data. This requires a big dose of analytical creativity. Then as needed, data scientists may apply a quantitative technique to get a level deeper – e.g. inferential models, segmentation analysis, time series forecasting, synthetic control experiments, etc.

5G -5TH Generation Mobile Network

Dr. Neeraj Garg
Department of Computer Science & Engineering, MAIT, Delhi.

5G is a new kind of network: a platform for innovations that will not only enhances today's mobile broadband services, but will also expand mobile networks to support a vast diversity of devices and services and connect new industries with improved performance, efficiency, and cost. 5G will redefine a broad range of industries with connected services from retail to education, transportation to entertainment, and everything in between. We see 5G as technology as transformative as the automobile and electricity.

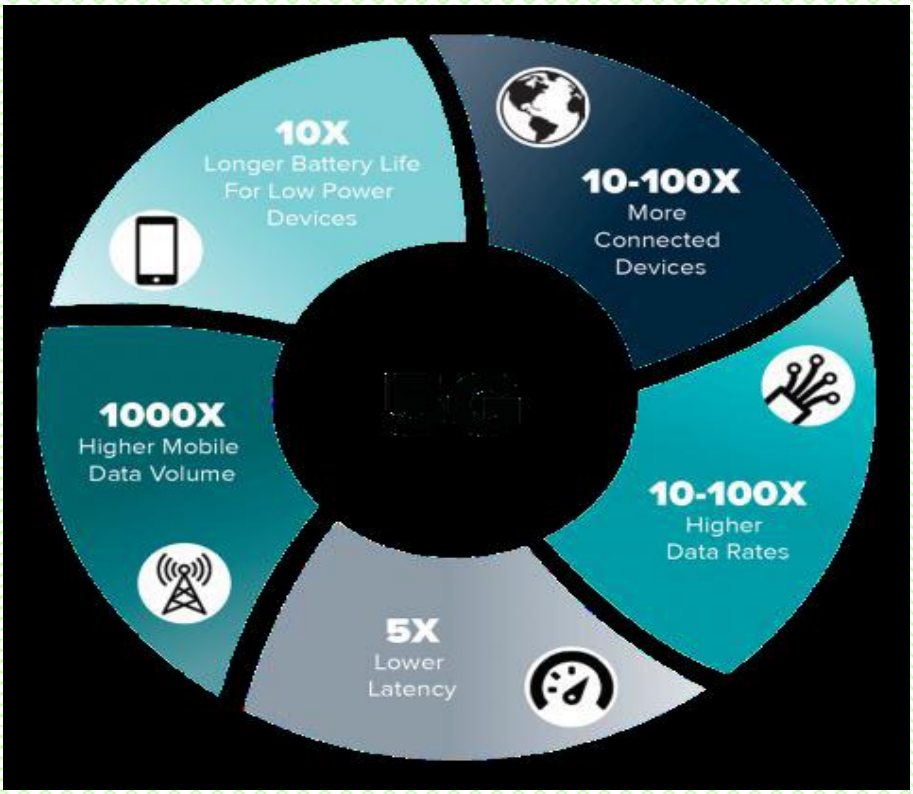


Fig. 2: Facets of 5G

In general, 5G use cases can be broadly categorized into three main types of connected services:

- Enhanced Mobile Broadband: 5G will not only make our smartphones better, but it will also usher in new immersive experiences, such as VR and AR, with faster, more uniform data rates, lower latency, and cost-per-bit.
- Mission-Critical communications: 5G will enable new services that can transform industries with ultra-reliable/available, low latency links—such as remote control of critical infrastructure, vehicles, and medical procedures.
- Massive Internet of Things: 5G will seamlessly connect a massive number of embedded sensors in virtually everything through the ability to scale down in data rates, power and mobility to provide extremely lean/low-cost solutions.

A defining capability of 5G is also the design for forwarding compatibility—the ability to flexibly support future services that are unknown today.

Per IMT-2020 requirements, 5G is expected to deliver peak data rates up to 20 Gbps. Qualcomm Technologies' first 5G NR modem, the Qualcomm® Snapdragon™ X50 5G modem, is designed to achieve up to 5 Gbps in a downlink peak data rate.

Fig 3: Mobile Generations

The new 5G NR air interface introduces many foundational wireless inventions, and in our opinion, the top five are:

1. Scalable OFDM numerology with 2n scaling of subcarrier spacing
2. Flexible, dynamic, self-contained TDD sub-frame design
3. Advanced, flexible LDPC channel coding
4. Advanced massive MIMO antenna technologies
5. Advanced spectrum sharing techniques

5G is a unified platform that is more capable than 4G

While 4G LTE focused on delivering much faster mobile broadband services than 3G, 5G is designed to be a unified, more capable platform that will not only elevate mobile broadband experiences but also support new services such as mission-critical communications and the massive IoT. 5G will also natively support all spectrum types (licensed, shared, unlicensed) and bands (low, mid, high), a wide range of deployment models (from traditional macro-cells to hotspots), as well as new ways to interconnect (such as device-to-device and multi-hop mesh

INTERNET OF THINGS

Ms. Neelam Sharma
Department of Computer Science & Engineering, MAIT, Delhi.

Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and other connected devices. The IoT is a giant network of connected things and people – all of which collect and share data about the way they are used and about the environment around them.

That includes an extraordinary number of objects of all shapes and sizes – from smart microwaves, which automatically cook your food for the right length of time, to self-driving cars, whose complex sensors detect objects in their path, to wearable fitness devices that measure your heart rate and the number of steps you've taken that day, then use that information to suggest exercise plans tailored to you

4

Fig. 4: Internet Of Things

Devices and objects with built-in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs. These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information detects patterns, make recommendations, and detect possible problems before they occur.

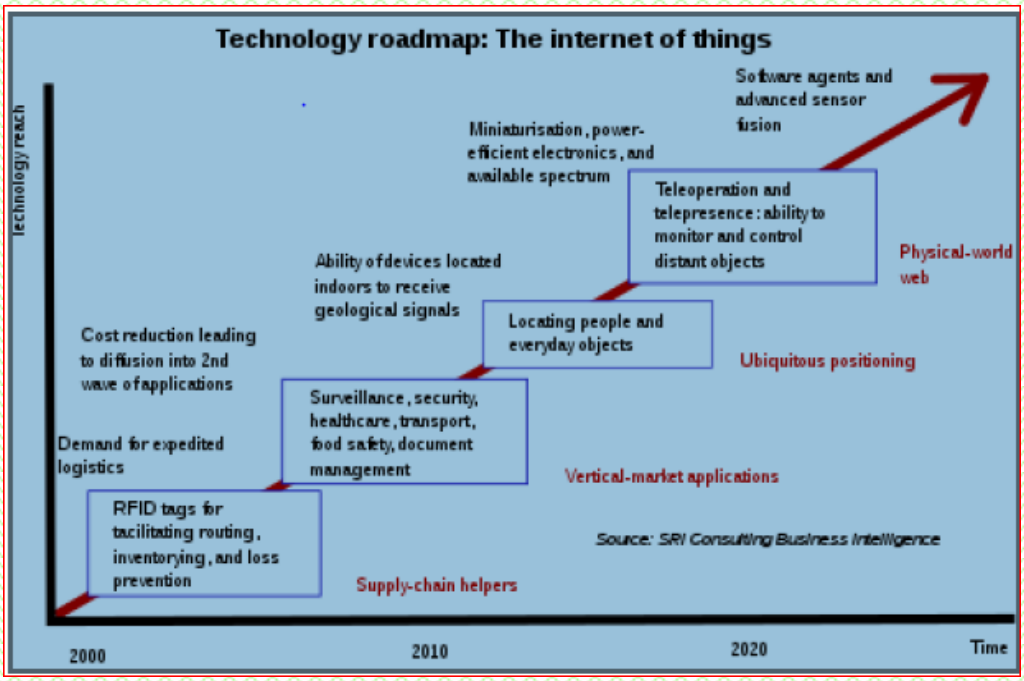


Fig. 5: Technology RoadMap

For example, if I own a car manufacturing business, I might want to know which optional components (leather seats or alloy wheels, for example) are the most popular. Using Internet of Things technology, I can use sensors to detect which areas in a showroom are the most popular, and where customers linger longest; Drill down into the available sales data to identify which components are selling fastest; Automatically align sales data with supply, so that popular items don't go out of stock. The information picked up by connected devices enables me to make smart decisions about which components to stock up on, based on real-time information, which helps me save time and money. With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean you can automate certain tasks, particularly when these are repetitive, mundane, time-consuming or even dangerous.

Why Kotlin is the future of Android application development?

Dr. Ashish Khanna
Department of Computer Science & Engineering, MAIT, Delhi.

Kotlin, a statically-typed programming language that is 100% compatible with Java, can be compiled to JavaScript and runs on the Java Virtual Machine (JVM), which was created by JetBrains back in 2010. JetBrains' major goal was to design an industrial-level object-oriented programming language that would be fully compatible with existing Java and Android projects and still eliminate some of the biggest issues of Java programming including nullity and excessive coding. Over the years, the language had gone through many stages before its stable version was unveiled in 2016.

Kotlin is relevant today because of two reasons.

- It has been developed as a solution to the problems that Android developers have faced over some time. Therefore, it answers most of the main issues that surfaced in Java, providing developers with interoperability, safety, clarity, and tooling support.
- But the reason why it is touted as a tour-de-force in the Android app development ecosystem is because major tech giant and the parent company of Android – Google, in its annual developer conference 'Google I/O 2017' announced that Kotlin is now an official Android language and Google will provide its first-class support for Kotlin on the Android platform. With Google itself becoming Kotlin oriented, major developers, are moving towards adopting it and the fact that many Java apps are being rewritten in Kotlin now, is being viewed as the future of building Android apps.

The growth rate of Kotlin

The fastest-growing language community in percentage terms is Kotlin. It grew by 58% in 2018 from 1.1M to 1.7M developers. Since Google has made Kotlin a first-class language for Android development, this growth is expected to continue, in a similar way to how Swift overtook Objective-C for iOS development. This language is simply creating waves in the world of android application development. Kotlin will continue to grow in popularity, and eventually dominate the Android space especially for new applications built in it. The biggest question out there is whether it will manage to spread out into other parts of development as successfully as it's managed to spread into Android not only but also web via KotlinJS, and native compilation targets.

"Data suggests that central black holes might play an important role in adjusting how many stars form in the galaxies they inhabit. For one thing, the energy produced when matter falls into the black hole may heat up the surrounding gas at the center of the galaxy, thus preventing cooling and halting star formation."

Priyamvada Natarajan

"The Black holes of nature are the most perfect macroscopic objects there are in the universe: the only elements in their construction are out concepts of space and time."

Subrahmanyan Chandrasekhar
1910 to 1995

STUDENT'S CORNER: TECHNICAL ARTICLES

5G TECHNOLOGY

Barbie Sehgal, CSE

5G technology is a breakthrough ,with a goal is to design a real wireless world that is free from the obstacles of the earlier generation. The 5G technology includes all major and advanced features which make it popular and in huge demand in the future. It offers bidirectional huge bandwidth. It makes the wireless world with no more limitations with access and zone issues. It creates one unified global standard. The advanced charge interfaces of 5G technology make it a lot of enticing and effective. The 5G technology is providing up to 25 Mbps connectivity speeds. 5G technology also supports virtual private networks. Security increases and no one can easily hack the system but this problem occurs with the 4G technology. Simply said 5G is widely believed to be smarter, faster and better than 4G. As compared to speeds 5G is 100 times faster than 4G technology. 5G will be used to fix bandwidth issues.

There are major benefits of 5G Technology like some are What if you can access your office desktop right now while you are laying on your bed? What if you can identify your stolen phone in a nanosecond? What if you're mobile can identify the best server and may more. Some Specific Uses of 5G technologies are like it will not only be faster than current 4G but also can revolutionize other sectors such as production, automotive, healthcare, and energy. 5G will replace the experience and support up to 10 to 20 GBPS download speed. It's equivalent to a fibre optic internet connection accessed wirelessly. The two components, 'Radio access network' and ' Core network' have varied kinds of facilities together with little cells, towers, masts and are dedicated in-building and residential systems that connect mobile users and wireless devices to the main core network. Low latency and IOT are main features for development using a supercharged 5G wireless network. IoT connects every appliance with sensor and it could be better developed with the help of 5G technology like Logistic, Shipping industry and Smart farming.

Smart towers: Application of 5G Technology

The Smart Towers by QOGNO are introduced in Indian Mobile Congress, 2019. The smart tower is the latest make in India project that uses the 5G technology. The smart tower is a modular, Scalable and extendable tower that integrates end to end city-centric services, helps in accessing helpful information and sector-based transactions. They are designed in such a way that they can deliver an array of diverse citizen needs, municipality administrative needs and ensuring public safety. The smart towers can be used for multiple targets. It has a different section for different functioning. The section includes the emergency services section, smart banner section, security cameras, Drone system. The first and the lower section is the Emergency services. If any an accident has happened nearby, people can press the switch to avail the security services, it includes the ambulance, police services and in the minimum time, the emergency services would be provided. The next section, Smart banner section keeps an eye on the people watching the banners and advertisements. The smart camera included in this section will look for the movement of eye-ball of the person and take into account how many people have seen the banners and for how much time. Above it, there are three different cameras installed parallelly which is used for security purposes and has a higher range of visibility. If any person tries to skips the traffic systems then these cameras detect the person's information. So, from this section traffic controlling is done. The last and the above most section of the smart tower includes the drone system. In a nutshell, this smart tower includes all the basic amenities needed by the city for its proper working. Whether it is of security or emergency services this tower has all the basic needs for a city. These types of towers are already installed by the company in some parts of Chennai. And the initial cost of the installation is around 80 to 90 lacks and surely in the next years, it will be set up in many parts of the country.

ARTIFICIAL INTELLIGENCE IN AUTONOMOUS VEHICLES

Siddharth Seth, 35414802717, CSE

Artificial Intelligence is the intelligence that is displayed by machines. AI can perform functions like learning, problem-solving and implementation in various fields. AI has an application in various fields like machine learning, natural language processing, robotics, medical diagnosis, computer vision, and planning. Autonomous vehicles are one of the greatest uses of AI. Autonomous vehicles are vehicles that are self-driven, driverless or robot-driven cars. It is a vehicle that can sense the environment around it and moves with no input or partial input by the human. These driverless cars combine a variety of sensors to understand and realize their surroundings. These sensors are sonar, odometer and inertial measuring units, radar and GPS (Global Positioning System). The autonomous vehicles become aware of the obstacles coming their way and also identify the suitable navigation paths. Though people think that self-drive cars are the future, there is still a no. of challenges in its way. These cars cannot recognize the presence of bicyclists and pedestrians on roads, as well as any animal which might appear on a road. AI will be used for speech recognition, eye tracking, the camera capturing, road condition evaluation, virtual assistance, and driver monitoring. The autonomous vehicles are provided with cognitive functions and logical as well as decision-making capabilities just like the human drivers possess so that they can adjust to any situation of traffic to avoid any accidents. These cars are provided with these sensors and other communication devices so that they can store this huge amount of data and AI enables them to analyze the way the car should drive. This data is processed by supercomputers and other data communication systems. The radars and cameras are used to generate the surrounding area, the traffic conditions and give all the valuable inputs to the autonomous driving cloud platform. There is an intelligent agent that makes use of AI algorithms to take meaningful and correct decisions. All the previous data is also stored which might help in making future decisions if any same condition is encountered. All the driving experiences are stored in the database so that safer and better experiences can be created for the users. Artificial Intelligence, especially the neural networks and deep learning are the key factors in the proper and safe functioning of the autonomous vehicles.

Fig. 6: AI controlled vehicle

AZURE SPRING CLOUD: FULLY MANAGED SERVICE FOR SPRING BOOT MICROSERVICES

Swati Singh, 20814802716, CSE

As customers have moved their workloads to the cloud, we've seen a growth in the use of cloud-native architectures, particularly micro-services. Micro-service-based architectures help improve scalability and velocity but implementing them can pose challenges. For many Java developers, Spring Boot and Spring Cloud have helped address these challenges, providing a robust platform with well-established patterns for developing and operating micro-service applications. But creating and maintaining a Spring Cloud environment requires work, such as setting up the infrastructure for dynamic scaling, installing and managing multiple components, and wiring up the application to your logging infrastructure. To help make it simpler to deploy and operate Spring Cloud applications, together with Pivotal, Microsoft has created Azure Spring Cloud. Azure Spring Cloud is jointly built, operated, and supported by both Pivotal and Microsoft. This means that you can use Azure Spring Cloud for your most demanding applications and know that both Pivotal and Microsoft are standing behind the service to ensure your success. High productivity development Azure Spring Cloud abstracts away the complexity of infrastructure management and Spring Cloud middleware management, so you can focus on building your business logic and let Azure take care of dynamic scaling, security patches, compliance standards, and high availability. With a few clicks, you can provision an Azure Spring Cloud instance. After configuring a couple of dependencies in your pom file, your Spring Cloud app is automatically wired up with Spring Cloud Config Server and Service Registry. Furthermore, you can deploy and scale Spring Boot applications in seconds. Ease of monitoring With out-of-the-box support for aggregating logs, metrics, and distributed app traces into Azure Monitor, you can easily visualize how your applications are performing, detect and diagnose issues across micro-service applications and their dependencies, drill into monitoring data for troubleshooting and gain a better understanding of what end-users do with your apps.

Open-source innovation with Spring integrations Azure Spring Cloud sets up the compute foundation for cloud-native Spring applications. From there, Azure Spring Cloud makes it simple to connect to data services such as Azure SQL Database, MySQL, PostgreSQL, or Cosmos DB to enable enterprise-grade end-user authentication and authorization using Azure Active Directory, to bind cloud streams with Service Bus or Event Hubs, and to load and manage secrets with Azure Key Vault.

No Shortage of Machine Learning Talent

Bhavye Sharma, IV year, CSE

If you thought learning some machine learning models and making a few projects on data would be sufficient to land you a job in the financial sector then the report on "machine learning in financial services" from the Bank of England and Financial Conduct Authority (FCA) will come as a bit of a shock. The report is based on a survey of 106 banks and finance firms in London. It turns out that, yes, machine learning is being used in banks. But, no, it's not hard to find anyone to fill the roles and that this is the least of the worries as machine learning is rolled out across the finance sector. The Bank of England and FCA also asked survey respondents what their problems were in implementing machine learning solutions. As the chart below shows, a shortage of machine learning talent was not top of the list.

Instead, banks ranked machine learning talent shortages as a negligible constraint alongside the horror of maintaining old legacy systems. Other problems faced by investment capital firms are the lack of explain ability and insufficient data.

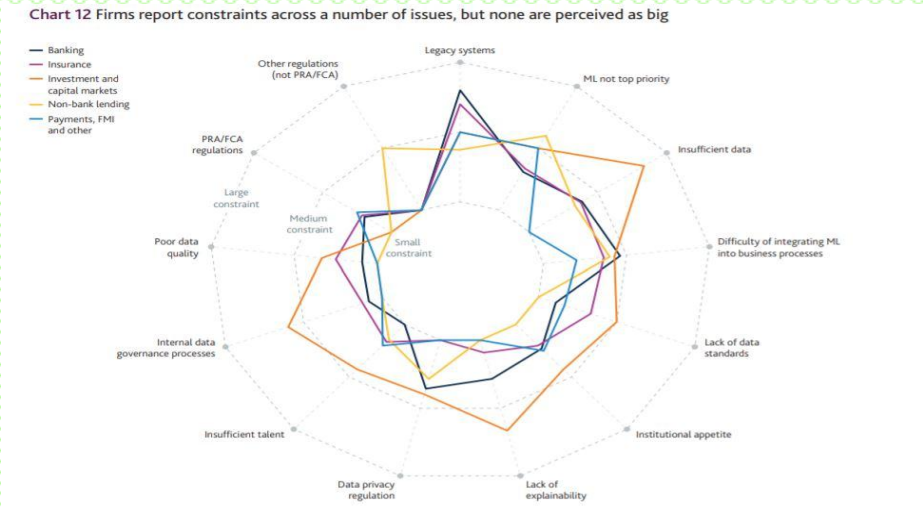


Fig. 7: Firms Reports

Another key factor to take into consideration is that Firms mostly design and develop ML applications in-house. However, they sometimes rely on third-party providers for the underlying platforms and infrastructure, such as cloud computing.

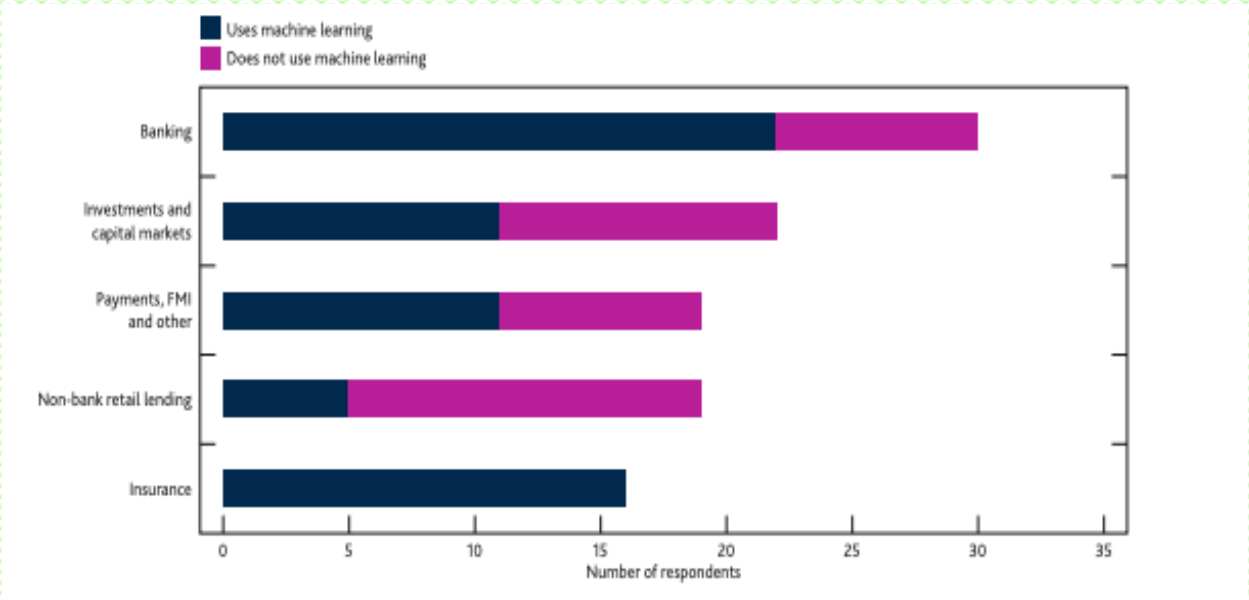


Fig. 8:MACHINE LEARNING 'S USE IN SECTORS

AUGMENTED REALITY AND VIRTUAL REALITY

Tanya Goel (36614802718), CSE

One of the biggest confusions in the world of augmented reality is the difference between augmented reality and virtual reality. Both are earning a lot of media attention and are promising tremendous growth. So, what is the difference between virtual reality vs. augmented reality?

Virtual reality (VR) is an artificial, computer-generated simulation or recreation of a real-life environment or situation. It immerses the user by making them feel like they are experiencing the simulated reality first-hand, primarily by stimulating their vision and hearing. VR is typically achieved by wearing a headset like Facebook's Oculus equipped with the technology, and is used prominently in two different ways:

- To create and enhance an imaginary reality for gaming, entertainment, and play (Such as video and computer games, or 3D movies, head-mounted display).
- To enhance training for real-life environments by creating a simulation of reality where people can practice beforehand (Such as flight simulators for pilots).

Virtual reality is possible through a coding language known as VRML (Virtual Reality Modelling Language) which can be used to create a series of images, and specify what types of interactions are possible for them.

Augmented reality (AR) is a technology that layers computer-generated enhancements atop an existing reality to make it more meaningful through the ability to interact with it. AR is developed into apps and used on mobile devices to blend digital components into the real world in such a way that they enhance one another, but can also be told apart easily. AR technology is quickly coming into the mainstream. It is used to display score overlays on telecasted sports games and pop out 3D emails, photos or text messages on mobile devices. Leaders of the tech industry are also using AR to do amazing and revolutionary things with holograms and motion-activated commands.

Augmented reality and virtual reality are inverse reflections of one in another with what each technology seeks to accomplish and deliver for the user. Virtual reality offers a digital recreation of a real-life setting, while augmented reality delivers virtual elements as an overlay to the real world.

Virtual is real now! VR and AR, the twin technologies that let you experience things in virtual, that are extremely close to real, are today being used by businesses of all sizes and shapes. But the underlying technology can be quite complex. Medical students use AR technology to practice surgery in a controlled environment. VR, on the other hand, opens up newer avenues for gaming and interactive marketing.

Both technologies are still in their emerging stages but hold immense promise for businesses even now. Moreover, an entrepreneur that enters the industry early improves the chances for success. AR/VR development is steadily getting easier and cheaper. 5G networks will facilitate super-fast downloads and streaming, energizing VR and AR devices.

Fig. 9:Augmented Reality vs Virtual Reality

STUDENT'S CORNER: PROJECTS

Real-Time Drowsiness Detection

Team Name - Project Hunters
Pratham Verma-07114802716, Rohit Shastri-08114802716, Nischal Tyagi-06614802716

Introduction and Working

Because of the hazard that drowsiness is present on the road, then methods need to be developed for counteracting its effects. This project aims to develop a prototype drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes in real-time. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. Detection of fatigue involves the observation of eye movements and blink patterns in a sequence of images of a face-Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue-related crashes.

First, the facial image is input using a webcam. Pre-processing was first performed by binarizing the image. The top and sides of the face were detected to narrow down the area where the eyes exist. Using the sides of the face, the center of the face was found which will be used as a reference when computing the left and right eyes. Moving down from the top of the face, horizontal averages of the face area were calculated. Large changes in the averages were used to define the eye area. There was little change in the horizontal average when the eyes were closed which was used to detect a blink. However, Matlab had some serious limitations. The processing capacities required by Matlab were very high. Also, there were some problems with speed in real-time processing. Matlab was capable of processing only 4-5 frames per second. On a system with a low RAM, this was even lower. As we all know an eye blink is a matter of milliseconds. Also a drivers head movements can be pretty fast. Though the Matlab program designed by us detected an eye blink, the performance was found severely wanting. This is where OpenCV came in. OpenCV is an open-source computer vision library. It is designed for computational efficiency and with a strong focus on real-time applications. It helps to build sophisticated vision applications quickly and easily. OpenCV satisfied the low processing power and high speed requirements of our application. We have used the Haar training applications in OpenCV to detect the face and eyes. The steps were as follows:-

Working: Gather a data set of face and eye. These should be stored in one or more directories indexed by a text file. A lot of high quality data is required for the classifier to work well. The utility application creates samples() is used to build a vector output file. Using this file we can repeat the training procedure. It extracts the positive samples from images before normalizing and resizing to specified width and height. The Viola-Jones cascade decides whether or not the object in an image is similar to the training set. Any image that doesn't contain the object of interest can be turned into negative sample. So in order to learn any object it is required to take a sample of negative background image. All these negative images are put in one file and then it's indexed. Training of the image is done using boosting. In training we learn the group of classifiers one at a time. Each classifier in the group is a weak classifier. These weak classifiers are typically composed of a single variable decision tree called stumps. Between training each classifier one by one, the data points are reweighted so that more attention is paid to the data points where errors were made. This process continues until the total error over the dataset arising from the combined weighted vote of the decision trees falls below a certain threshold.

Crowd Count and Density Mapping Using Dilated CNN

Team Name: Team Rocket
Deepak Jindal: 35514802716, Kamaljot Singh Pannu: 35714802716, Vishal Yadav: 11414802716

Abstract: There is a need for accurate crowd counting, crowd control or similar security services. We propose a solution in the form of a congested scene analysis tool or Congested Scene Recognition (CSRNet) that performs a data-supported and deep learning-enabled operation to count the number of people in a crowd and also to generate a high-quality density map. Density map is extremely useful as a simple count is not enough as the same number of people could have dissimilar crowd density. The proposed CSRNet is composed of two major components a convolutional neural network (CNN) as the front-end for 2D feature extraction and a dilated CNN for the back-end, which uses dilated kernels to deliver larger reception fields and to replace pooling operations.

Handwritten Digits Recognition using Convolutional Neural Network

Team Name - Technocrats
Raaghav Mathur (44614802716), Bhavya Grover (60196402716), Anuj (01614802716)

Abstract - Recent advancements in machine learning and artificial intelligence are pushing the frontier of what machines are capable of doing in all facets of business and the economy. Handwritten digits recognition is a complex task that is central to a variety of emerging applications. It has been widely used by machine learning researchers for implementing practical applications like computerized bank check numbers reading. In this project, we will use a convolutional neural network (CNN) which will be implemented using Keras library. CNN is a class of deep neural networks which is commonly applied for evaluating visual images. The testing will be conducted from the publicly available MNIST handwritten dataset which contains 60,000 training images and 10,000 testing images. The data will be pre-processed using matrices of size 28 X 28 with varying values. The optimizer used will be RMSProp while the activation function will be rectified linear unit (RLU). Through this project, we aim to achieve high accuracy in recognizing handwritten digits using machine learning.

Animated Character Face Generation using Deep Convolutional Generative Adversarial Networks(DCGANs)

Team:GAN
Vipin Bhardwaj(11314802716), Bittoo Aggarwal(02914802716), Savitoj Singh (09514802716)

Abstract: Face generation in the animation industry is a lot harder work to do and involves lots of human intervention and creativity. It is very time consuming and also required lots of research for the creator to understand the previous used animated character in the series which also increases the cost as well. We are trying to make this thing autonomous, using DCGANs i.e (deep convolutional generative adversarial Network) With the recent development in Generative adversarial network(GAN) we feel that we can produce exceptionally accurate animated visual images. In the project, we will use “ANIMATED CHARACTER DATASET “ from kaggle and will get the bottleneck features extractions of the characters using auto encoders and finally we will train these features to GAN to produce accurate visual animated images.

STUDENT'S CORNER: SUMMER INTERNSHIPS

Neural Architecture Search for Semantic Segmentation and LSTM based NDVI prediction

Harshit Singhal (01596402716)-CSE

Technology: Deep Learning
Company: Indian Space Research Organization – ISRO
Project Description:
The project was titled "Neural Architecture Search for Semantic Segmentation and LSTM based NDVI prediction". The internship project comprised of 3 parts: - 1) Neural Architecture Search (NAS) for Semantic Segmentation, 2) Model Size Optimization Using Google-Morphnet and 3) Hyper Parameter Search for LSTM based Network for NDVI prediction and UNET for Semantic Segmentation.

The first problem that was focused, was Neural Network Architecture Search. Developing neural network models often requires significant architectural engineering. This requires specialized skills and is challenging in general, we may not even know the limits of the current state-of-the-art techniques! It's a lot of trial and error and the experimentation itself is time-consuming and expensive. This is where NAS comes in. NAS is an algorithm that *searches* for the best *neural network architecture*. For this task of Neural Architecture Search for Semantic Segmentation, we first implemented Hierarchal NAS(HNAS) developed by Google in April 2019, followed by a few more NAS approaches to see what works the best. We did the comparative analysis of different NAS approaches and understood the basic idea which helps in such a task. Then we implemented DARTS: DIFFERENTIABLE ARCHITECTURE SEARCH which was a NAS approach for classification tasks and using the understanding from all the above approaches we successfully ported the idea of DARTS to a Semantic Segmentation problem. We concluded by finding a new NAS approach and implemented an end-to-end pipeline for the above-proposed network which can be used by ISRO scientists to carry out their research on the ISRO AI cloud.

The second problem that we focused on was Model size. Usually, when we work on a Deep Learning based solution the model size varies from 500 MB to a few GB's thus making it difficult to deploy on a small processing device like mobile systems. In these cases, the models are deployed on very powerful machines with very high memory like in a Cloud-based environment. To solve this problem, we used Morphnet, developed by Google in April 2018, which takes a seed network and reduces the model size of the seed network by removing the dead and least contribution kernels in a Convolution Neural Network. Using this approach, we were able to reduce the model size of UNET based architecture for Satellite Image Urban Area Segmentation from 360Mb to 4.9Mb.

Lastly, we compared the implementation of different Hyper-Parameter Optimization techniques. Tuning of Hyper-Parameters in neural networks and basic machine learning approaches is very important because a better set of hyper-parameters can lead to a very significant solution. For this task, we compared the working of *HyperBand* and *Bayesian Optimization of HyperBand* (BOHB) which are the top 2 approached for hyper-parameter tuning. We conclude that BOHB works better for our required task.In the end, we implemented an end-to-end pipeline for Hyper-Parameter tuning for the NDVI prediction task, and an end-to-end pipeline for Semantic Segmentation task.

Quarter Allotment Web Application

Aakanksha Dubey (00114802717), III rd year

Company Name: Airports Authority of India
Airports Authority of India allot quarters to its employees with the help of a procedure that is mainly done by paperwork and no Digital support is used in this procedure which takes an appreciable amount of time. As all of these procedures and work are done manually it can lead to

certain problems. Also, this process requires more human labor and energy. Hence this process causes time and energy wastage. To resolve these issues in current systems a digital system of quarter allotment for Airports Authority of India is made under this project to digitalize all the tasks which are usually done manually. This application is a website that would do all processes which are required to allot quarters to a particular employee. All tasks, form submission, verification, quarter allotment are done using this website. Existing employees can log in themselves on the application. After login, he/she can fill the application form by accepting terms and conditions. After this verification by the HR department and allotment is done by Quarter Admin. All these processes are done under one roof. This application saves both the time and energy required for the same procedure. Also, this procedure is more reliable as compared to the previous manual procedure as the previous process can lead to various problems.

Cartpole environment

Pratyush Goyal (40996402717),IIIrd year

Training technology used: Deep Q Neural Networks (Reinforcement + Deep Learning)

Company profile: Online Course (Coursera)

The aim of the project was to develop an agent/algorithm to solve the Cartpole environment provided by the OpenAI Gym Python Library. The project utilizes Deep-Q Neural Networks, Or Deep-Q learning in short, to accomplish the aforementioned aim. Firstly, the Cartpole environment as provided by the OpenAI gym comes with predefined action space and state space. The actions space contains the actions that the agent can perform and the state space contains values for the current state which are changed according to previous state and action performed on it. The *'win'* condition for the cartpole environment is to prevent the upright pendulum from falling over for at least 195 timesteps in at least 100 consecutive episodes. The score is calculated according to the number of timesteps the pendulum survives. Secondly, the technology used – Deep-Q learning – was first demonstrated by Google's DeepMind in 2013 which demonstrated an AI agent learning to play Atari games by just observing the screen without any prior information about the games. The name itself is a combination of two machine learning algorithms Q-Learning from Reinforcement learning branch and Deep Learning.

The project demonstrates the use of this technology to solve the cartpole environment. The technology itself is easy to understand and simply utilizes neural networks to approximate Q-value functions. This also happens to be the biggest difference between conventional Q-Learning and Deep Q-Learning, that instead of using single Q-value to train the agent, here the agent selects max Q-value output from the number of Q-value functions approximated by the neural network. The biggest challenge to this learning is the presence of an unknown target value, which is important to calculate the loss value. Hence memorization and replay functions play an important part in the realization of this technology in practical. Memorization is used to memorize the experience of the agent when it explores the environment, while replay function trains the agent on some random batch of these memorized experiences.

In the end, without any prior information about the game, the agent successfully demonstrated its ability to survive for as many as 300 timesteps for more than 150 consecutive episodes, which can be improved further by simply using a machine with better specifications.

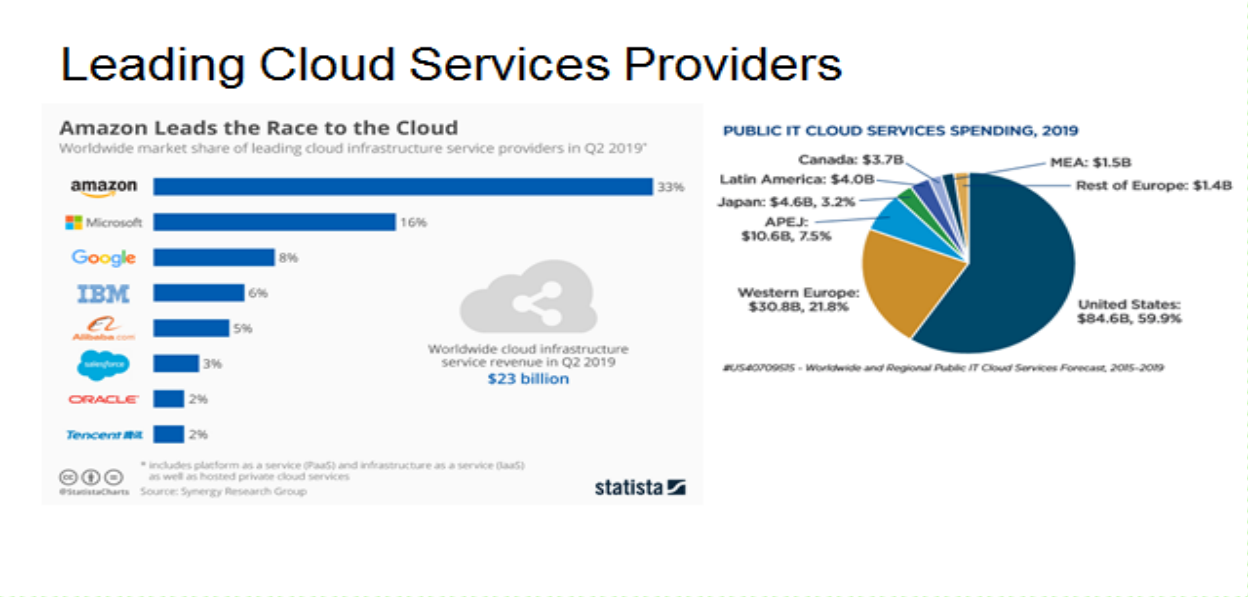
Your contribution to the project: The project was developed and tested independently without external help. The method to create the DQN agent was derived from internet sources such as analytics viyda, towards data science, medium and github.

ALUMNI CORNER: TECHNICAL ARTICLES

AMAZON ELASTIC BLOCK STORE

Kshitij Singh, IBM, GURUGRAM(Batch 2000-2004)

Here I would like to describe about some cloud service providers and role of Amazon Co. and its stake with various technologies like EBS,S3,VBC,AMR etc.



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Amazon Elastic Block Store (EBS)

- Provides block level storage volumes (1 GB to 1 TB) for use with Amazon EC2 instances.
  - Multiple volumes can be mounted to the same instance.
  - EBS volumes are network-attached, and persist independently from the life
  - Storage volumes behave like raw, unformatted block devices, allowing users to create a file system on top of Amazon EBS volumes, or use them in any other way you would use a block device (like a hard drive).
- EBS volumes are placed in a specific Availability Zone, and can then be attached to instances also in that same Availability Zone.
- Each storage volume is automatically replicated within the same Availability Zone.

Amazon Simple Storage Service (S3)

- Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web.
- Write, read, and delete objects containing from 1 byte to 5 terabytes of data each. The number of objects you can store is unlimited.
- Each object is stored in a bucket and retrieved via a unique, developer-assigned key.
  - A bucket can be stored in one of several Regions.
  - You can choose a Region to optimize for latency, minimize costs, or address regulatory requirements.
  - Objects stored in a Region never leave the Region unless you transfer them out.

Amazon Virtual Private Cloud (VPC)

- Amazon VPC lets you provision a logically isolated section of the Amazon Web Services (AWS) Cloud.
- You have complete control over your virtual networking environment, including:
  - selection of your own IP address range,
  - creation of subnets, and
  - configuration of route tables and network gateways.

- VPC allows bridging with an onsite IT infrastructure with an encrypted VPN connection with an extra charge per VPN Connection-hour.
- There is no additional charge for using Amazon Virtual Private Cloud, aside from the normal Amazon EC2 usage charges.

Amazon Elastic MapReduce (EMR)

- Amazon EMR is a web service that makes it easy to quickly and cost-effectively process vast amounts of data using Hadoop.
- Amazon EMR distribute the data and processing across a resizable cluster of Amazon EC2 instances.
- With Amazon EMR you can launch a persistent cluster that stays up indefinitely or a temporary cluster that terminates after the analysis is complete.
- Amazon EMR supports a variety of Amazon EC2 instance types and Amazon EC2 pricing options (On-Demand, Reserved, and Spot).

Amazon Relational Database Service (RDS)

- Amazon RDS is a web service that makes it easy to set up, operate, and scale a relational database in the cloud.
- Amazon RDS automatically patches the database software and backs up the database, storing the backups for a user-defined retention period and enabling point-in-time recovery.
- Amazon RDS provides scaling the compute resources or storage capacity associated with the Database Instance.
- Pay only for the resources actually consumed, based on the DB Instance hours consumed, database storage, backup storage, and data transfer.
    - On-Demand DB Instances let you pay for compute capacity by the hour with no long-term commitments.

Amazon DynamoDB

- DynamoDB is a fast, fully managed NoSQL database service that makes it simple and cost-effective to store/retrieve any amount of data, and serve any level of request traffic.
- All data items are stored on Solid State Drives (SSDs), and are replicated across 3 Availability Zones for high availability and durability.
- DynamoDB tables do not have fixed schemas, and each item may have a different number of attributes.
- DynamoDB has no upfront costs and implements a pay as you go plan as a. a flat hourly rate based on the capacity reserved.

Amazon Elastic Beanstalk

- AWS Elastic Beanstalk provides a solution to quickly deploy and manage applications in the AWS cloud.
- Elastic Beanstalk leverages AWS services such as Amazon EC2, Amazon S3, ….
- To ensure easy portability of your application, Elastic Beanstalk is built using familiar software stacks such as:
    - Apache HTTP Server for Node.js, PHP and Python
    - Passenger for Ruby,
    - IIS 7.5 for .NET
    - Apache Tomcat for Java.

Amazon CloudWatch

- Amazon CloudWatch provides monitoring for AWS cloud resources and the applications customers run on AWS.Amazon CloudWatch enables you to monitor your AWS resources up-to-the-minute in real-time, including:
    - Amazon EC2 instances,
    - Amazon EBS volumes,
    - Elastic Load Balancers,
    - Amazon RDS DB instances.

Customers can also supply their own custom application and system metrics, such as memory usage, transaction volumes, or error rates,

Amazon Simple Workflow Service (SWF)

- Amazon SWF is a task coordination and state management service for cloud applications.
- Using Amazon SWF, you structure the various processing steps in an application that runs across one or more machines as a set of “tasks.”

FROM ROBOT TO A ROBOTIST

Sanjiv Gupta, Scientist, DRDO(Batch 1999-2003)

For a holistic working mind, body and soul has to work in unison to perform the desired task effectively. As we grow in our career the need for acquiring new skills in order to keep up with the future job challenges are of utmost importance. We are often caught up with the monotonous official work with a set pattern being repeated in different intervals be it biannually, yearly or more and often changes are needed in order to keep oneself motivated to perform variety of tasks that this job demands within the framework of the working of the lab. I had tried to perform the various tasks assigned to me in most fruitful manner and which reaped results but then it was time to move on and I applied for higher studies at IIT.

I was given a chance for pursuing M.Tech programme in Mechanical Design at IIT Delhi which was an invigorating opportunity to chisel and hone my skills for taking up future job challenges but getting there might be tough ..but the journey ahead was even tougher.....My fixed schedule and patterns were broken and from reporting to the office at 9 am, I was often found running to attend classes at 8 am with strict attendance adherence. Suddenly, with the demands of the curriculum I was taken too off guard trying to make sense of the equations and terms after a break of 12 years since I last studied in the college. I was found competing with the most brilliant minds in the country who had passed the GATE exam as mechanical toppers and those who had decided to pursue further studies after passing from IIT. The assignments and the course work were quite demanding which kept me on my toes both mentally and physically as not a day passed when I could sleep before 1-2am in the night after the submission of the assignments. The time flew by from minors to majors and the semester finished and I was lingering on for a respite, which was not to come. I was allotted a project under the guidance of Prof. Subir Kumar Saha, who is a well noted robotist in the country and it was a mixed bag to learn the future of technology and working under the most idealistic professor who also happened to be the head of the department. The project allotted to me was RoboMuse; ‘muse’ is a word derived from Latin meaning‘inspiration’. The project was the brain child of Prof S.K. Saha under whose guidance 6versions of Robo Muse has been made till date by various students from the robotics club which draws students from various inter-disciplines. From line following robots to navigation of robots using various sensors such as Kinect, various commands had been developed by yesteryear students but these commands were only to move the robot in specific path by also avoiding obstacles.

The first task assigned to me was to learn the working of Youbot, a research platform developed by KUKA which works on LINUX and ROS (Robotic Operating System) and understand and demonstrate its working. I had to learn the working of LINUX and its basic commands; the interface being totally opposite of the windows platform which we are totally used to working. It was akin to being used to the right-hand drive of India and getting to learn the left-hand drive skills, but after some slogging I could get the hang of it. I had prior knowledge of C++programming but learning to control the hardware through programming was new to me through some dedicated hard work, internet help files and guidance from peers I was able to demonstrate the working of the YouBot. Thereafter, the task assigned to me in the third semester was to perform structural analysis of the available mechanical structures of RoboMuse 4 and RoboMuse 3XT (developed by students from Thapar) which was a difficult task initially due to lack of proper drawings and the system being in an assembled state. The demands from my project guide were hectic and he was only available on the weekends for consultation as he was more often busy with his duty as Departmental head. Finally, I could manage to complete the work assigned to me doing structural analysis of the RoboMuse platforms during the first part of the project but additional expectations were defined for me torun the actual RoboMuse using the ROS commands. This was totally new field for me with no prior experience of running an actual robot using ROS programming. The RoboMuse 4, which I had to work on the next semester and

demonstrate some viable applications, had been developed over the period of 3 years by the students of IIT Delhi often working in groups with interdisciplinary students. The RoboMuse structure was first made and the hardware implemented; thereafter the ROS for running the robot with basic commands was implemented with limited capability to perform navigation. The documentation of the product made was not very informative and I had to struggle to make sense by the time of my 3rd semester presentation where in I could not demonstrate the working of the robot.I was clearly disappointed and disillusioned with the expectations from my project guide and there being no expert in that field to help. I shared my views with my project guide who understood my problem and agreed to provide help through an internship trainee Mr.Subramanium Krish from NIT Trichy (with electronics and communication background) who had previously worked on the development of ROS packages for RoboMuse 4 over the period of 2 years. The task assigned to me in the final semester was to perform experimentation to measure the mechanical parameters of performance of RoboMuse and improve on the parameters. Thereafter, I had to develop and demonstrate some industrial applications for the RoboMuse. The internship trainee finally arrived in the December of 2017 and was supposed to stay for a month until his return back to his college and we both were assigned tasks of experimentation with RoboMuse. We were supposed to work in a semi open environment in cold December month at SAC (Student Activity Center) as moving the robot and performing experimentation needed significant space.The RoboMuse is a bulky robot weighing 23 kgs and is a differential drive robot and uses Kinect (Microsoft X Box Sensor) as a sensor to perform vison-based sensing to sense the environment and navigate according to the velocity or the position commands given to the Robot. I began learning the basic commands to run the RoboMuse from the intern and could now finally learn to run the RoboMuse with the basic commands. We then developed a seriesof experiments by which we measured the performance parameters of the RoboMuse such as to determine the robot capability to move to designated commanded path with and without the obstacle and also the response of the robot to the vagaries of the environmental factors. We were able to significantly correct the deviation of the robot movement while performing the straight line or rotation movement by employing the University of Michigan benchmark test.The results were able to significantly correct the repeatability from 30 cm deviation to 3 cm deviation which is a good repeatability and in line with the commercially available robots. After the intern left, I was all alone to develop further applications and work on RoboMuse. In the midst of this my project supervisor handed a draft International standard (ISO standard) for mobile robots for review and I was surprised to see almost 75 % of the work we did was in line with the standard under development. According to the experience we gained in running the indigenous mobile robot I could suggest certain changes which may be implemented in the standard for mobile robots being prepared.I had to put in large effort reading books and searching for online help available on ROS(Robotic Operating System developed by willow garage) such as ROS wiki page and video tutorials available on varied topics related to ROS.ROS is an open source platform and the help is available on the internet on the various topics which people face being the developer and the open source community is of significant help as one doesn't have to start from the scratch and people often share their work and work collaboratively for development of ROS packages or applications. The package thus built has to be customized to one's requirement and the required application is built. The knowledge thus gained was slowly and steadily used to make simulated package for RoboMuse on the Gazebo simulator and the various application such as the surveillance application, autonomous navigation and endurance test worked well in the simulated environment. The real test came by to demonstrate the surveillance application which was known as Watchbot at IIT Delhi Open House which is visited by the students, people from industry etc. to showcase the products developed by IIT students. The surveillance applicationwas successfully demonstrated and this appeared on the webpage of IIT Delhi which was asignificant achievement for me.

Thereafter, I got the impetus to demonstrate another useful application of endurance test where in the robot moves in a mapped environment amongst randomly defined waypoints avoiding obstacles placed in its path and it could be run successfully until stopped for over100m without stopping and achieving its target without failure. This application may be useful in the service industry to transport goods and services to the desired defined place. Both the applications thus developed matched in performance with that of the simulated environment. Thus, came my final presentation which went on well and I could demonstrate live videos of the applications thus developed and the experiments I had performed. The thesis submitted for the "Design and Analysis of RoboMuse" and RoboMuse Manual is a comprehensive document for the project which may be used by future interns for learning RoboMuse and its applications. The project supervisor was finally contended with the work but placed a condition on me to train the new incoming interns to take over the RoboMuse and develop further useful applications with them before I hand over the charge fully to another intern who shall carry the work forward.In the brief spell until my relieving from IIT, I trained and worked with the interns from NIT Trichy and IEC Noida to develop surveillance application for performing security application in a defined environment and developing applications for autonomous docking of the robot for charging by using QR (Quick Response) Codes and Aruco markers which are used in augmented reality. We performed the experimentation to study the response of the robot by using the different markers which will be published in a paper shortly."We often have to be put the candidate under pressure in order to get the best out of him", my professor remarked as parting words and told me the performance was beyond his expectations. This remark by my professor and guide which was something which was satisfying for me. Alas my hard work had paid off. I was also awarded the FITT (Foundation for Innovation and Technology Transfer) award for the best industry relevant project at IIT Delhi. The platform provided by informative and interdisciplinary subjects such as electronics, programming, mechatronics etc. that I had learnt in MAIT college and my degree from GGSIPU in Mechanical and Automation helped me to be competitive in my assignment of Robotics at IIT. The completive curriculum at college was a mix of essential traditional subjects, which were the building blocks, and advanced courses which helped me face and negotiate the challenging assignment with flying colors. Overall the journey to make a blind man (Robot) walk and then run is a difficult task and we must appreciate our senses at this time to know how blessed we are with what we have. The journey from being robotic to robotist was pretty challenging and eventful and has significantly enhanced my knowledge and skills and I look forward to working on it more when I have the opportunity. But surely, I don't want to be a Robot again.

CLOUD COMPUTING WITH AMAZON WEB SERVICES

Gaurav Aggarwal, (Batch 2000-2004)

Definition: Web service is self-describing and stateless modules that perform discrete units of work and are available over the network

Web service providers offer APIs that enable developers to exploit functionality over the Internet, rather than delivering full-blown applications

Web Services Description Language (WSDL):

- Expressed in XML which include both data type and messages
- Four types of operations:
  - One-way - Messages sent without a reply required
  - Request & response - Sending and replying messages
  - Solicit response - A request for a response
  - Notification - Messages sent to multiple receivers

SERVICE ORIENTED ARCHITECTURE Service Oriented Architecture (SOA) is essentially a collection of services which communicate with each other Contain a flexible set of design principles used during the phases of systems development and integration Provide a loosely-

integrated suite of services that can be used within multiple business domains. Approach: Usually implemented by Web Service model

Challenges: Ever changing business requirement, high competition

- Long and delayed software delivery
- High rate of solution obsolesce
- High cost of setting up a data centre. High cost of operation (SW Licence, Labour)

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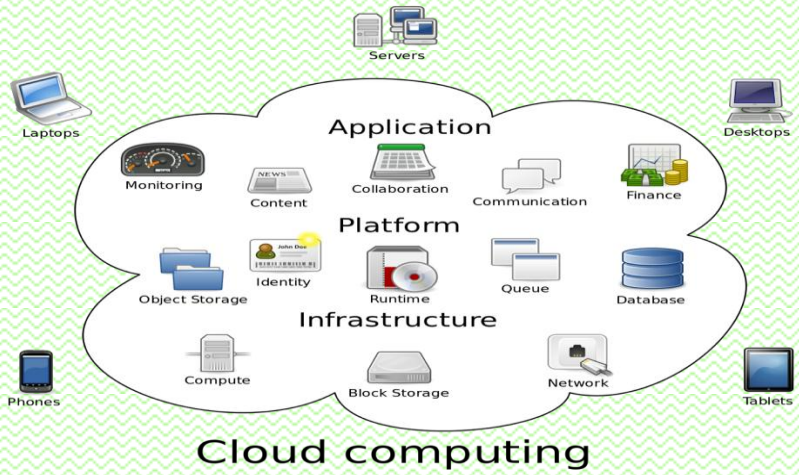

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Fig. 10: Infrastructure

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

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- This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models

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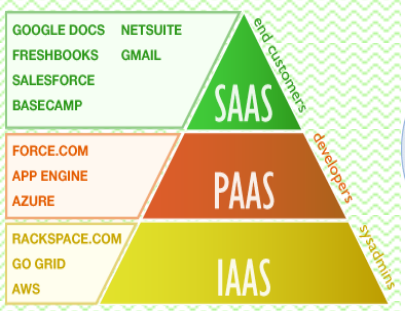

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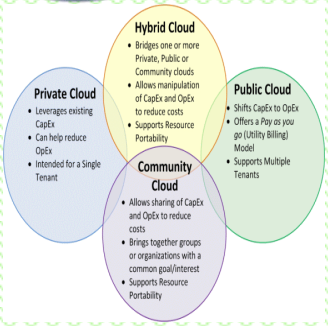

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Fig. 11:cloud computing Model

INDUSTRY EXPERT'S CORNER: TECHNICAL ARTICLES

AGILE Technology

Kumar Vasan
Sr. Manager
HCL Technologies
(Professional Scrum Master I, Certified Agile Coach and Customer RelationshipSpecialist

What is Agile?

Agile is a time boxed, iterative approach to software delivery that builds software incrementally from the start of the project, instead of trying to deliver it all at once near the end. **Scrum**, a subset of Agile.is a lightweight process framework for agile development, used one in which incremental builds are delivered to the customer nearly every two to three weeks in time.

What is Design Thinking?

Design thinking is a process for creative problem solving. Design thinking has a human-centered core. It encourages organizations to focus on the people's creativity which leads to better products, services, and internal processes.

Which one do you need and why?

While Agile is an approach to **problem-solving**, design thinking is an approach to **problem-finding**. Design thinking calls for a high degree of empathy and understanding of end users, and an iterative process of developing new ideas, challenging assumptions, and redefining problems, with the goal of identifying alternative solutions that might not necessarily be apparent.

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- **Fig. 12: Five stages of design thinking**

- **Empathize** – Understand people, their behaviors, and motivations. Because people often don't know, or can't articulate, these things explicitly, understanding emerges through viewing users and their behaviors in context to identify patterns, ask questions, and challenge assumptions.
- **Define** – Create an actionable problem statement to define the right challenge to address, as well as the set of needs that are important to fulfill, based on the organization, its goals, and the perspective of end users.
- **Ideate** – Leverage techniques such as brainstorming, mind mapping, sketching, or creating paper prototypes to step back, go wide, and come up with more innovative or impactful solutions that weren't originally envisioned.
- **Prototype** – Bring ideas to life by showing, not telling; quickly create working prototypes to put something into users' hands and begin to collect real-world feedback.

- **Test** – Learn from users' experience, iterate, and repeat the process as needed until reaching a Minimum Viable Product (MVP)

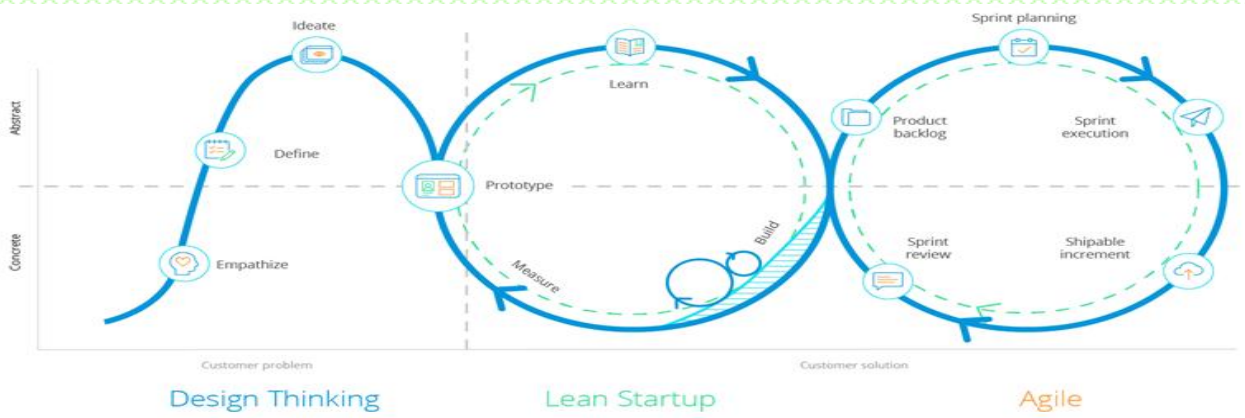

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Fig. 13:Design.Learn With Agile

Once you've identified the true nature of the problem to be solved, the team can leverage Agile to incrementally build out the solution, taking it from MVP to pilot to large-scale production. Moreover, agile becomes the mechanism to enhance the solution over time, making it a "living product" that evolves with user feedback and new business or market needs.This leads to another important similarity between design thinking and agile: frequent iteration. By creating regular interaction points through meetings and demos, the development team can continually gather new insights that help them adapt and better align the software being developed with both user and business goals.

While design thinking and agile can be applied alone, the two approaches are better together, creating a mutually reinforcing environment focused on user-centricity and rapid iteration as a means of reaching optimal outcomes. Design thinking brings a strong user focus while agile is an excellent way to incrementally deliver solutions, ensuring user needs are kept front and center throughout the entire design and development process. For teams looking to leverage agile and design thinking for the first time, here are my three recommendations to keep in mind:

1. **Start small:** Focus on high-value, low-risk opportunities to gain experience using design thinking and agile together. Then, with capability matures, have more challenging initiatives.
2. **Create cross-functional teams:** To facilitate the required creativity, create cross-functional teams that work together to design and develop solutions. Here the team should be physically collocated with end users to promote frequent collaboration.
3. **Balance design and development:** Because agile teams are often inclined to "just start coding", mixing agile and design thinking for the first time may create tension about how much time to spend on design thinking before beginning development. Make sure the team understands the value of the empathy, definition, and ideation phases, in particular, and that design thinking is not leveraged only at the front end of the process.

"When you immerse yourself in medicine you realize that hope is not absolute. It's not that simple."

Siddhartha Mukherjee

CYBERSECURITY

Amit Bhatia
https://abhatia.net

The information Technology landscape is now evolving at such a rapid pace that any predictions of the ground-breaking technical trends becomes obsolete within days of publishing it. The evolution of technology itself is fuelling exponential growth which is causing the rapid acceleration in new areas and fields which just few years back were seemed to be part of fantasy or fiction.

What we as humans, forget or turn a blind eye is towards the inherent security risks comes with the peril of technology. Any of our information which was considered is not private any more. Google and Facebook would probably know more about us then even our own family members. This is where cyber security plays a crucial role in field of IT.

Cyber Security might not seem like emerging technology, but as new threats are constantly coming up, the field of cyber security is also constantly innovation to fight all types of threats evolving the hackers who are trying to illegally access data are not going to give up any time soon, and they will continue to find ways to get through even the toughest security measures. In today's world it's not just for financial gains but political measures as well as national security as well. The latest threat being revealed is Cyber-attack on Kudankulam nuclear Power plant in our country.

As long as we have threats from hackers having malafide intent, we will have cyber security as an emerging technology because it will constantly evolve to defend against those hackers. However, we're falling short when it comes to filling those jobs. As a result, it's predicted that we will have 3.5 million unfilled cyber security jobs by 2021. There are plenty of options from a beginner to an expert in field of IT if you are interested in cyber security.

Career Paths in Cyber Security

- Chief Information Security Officer.
- Forensic Computer Analyst.
- Information Security Analyst.
- Penetration Tester.
- Security Architect.
- IT Security Engineer.
- Security Systems Administrator.
- IT Security Consultant

Cyber security purpose is to protect the data and integrity of computing assets belonging to or connecting to an organization's network including your IOT based gadgets and smartphones. Its purpose is to defend those assets against all threat actors throughout the entire life cycle. Kill chains, zero-day attacks, ransom ware, alert fatigue and budgetary constraints are just a few of the challenges that cyber security professionals face. Cyber security experts need a stronger understanding of these topics and many others, to be able to confront those challenges more effectively.

Robotic Process Automation

VIJAI PRAKASH VERMA | VIJAI@ATASPL.COM |
BusinessHead – Public Cloud Solution
Allahabad Technologies and Solutions Pvt. Ltd.

In the fastest changing IT world, RPA automates repetitive tasks that people used to do. We may be heard giving references to management and orchestration solutions. Here, Robotic Process Automation, or RPA, is another technology that is automating jobs.RPA is the use of software to automate business processes such as interpreting applications, processing transactions, dealing with data, and even replying to emails. These are not just the menial tasks of a low-paid worker: up to 45 percent of the activities we do can be automated, including the work of financial managers, doctors, and CEOs.

Even RPA automation will threaten the livelihood of million or more knowledge workers or some percent of the global workforce, RPA is also creating new jobs while altering existing job.RPA tools like UIPath, Blue Prism can be used for test automation. Advanced automation tools like UFT can be used for RPA if you have good coding skill. But RPA tools for more fit for purpose.
RPA Implementation Methodology

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Fig. 15: RPA IMPLEMENTATION METHODOLOGY

Planning: In this phase, you need to identify processes which you want to automate. Clear roadmap should be defined to scale up RPA implementation
Development: In this phase, you start developing the automation workflows as per agreed plan. Being wizard driven, the implementation is quick.
Testing: In this phase, you run Testing cycles for in-scope automation to identify and correct defects.
Support & Maintenance: Provide continuous support after going live and helps in immediate defect resolution. Follow general maintenance guidelines with roles and responsibilities with business and IT support teams.

Benefits of RPA:

- The main goal of RPA automation process is to replace repetitive and boring clerical task performed by humans, with a virtual workforce.
- The average productivity of human is 60% with few errors as compared to Robot's productivity which is 100% without any errors.

"There are two major challenges before Indian agriculture today: ecological and economical. The conservation of our basic agriculture assets such as land, water, and biodiversity is a major challenge. How to make agriculture sustainable is the challenge."

M. S. Swaminathan

RESEARCH CORNER: FACULTY PUBLICATIONS

1. **Deepak Gupta, Shirsh Sundaram, Joel Rodrigues, Ashish Khanna, "An improved fault detection crow search algorithm for wireless sensor network", *International Journal of Communication Systems (Wiley)*, July 2019, SCIE (IF 1.27).**

Abstract: In wireless sensor networks (WSNs), the collected data during monitoring environment can have some faulty data, and these faults can lead to the failure of a system. These faults may occur due to many factors such as environmental interference, low battery, and sensors aging etc. We need an efficient fault detection technique for preventing the failures of a WSN or an IoT system. To address this major issue, we have proposed a new nature- inspired approach for fault detection for WSNs called improved fault detection crow search algorithm (IFDCSA). IFDCSA is an improved version of the original crow search algorithm (CSA). The proposed algorithm first injects the faults into the datasets, and then the faults are classified using improved CSA and machine learning classifiers. The proposed work has been evaluated on the three real- world datasets, i.e., Intel lab data, multihop labeled data, and Sensor Scope data, and predicts the faults with an average accuracy of 99.94%. The results of the proposed algorithm have been compared with the three different machine learning classifiers (random forest, k- nearest neighbors, and decision trees) and Zidi model. The proposed algorithm outperforms the other classifiers/models, thus generating higher accuracy and lower features without degrading the performance of the system.

1. **Ashish Khanna, Joel J. P. C. Rodrigues, Naman Gupta, Abhishek Swaroop, Deepak Gupta, Victor Albuquerque, Kashif Saleem, "A mutual exclusion algorithm for flying Ad Hoc networks", Computer and Electrical Engineering (Elsevier), SCIE (IF 1.7).**

Abstract: Mutual exclusion (ME) is a highly researched problem in distributed computing systems. In the mutual exclusion problem, no two nodes can use critical resource simultaneously. Numerous protocols have been proposed for various types of static as well as mobile distributed systems, namely, Mobile Ad Hoc Networks (MANET), Vehicular Ad Hoc Networks (VANET) and cellular networks. The flying ad hoc networks (FANET) is an interesting variant of distributed systems and, to the best of our knowledge, no protocol exists in the literature for mutual exclusion in FANETs. In FANETs, the critical resource is mounted on an unmanned aerial vehicle (UAV) and user nodes are assumed in the transmission range of the UAV. Ours is the first algorithm to ensure ME in FANETs. The algorithm is token-based and we name it Mobile Resource Mutual Exclusion (MRME) algorithm. Unlike other ad hoc networks, due to swift mobility of nodes as well as resource, the FANETs topology is highly dynamic and fault prone. The MRME algorithm handles it successfully. Further, we present the correctness proof, complexity analysis and simulation results. The worst-case complexity of MRME is O(n) and synchronization delay is T, where T is message propagation delay.

2. **N. Garg, J. S. Lather, S. K. Dhurandher, "Remote Patient Identification based on ECG and Heart Beat Pattern Over Wireless Channel". IJIE, Vol. 8, Ed. 3, DEC 2019, SCIE.**

Abstract: Wireless Body Area Network (WBAN) is an innovative solution for distant monitoring of patients. In WBAN sensors are placed on human body to monitor vital parameters, and these parameters send to physician using wireless network. As in wireless network data is aggregated before transmission therefore when data is de-aggregated on receiver side it is important to know which data belongs to particular intended patient. In this work, it is shown that electrocardiogram

(ECG) and heart beat pattern itself can be used for the identification of patients as it carries distinctive features which are unique to each person. Moreover, ECG is an image thus when transferred over Orthogonal Frequency Division Multiplexing (OFDM) wireless channel adds noise, therefore a level of Signal-to-Noise Ratio (SNR) needs to be maintained for error free recovery. This paper proposes ECG and heart beat pattern-based patient identification process over OFDM channel. Proposed methodology is tested on ECG database and it has been found that the accuracy of the method is 99.98%.

3. **Deepak Gupta, Prerna Sharma, Krishna Choudhary, Kshitij Gupta, Rahul Chawla, Ashish Khanna, Victor Hugo C. de Albuquerque, "Artificial plant optimization algorithm to detect infected leaves using machine learning", *Expert Systems (Wiley)*, SCIE (IF 1.5).**

Abstract: Plant leaves play an important role in the diagnosis of plant diseases. Losses from such diseases can have a significant economic as well as environmental impact. Thus, examination of leaves into a healthy or infected carries substantial importance. An improved artificial plant optimization (IAPO) algorithm using machine learning has been introduced that identifies the plant diseases and categorize the leaves into healthy and infected on a private dataset of 236 images. Features are extracted from the images using histogram of oriented gradients (descriptor). The concepts of artificial plant optimization are then applied to study the features of healthy leaves using IAPO. A machine learning algorithm has been created to make the model adaptive with varied datasets. The degree of infection is eventually computed, and the leaves with infection greater than a certain calculated threshold are classified as infected leaves. The results show that IAPO can be used for classification of infected and healthy leaves and this algorithm can be generalized to solve problems in other domains as well. The proposed IAPO is also compared with other classification algorithms including k- nearest neighbours, support vector machine, random forest and convolution neural network that show accuracies of 78.24%, 83.48%, 87.83%, and 91.26%, respectively, whereas IAPO shows quite accurate results in classification of leaves with an accuracy of 97.45% on training set and 95.0% accuracy on test set.

4. **Zameer Fatima, Lakhshita Bhargava, Ayushi Saxena, Alok Kumar, "Crude Oil Consumption Forecasting Using Classical and Machine Learning Methods", International Journal of Knowledge Based Computer Systems. ISSN 2321-5623**

Abstract: The global oil market is the most important of all the world energy markets. Since crude oil is a non-renewable source, its quantity is fixed and limited. To manage the available oil reserves, it will be helpful if we have estimation about the future consumption requirements of this resource beforehand. This paper describes methods to forecast crude oil consumption of next 5 years using past 17 years data (2000-2017). The decision-making process comprised of: (1) Preprocessing of dataset, (2) Designing forecasting model, (3) Training model, (4) Testing model on test set, (5) Forecasting results for next 5 years. The proposed methods are divided into two categories: (a) Classical methods, (b) Machine Learning methods. These were applied on global data as well as on three major countries: (a) the USA, (b) China, (c) India. The results showed that the best accuracy was obtained for polynomial regression. An accuracy of 97.8% was obtained.

5. **Prerna Sharma, Rishabh Jain, Moolchand Sharma, Deepak Gupta, "Parkinson's diagnosis using Ant-Lion Optimization Algorithm", *International Journal of Innovative Computing and Applications* (Inderscience), ESCI, Scopus.**

Abstract: Parkinson's disease (PD) is a long-term progressive disorder of the central nervous system that mainly affects the movement of the body. But there are several limitations in detecting PD at an early stage. In this paper, a binary variant of the recently proposed ant-lion optimisation (ALO) algorithm has been proposed and implemented for diagnosing patients for Parkinson's disease at early stages. ALO is a recently proposed bio-inspired algorithm, which imitates the hunting patterns of ant-lions or doodlebugs proposed algorithm is used to find a minimum number of features that result in higher accuracy using machine learning classifiers. The proposed modified version of ALO extracts the optimal features for the two different Parkinson's Datasets with improved accuracy and computational time. The maximum accuracy achieved by the classifiers after optimal feature selection is 95.91%. The proposed algorithm results have been compared with other related algorithms for the same datasets.

6. **Moolchand Sharma, Shubbam Gupta, Prerna Sharma, Deepak Gupta, "Bio-inspired algorithms for diagnosis of breast cancer", *International Journal of Innovative Computing and Applications* (Inderscience), ESCI, Scopus.**

Abstract: Most commonly found cancer among women is breast cancer. Roughly 12% of women grow breast cancer during their lifetime. It is the second prominent fatal cancer among women. Breast cancer diagnosis is necessary during its initial phase for the proper treatment of the patients to lead constructive lives for an extensive period. Many different algorithms are introduced to improve the diagnosis of breast cancer, but many have less efficiency. In this work, we have compared different bio-inspired algorithms including artificial bee colony optimisation, particle swarm optimisation, ant colony optimisation and firefly algorithm. The performances on these algorithms have been measured for UCI Dataset of Wisconsin Diagnostic Breast Cancer, and the results have been calculated using different classifiers on the selected features. After the experiment, it is seen that BPSO has shown maximum accuracy of 96.45% and BFA has shown considerable results of 95.81% with six features which is minimum of all algorithms.

7. **Kapil Sharma, Sandeep Tayal," An Adaptive Whale Optimization Algorithm Guided Smart City Big Data Feature Identification for Fair Resource Utilization," International Journal of Innovative Technology and Exploring Engineering ISSN: 2278-3075, Volume-8, Issue-12, October 2019**

Abstract: World improvement is the development of every single province of the world. Smart city implies changed hardware to adjusted individuals. Smart cities have the most indispensable part in altering distinctive regions of human life, touching segments like transportation, wellbeing, vitality, and instruction. Productively to make measurements to improve distinctive smart city benefits huge information frameworks are put away, prepared, and mined in smart cities. For the change and course of action of huge information applications for smart cities, different difficulties are faces. In this paper, we propose a wrapper display based ideal element recognizable proof calculation for ideal use of assets given highlight subset age. Nine component determination techniques used for compelling element extraction. At last, which includes best add to the ideal usage of assets got by means of a novel element recognizable proof calculation made by the application out of a Whale Optimization Algorithm with Adaptive Multi-Population (WOA-AMP) system as inquiry process in a wrapper display driven by the notable relapse demonstrate regression model Random Forest with Support Vector Machine (RF-SVM). Our proposed calculation gives the exact method to choose the most agreeable feature blend, which prompts ideal asset usage.

8. **Yogesh Sharma, Aviral Bansal, Rajat Garg, Vivek Saini, "Blockchain Technology in Watch Industry to Prevent Counterfeit Watches", International Journal of Computer Science and Network, Vol 8, Issue 2.**

Abstract - The production and distribution of counterfeit watches is an increasingly worldwide issue, especially for consumers and Companies. Fake watch sales are approximated at $1 billion per year. Swiss Customs Service, suggest that there are some 30 to 40 million counterfeit watches sold every year. One of the reasons for watch counterfeiting is the imperfect supply chain system. Watches change ownership from manufacturers to wholesaler; distributer and then shopkeepers before it reaches the customer. Information is not shared between systems in the current chain supply system, manufacturers don't know what happened to their products, watches regulatory authority has no traceability of the product, recalls are expensive and complicated, and companies cannot follow-up customers. In this paper we explain how to use blockchain technology can add traceability, visibility and security to the Watches supply system. The proposed system will be used in Watch industry to track the Watches from its manufacturing until its delivery to customers. Blockchain technology will be used for storing transactions and only trusted parties will be permitted to join the network and push data to blockchain.

9. **Sudha Narang, Mohit bansal, Hitesh Kardam, Himanshu Khairwal, Jyoti Sharma, "Review on Using Biometric Signals in Random Number Generators", International Journal of Advanced Research.**

Abstract: Random numbers play an important role in digital security and are used in encryption, public key cryptography to ensure the safe and unchanged transmission. Random number generators are required to generate these random numbers, but true randomness is difficult to achieve and requires a true random source to generate the number which cannot be predicted from the knowledge of previous inputs. This paper discusses about incorporating biometrics and cryptography for stronger security and to generate random numbers with true randomness. Biometric systems are used to uniquely identify individuals in the security but uses a sophisticated procedure. Biometric signals are non-deterministic processes that are unpredictable and good source of randomness. This paper reviews the feasibility of using biometric signals in Random Number Generator (RNG) discuss whether biometric signals such as heartbeats, vascular patterns, iris scans and human Galvanic Skin Response (GSR) can be used in nearby future to generate reliable Random numbers. This paper will also review the work done towards generating random numbers using these biometric signals and the result of them, verified with statistical test suites such as NIST.

10. **Sudha Narang, Srishti Bansal, Deepali, "Still Image Colorization using CNN", IJESC, Vol 9, Issue 5.**

Abstract: Image colorization is a process of automatically putting colors in a gray scale image where there is no manual work required and this task is illusively tricky. The underlying issue is that the resultant image needs to be perceptually meaningful, and visually appealing. To solves this issue, we have designed a CNN model along with VGG16 architecture that recognizes a grayscale image and returns a colored image output. We have umbrellaed the concepts of image recognition, color prediction and convolutional neural networks along with the use of Keras library in Python to construct our desired model. A user interface has also been fabricated to get personalized inputs.

11. **Arvind Kumar, Jyoti Sharma, "A new proposal with a cohesion metric for finding the complexity of COTS Components", Technological Innovations in management Engineering and science.**

Abstract—In today's world we are living with a high technological environment surrounded with full of software's. The software's which we are using must be of good quality and of less

complexity. The complexity of the software is highly dependent on the design of the software that we are using and the design is directly proportional to concept of coupling and cohesion. In this paper, we are giving the usage of already developed cohesion metric in finding the complexity of commercialized websites or software's by calculating the complexity of individual components.

12. **Akanksha Kochhar, Prerna Sharma, "Machine Learning with IOT: A comprehensive Survey", Innovative Computing and Communication. Vol.1 (July 2019).**

ABSTRACT: Rapid evolutions in the hardware and software that uses devices which are used in technologies in communications have introduced the concept of IOT that is Internet of Things. IOT involves the connection of devices with one another in such a way, so that they can share information with each other and gather large number of facts on daily basis. But the disadvantage involved in the analysis of the data collected, extraction of the information and creation of the applications is that all these require human interference. IOT devices must be intelligent which can create automated smart applications introducing the concepts of Machine Learning with IOT can led to huge improvements in the application. In this paper a review is conducted on the existing work done by the researchers in using Machine learning with IOT which includes the application areas. Also, the major challenges which are faced in using Machine Learning with IOT are briefly discussed. The aim of this paper is to gain knowledge about how both the technologies are used together and applied in the smart environment.

13. **Shallu Juneja, Garvit Verma, Basant Kumar, Avinash Kumar Singh, "Vision Based Mouse Control System using different Colour Coding", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol 5, Issue 2.**

Abstract: In this project, Human computer Interaction approach (HCI) is done, where we are trying to control the movement of mouse cursor and its click events using hand gestures with different colors. Hand gestures were acquired using a camera based on color detection technique. This method is mainly focused on the use of Web Camera to develop the visual based interaction between a computer and human in a cost-efficient manner. These day's intelligent machine are being developed which can be used along with the computer and helps in friendly Human Computer Interaction (HCI). In the previous year's many technologies are used for developing the virtual mouse. In this project, we have tried to provide an upgraded technology for the virtual mouse. To work with a computer mouse and Keyboard are the very essential input devices. To solve this problem virtual keyboard and mouse is developed.

14. **Deepti Gupta, Yash Goel, Neeraj Sharma, "Controlling Set Top Box using Hand Gestures", IJSRET, Vol 5, Issue 2**

Abstract- - Controlling the T.V set top box has been done through an infrared remote control since its inception but with the growth in smart technology all around us our control can be more interactive and easier by the motive behind this gesture based remote control is to remove the constraint of a handheld device. remote control will also be useful for people with disabilities as compared to traditional handheld remote be pressed to control the STB which can cause muscle strain to people with physical disability whereas a simple gesture will not cause such strain and will also make it easier for them to control their T.V effortlessly. This system w microcontroller board and use Ultrasonic sensor to detect hand gesture and an infrared LED to transmit the decoded signal to the Set Top Box.

15. **Moolchand Sharma, Bhanu Jain, Chetan Kargeti, Vinayak Gupta, Deepak Gupta, "Detection and Diagnosis of Skin Diseases Using Residual Neural Networks (Resnet)", *2019,International Journal of Image and Graphics* (World Scientific), ESCI, SCOPUS.**

Abstract: Skin diseases have become prevalent in the present times. It has been observed in a study that every year the percentage of global population suffering from skin diseases is 1.79%. These diseases have a potential to become extremely dangerous if they are not treated in the nascent stages. It is extremely important that skin diseases are detected and diagnosed at the starting stages so that serious risks to life are avoided. Often, exhaustive tests are required so as to arrive on a conclusion regarding skin condition, the patient may be affected with. Thus, an expert system is required that has the ability to identify diseases and propose the required diagnosis. Presently, only a few solutions are available for diagnosis of skin diseases using computerized system but this is an era which is under extensive research and can be developed further. As the existing system has certain loopholes, thus this system attempts to override the present problems by applying a different approach. As a result of comparison of results from numerous research papers, an expert system has been developed by choosing residual neural networks and this system can be used to aid skin specialists in identifying and diagnosing various major diseases of skin like (Eczema, Psoriasis & Lichen Planus, Benign Tumors, Fungal Infections and Viral Infections) in more effective and efficient manner. The causes for identified skin disease can be outlined through this system and treatment can be provided.

16. **Neeraj Garg, S. K. Dhurandher, "Automatic retail Invoicing and Automation", International Conference on Innovative Computing and Communication (ICICC), 2019.**

Abstract: The goal of this research paper is to make today's computing systems to sense the presence of users at some place and their current states. This research paper further may exploit present context information of users and helps people to get current context services as per the preferences and current needs like giving current discounted product details (they wish to buy) and giving personal recommendations like a movie, trending clothes in the market, significant particulars in a warehouse about product purchases. The realized implementation of suggesting particular services by warehouse server is done by studying user profile, analyzing user behavior and user purchase history. It was found out after taking Zadeh's fuzzification equation in the process that clothes should be taken extra-large for a person and probability is found out to be 78% true in all cases except some conditions of person having weight less than 76.5 kg(middle clothes preferred) and also age less than 11 years(small clothes preferred in this case).

17. **Anubha Sethi, "Analogizing of Evolutionary and Machine Learning Algorithms for Prognosis of Breast Cancer", 2018 7th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO), 252-255, 2018**

Abstract: Breast cancer has proven to be a serious disease caused in women according to medical science. This study focuses on prediction of breast cancer in three different datasets, namely: Wisconsin breast cancer (WBC), Wisconsin Diagnosis Breast Cancer (WDBC) and Wisconsin Prognosis Breast Cancer (WPBC) datasets. The comparative study has been done between evolutionary algorithms and machine learning algorithms. Evolutionary algorithms include Particle Swam Optimization (CPSO) and Genetic Algorithm for Neural Network (GANN) whereas machine learning algorithms include KNN and C4.5 for predicting the breast cancer. The results are obtained after performing the experiment on different algorithms on the basis of their

accuracy and standard deviation which may help people in medical science for better prediction of their disease and hence enabling appropriate treatment.

18. **Prerna Sharma, Krishna Choudhary, Kshitij Gupta, Rahul Chawla, Deepak Gupta, Arun Sharma, "Artificial Plant Optimization Algorithm to detect Heart Rate & Presence of Heart Disease using Machine Learning", 2019, *Artificial Intelligence in Medicine (Elsevier)*, SCIE (IF 3.57).**

Abstract: In today's world, cardiovascular diseases are prevalent becoming the leading cause of death; more than half of the cardiovascular diseases are due to Coronary Heart Disease (CHD) which generates the demand of predicting them timely so that people can take precautions or treatment before it becomes fatal. For serving this purpose a Modified Artificial Plant Optimization (MAPO) algorithm has been proposed which can be used as an optimal feature selector along with other machine learning algorithms to predict the heart rate using the fingertip video dataset which further predicts the presence or absence of Coronary Heart Disease in an individual at the moment. Initially, the video dataset has been pre-processed, noise is filtered and then MAPO is applied to predict the heart rate with a Pearson correlation and Standard Error Estimate of 0.9541 and 2.418 respectively. The predicted heart rate is used as a feature in other two datasets and MAPO is again applied to optimize the features of both datasets. Different machine learning algorithms are then applied to the optimized dataset to predict values for presence of current heart disease. The result shows that MAPO reduces the dimensionality to the most significant information with comparable accuracies for different machine learning models with maximum dimensionality reduction of 81.25%. MAPO has been compared with other optimizers and outperforms them with better accuracy.

19. **Deepak Gupta, Jatin Arora, Utkarsh Agrawal, Ashish Khanna, Victor Hugo C. de Albuquerque, "Optimized Binary Bat Algorithm for classification of White Blood Cells", *Measurement (Elsevier)*, doi: 10.1016/j.measurement.2019.01.002, SCIE (IF 2.2).**

Abstract: The quantitative and differential analysis of leukocytes present in human body provide conducive hematological information to physicians for diagnosis of various infections and ailments. This paper proposes an Optimized Binary Bat algorithm, an enhanced version of the original Binary Bat Algorithm, for classification of different types of leukocytes. It is used for the first time in this field of application to the best of our knowledge. A set of features are extracted from images of WBCs and then the optimized algorithm is used to obtain a subset of those features which are essential and more relevant from the high-dimensional dataset. Similar to the original BBA, the optimized BBA is an evolutionary algorithm inspired by the echolocation technique used by bats for locating a prey or an object. OBBA aims to reduce the dimensionality of the dataset by determining the features which are most discriminative. The proposed algorithm is implemented using four different classifiers, K-nearest neighbors (KNN), Logistic Regression, Random Forest and Decision Tree, and their performance is compared. The proposed OBBA can be used in classification of WBCs with an average accuracy of 97.3% and help in analysis of numerous hematological conditions. The optimized BBA is also compared with other nature inspired algorithms including Optimized Crow Search algorithm and Optimized Cuttlefish algorithm, and the results indicate that the suggested algorithm is sufficiently fast and accurate to be used in hematological analysis.

RESEARCH CORNER: STUDENT'S PUBLICATIONS

1. **Naveen Bhardwaj, Gagan Chawla, Nikhil Kumar Sharma, Kavita Saxena, "Automatic Number Plate Recognition System", MAIT Journal of Technology 01 (2018) 17-24.**

Abstract: This project aims to develop a system that can be used to locate vehicle number plate and recognize the characters from it given an image in which number plate is visible. The Automatic Number Plate Recognition (ANPR) System is a mass surveillance system that can use special cameras designed for the purpose or the existing CCTV camera footage. This system can be used by different police forces to help them in their investigation or various other purposes like automatic toll collection, automatic parking and other access control situations. Ordinarily system uses infrared lightning to take photos but those systems could not be used in night. Now most of the systems uses neural network technique. The work proposed here uses Contour Detection, Image Segmentation and KNN algorithm for Optical Character Recognition (OCR) to make the system quicker and more efficient

2. **Arshie Jain, Amulya Jain, Aditya Gurbaxani, Ashish Sharma, Sandeep Tayal, "Overview of Energy Efficiency Techniques in 5G Networks", JETIR, Vol6, Issue 6.**

Abstract: An increase in the number of users and per user bandwidth, wireless networks require advancements byincreasing the cell site density. Suggested advancement includes what is called heterogeneous 5g networks in which small cells are added to the existing macro cell networks. The location of new small cell sites is decided by several locations - dependent factors like congestion measurements, user densities and requests. This paper provides an overview of the technologies and schemes used to make 5g wireless communication between the base station and the mobile subscriber energy efficient and also highlighting the drawbacks of each technology used. By using technologies such as mmWaves providing resistance to noise and very high bandwidth for providing better Quality of Service to customers, having a disadvantage for short range and facing problems in line of sight i.e. could be obstructed by some object. Other technology could be Massive MIMO that can improve the spectrum efficiency and also used to increase the gain of transmitted signals but has high signal processing complexity and costly implementation. Device-to-Device communication provides a method for Dynamic Routing to reduce cost and even provide connectivity in remote areas or dead-zones without proper infrastructure.

3. **Srishti Sahni, Farzil Kidwai, Prerna Sharma, Harshit Singhal, "Implementation of IoT to Minimize Post-harvest Losses", Innovative Computing and Communication: An International Journal, Vol. 1, Issue 2, September 2019.**

Abstract—This paper analyzes the abiotic factors responsible for the post-harvest losses of cereal grains. Factors like relative humidity, temperature, moisture and oxygen content of the warehouses are taken into account and their relationship with the rate of decay of cereal grains is examined. A ubiquitous sensing environment is set up using an IoT (Internet of Things) device which collects real time data and establishes a network between different sensors and actuators, reducing human interference to zero. The collected data is used to predict the approximate time within which the grains should be treated in order to avoid degradation and minimize losses. A machine learning algorithm is applied and a suitable model is constructed to achieve the same.

This model evaluates the analytical and experimental data from previous researches and draws conclusions which are then implemented in association with the IoT device to generate precise results. The results are contemplated and alerts are generated accordingly.

4. **Abhay Goel, Abhishek Sharma, Namita Gupta, "A Variant of Bucket Sort", 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT).**

Abstract: Sorting is a technique to rearrange a given list of elements according to a comparison operator on the elements. There are a large number of Sorting Algorithms like Insertion Sort, Merge Sort, Bucket Sort, Shell Sort, etc. The efficiency of the sorting algorithm depends on many factors such as memory usage patterns (the number of times the sections of memory must be copied or swapped to and from the disk), the total number of comparisons and the time requirements for the algorithms to run. In this paper, a method is proposed which combines two sorting algorithms (Bucket Sort and Shell Sort) in a way that takes advantage of the strength of each to improve overall performance.

5. **Anand Shukla, Nitish Pathak, Neelam Sharma,"Comparative Analysis for e-Services based on chi-Square test", ICAESMT19.**

Abstract: In the edge of Information Technology, where most of the persons having smart phones, almost every organization either private or public wants to delivered their services through the online medium. Indian Government is also focusing on making Digital India; Government is launching their social welfare schemes through e-Services also.E-services (electronic services) are services which use of information and communication technologies (ICTs). If we talk about the medical, health related specific e-Services, lots of opportunities are still left, like in Chhattisgarh and Bihar, e-Services are their but it required lot of improvements, the parameters on which the said states are facing challenges, have been taken care in this study and analysis. In this paper the study and analysis are done for a Rohilkhand region, one of the largest regions of another Indian state i.e. Uttar Pradesh (largest state of Indian). This research paper consists the study, analysis for effectiveness of e-Services in terms of medical assistance, for the same we have conducted a survey for the comparison among the three e-Services. The analysis has been done on the surveyed data through the Chi-Square test; the result of the said test has been mentioned in the conclusion title.

6. **Naman Gupta, Deepak Gupta, Ashish Khanna, Pedro Rebouças Filho, Victor Hugo C. de Albuquerque, "Evolutionary Algorithms for Automatic Lung Disease Detection", *2019, Measurement (Elsevier)*, SCIE (IF 2.2).**

Abstract: The World Health Organization estimated that 210 million people are suffering from Chronic Obstructive Pulmonary Disease (COPD), causing 300 thousand deaths in 2005 with an increase of 30% in 2015. Also, it is estimated that by 2030, COPD will rank third worldwide among the leading causes of death. These statistics about lung diseases get worse when one considers fibrosis, calcifications and other diseases. Medical images analysis is of great importance for early and accurate diagnosis of pulmonary disease and assist medical doctors for effective treatments and prevents further deaths. This work aims to identify and classify lung Computerized Tomography (CT) scan images as healthy lungs and diseases as COPD and Fibrosis. Three steps are required to achieve these goals: Extracting relevant features from the lung images, Feature Selection and Identification of lung diseases using a machine learning classifier. In the first step, this work follows an approach that extracts Haralick texture features using Gray Level Co-occurrence Matrix, Zernike's moments, Gabor features and Tamura texture

features from the segmented lung images to compose a pool of features for selection. As to the second step, we propose three evolutionary algorithms, Improvised Crow Search Algorithm (ICSA), Improvised Grey Wolf Algorithm (IGWA) and Improvised Cuttlefish Algorithm (ICFA), as a feature selection method, which selects an optimal features subset from a large pool of features extracted from medical images to improve the classification accuracy and reduce the computational costs. In the final step, four machine learning classifiers: k-Nearest Neighbor, Support Vector Machine, Random Forest Classifier and Decision Tree Classifier were applied to each feature subset selected by the proposed feature selection methods. The experimental results show that ICSA eliminated the maximum amount of insignificant features of about 71% whereas IGWA removed only 52.3% out of the total extracted features. ICFA filtered out the least number of features upto 40.6%.

7. **Utkarsh Agrawal, Jatin Arora, Rahul Singh, Deepak Gupta, Ashish Khanna, Aditya Khamparia, "Hybrid Wolf-Bat algorithm for optimisation of connection weights in multi-layer perceptron", *ACM Transactions on Multimedia Computing Communications and Applications*, July 2019, SCIE (IF 2.87).**

Abstract: The article "Hybrid Wolf-Bat algorithm for optimisation of connection weights in multi-layer perceptron" proposes a hybrid Wolf-Bat algorithm, a novel optimization algorithm, for the purpose of finding the ideal set of weights for training a Multilayer Perceptron neural network. This novel approach is tested on ten different datasets of the medical field, obtained from the UCI machine learning repository & the results are compared with those of four recently developed nature-inspired algorithms: Grey Wolf Optimization algorithm (GWO), Cuckoo Search (CS), Bat Algorithm (BA) and Whale Optimization Algorithm (WOA). Their proposed method is better in terms of both speed of convergence and accuracy and outperforms the other mentioned algorithms.

8. **Srishti Sahni, Vaibhav Aggarwal, Ashish Khanna, Deepak Gupta, Siddhartha Bhattacharyya, "Quantum-Inspired Evolutionary Algorithms for Neural Network Weight Distribution: A Classification Model for Parkinson's Disease", 2019, *Journal of Information and Organizational Sciences*, ESCI, SCOPUS.**

Abstract: Parkinson's Disease is a degenerative neurological disorder with unknown origins, making it impossible to be cured or even diagnosed. The following article presents a Three-Layered Perceptron Neural Network model that is trained using a variety of evolutionary as well as quantum-inspired evolutionary algorithms for the classification of Parkinson's Disease. Optimization algorithms such as Particle Swarm Optimization, Artificial Bee Colony Algorithm and Bat Algorithm are studied along with their quantum-inspired counter-parts in order to identify the best suited algorithm for Neural Network Weight Distribution. The results show that the quantum-inspired evolutionary algorithms perform better under the given circumstances, with qABC offering the highest accuracy of about 92.3%. The presented model can be used not only for disease diagnosis but is also likely to find its applications in various other fields as well.

9. **Kartik Sharma, Ashutosh Aggarwal, Tanay Singhania, Deepak Gupta, Ashish Khanna, "Hiding Data in Images Using Cryptography and Deep Neural Network", 2019, *Journal of Artificial Intelligence and Systems*, 1, 143–162, DOI: 10.33969/AIS.2019.11009.**

Abstract: Steganography is an art of obscuring data inside another quotidian file of similar or varying types. Hiding data has always been of significant importance to digital forensics.

Previously, steganography has been combined with cryptography and neural networks separately. Whereas, this research combines steganography, cryptography with the neural networks all together to hide an image inside another container image of the larger or same size. Although the cryptographic technique used is quite simple, but is effective when convoluted with deep neural nets. Other steganography techniques involve hiding data efficiently, but in a uniform pattern which makes it less secure. This method targets both the challenges and make data hiding secure and non-uniform.

10. **Ashish Sharma, Deepak Gupta, Nimish Verma, Mayank Sehgal, Nitesh, "Optimizing machine learning models using multi objective grasshopper optimization algorithm",** ***Innovative Computing and Communication*****. Vol.1 (July 2019) 29–34.**

Abstract— Multi Objective Grasshopper Optimization Algorithm is a re- cent meta-heuristic swarm intelligence algorithm developed by Mirjalili at. El. It is inspired from the movement of grasshopper swarms in nature. It can be applied in numerous domains due to its impressive characteristics like easy to use, scalable, flexible and better performance than classic methods in real problems. In the paper, MOGOA, which is a population-based method has been used for feature selection. First, MOGOA has been used for feature extraction from six different datasets to form feature subsets from each dataset. Then three machine learning models - KNN, Logistic Regression and Random Forest have been implemented to predict the results before and after feature selection. Finally, accuracy of results is obtained and comparison of results is performed. In the first section of this paper, theoretical foundation of multi-objective problems,
feature selection and evolutionary algorithms is introduced. In second section, MOGOA, its implementation and the three machine learning models are explained.

11. **Yogesh Khatri, Rachit Chhabra, Naman Gupta, Ashish Khanna, Deepak Gupta, "Secure MODIFIED AES Algorithm for Static and Mobile Networks".** ***(ICICC2019). Advances in Intelligent Systems and Computing, Springer 1059.***

Abstract: Security has been a primary concern for each type of network to provide secure communication among the users of different types of network. Presently, many techniques are present for providing security in networks but Advanced Encryption Standard (AES) has been proved to be the most prominent, keeping the data security as the major factor in data transmission. In the presented exposition, a modified variant of AES algorithm named as Modified Advanced Encryption Standard (MAES) has been introduced for secure data transmission in wired and various wireless networks namely, MANET, VANET, and FANET. The proposed technique focuses on both prevention and detection of the security attacks on the network. Theoretically, it is difficult to break the security or crack the key in the assumed network. The proposed protocol takes 2256 computations as compared to the basic AES standard which take 232 in case of differential fault analysis. The simulation results show that the proposed MAES outperformed AES in terms of security against attacks such as side channel attacks.

12. **Akshay Khatter,Namita Gupta, Keshav Issar, Nishant Sardana, "Video to Text Analysis: Deep Learning", International Journal of Scientific and Engineering Research, Vol 10, Issue- 6**

Abstract— Using Deep learning techniques, proposing a new approach that analyses a video and then present it in understandable language using NLP techniques. For most people, watching a brief video and describing what happened (in words) is an easy task. For machines, extracting the meaning from video pixels and generating natural-sounding language is a very complex problem.

Solutions have been proposed for narrow domains with a small set of known actions and objects. Video captioning is the method of generating a natural language sentence that explains the content of the input video. This paper proposes a deep neural network model for effectively captioning the video. Apart from visual features, our proposed model additionally describes the video content effectively such that we can understand the easily video and in lesser time. This paper consists of methods, structure and design explored by us, to understand videos. This paper shows results of implementation of frame by frame captioning, YOLO and also proposes a hybrid approach combining YOLO, image captioning and a double convolutional neural networks approach. We propose the models to do both classification and caption also, using hybrid of the discussed models.

13. **Deepanshi Bansal, Kshitij Gupta, Aayush Gupta, Pooja Gupta, "Activity Recognition Using Video Captioning and Summarization", International Journal of Innovative Technology and Exploring Engineering, Vol 8, Issue-8.**

Abstract: As the technology is improving every day, people are getting more inclined towards it.The busy schedule of people could not let them spare enough time to watch long videos whether it is related to some cricket match or some teaching or some glimpse of some video. Hence, there is a need to build a system to generate a summary of any video for having approximate glimpse without seeing the video. Also, everyday thousands of videos are uploaded on youtube and thus filtering is really necessary when we are searching for a particular video. There also, Video summarisation comes into action where one could skip multiple videos which may not be what the user wants by just looking at the summary without watching it and investing time on it. The report discusses about how captioning and summarisation could be done using convolutional and recurrent neural networks and natural language processing

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"We know from theoretical models that mergers of massive, gas-rich galaxies were most frequent in the past. Now we've found that these mergers are responsible for producing both the nearby obscured quasar population and their distant cousins."

PriyamvadaNatarajan

"The rain-cum-solar energy center functioning in Chennai is a source of credible public information on rainwater harvesting and solar energy use. Such centres need to be replicated in all our cities, towns and block headquarters"

M. S. Swaminathan

"Lofty questions about the mind are fascinating to ask, philosophers have been asking them for three millennia both in India where I am from and here in the West – but it is only in the brain that we can eventually hope to find the answers."

Vilayanur S. Ramachandran

TEDxMAIT

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Speakers for TEDx-2019

tedxmait.delhi@gmail.com

We are bringing together speakers from different walks of life under one roof to give talks that are idea-focused yet diverse, to foster learning, give deep insight and to inspire. Our esteemed speakers are all set to provoke conversations that matter.

Nitesh Kumar Jangir
Co-founder at Coeo Labs

Nitesh Kumar Jangir is an electronics engineer with a focus on embedded system design. Being the co-founder at Coeo Labs also an active inventor, 6 patents were filed and granted by him in the field of medical devices and artificial intelligence. He is the creator of Saans - a breathing support device to tackle avoidable deaths of premature babies from respiratory distress syndrome due to a lack of immediate access to complex medical equipment. Due to his hard and innovative work, he marked a place for himself in Forbes 30 under 30, 2019 (India and Asia).

AshimBery
Percussionist

Ashim Bery is a percussionist based in New Delhi. He has been practicing and learning the Tabla for the last 17 years. In 2015, he began working on a solo project like a tongue drummer and handpan artist. Through his work, he tries to fuse music with works of fellow musicians, artists, theatre professionals, writers, and poets. Each composition of his has a personal story to tell and likes to incorporate storytelling as a medium within the music.

MrigankaSaxena
Architect and Urban Designer

Mriganka Saxena is an Architect and Urban Designer with over 17 years of experience. She has done her M.Sc. in City Design and Social Science from the London School of Economics. Her leadership and contributions in projects, especially the Yamuna River Project, as well as policies, have transformed city transport and created sustainable habitats. It has rejuvenated water bodies and drains, which, in turn, has helped turn around the lives of many families.

Rachel Cunningham
Chef and Travel Blogger

Rachel Cunningham is a world traveler and works as a superyacht chef. Owing to her profession, she visits places all over the world and shares all her experiences on her blog. She has been to 115 countries to date and has been traveling the world for 15 years. Over her years of travel, she has witnessed the sunrise over Machu Picchu, learned to cook with a famous South Korean Monk from Netflix, taught children in Nepal, rode camels in Egypt and danced at a carnival in Trinidad, among many other amazing adventures at exotic locations.

Paromita Roy
Urban Designer and Architect

Paromita Roy is a reputed architect for contemporary buildings. She was an Urban Designer working in Shanghai but left her lucrative job to have a career dedicated solely to public service. She is also the Deputy General Manager of IRSDC which is the nodal agency for railway station development in India. At the Home Minister office located in Delhi, she is designated as the knowledge partner working with the Home Ministry

Dr.TavpriteshSethi
Assistant Professor at IIIT Delhi

Dr. Tavpritesh Sethi is a physician-scientist and Assistant Professor of Computational Biology at Indraprastha Institute of Information Technology. He has been a visiting faculty member at Stanford University. Dr. Sethi specializes in improving outcomes in neonatal, child and maternal health by bridging medicine and artificial intelligence. His research is focused on the development and deployment of machine-learning-based solutions to enable decisions and policy in pressing healthcare questions.

"Agriculture is the backbone of the livelihood security system of nearly 700 Million people in the country and we need to build our food security on the foundation of home grown food."

M. S. Swaminathan

"Luckily there were no venomous snakes around Hoosick, N.Y., so I amassed quite a collection of milk snakes, garters, ribbons and ring- necked snakes."

Romulus Whitaker

STARTUPS

LIVEGYAAN

Arpit Jain (42614802717)

As we know education is really important and with digital India scheme it is necessary to make the sector of education more digital. Realising the need of the hour and the condition of education in rural areas we started livegyaan. Livegyaan is basically a platform on which student can learn academic as well as skill-based subjects at the comfort of their home.

Our main motto is to provide quality education to all the children that are currently living in the villages and the schools there cannot provide efficient studies due to the lack of teaching staff. We believe that if right to education is a fundamental right than it should be accessible to each and every child who wants to should get educated.

We at livegyaan aim to collaborate with those schools and provide them with the facility of live tutoring sessions that will be conducted by our well qualified faculties. As we all know that student teacher interaction is must for the better understanding of the subject hence, we interact one on one with each and every child of that school by visiting there every week.

In this way we are one of its kind educational start up that interact with the students one on one rather than just providing them with educational stuff and prerecorded sessions. One of the most unique features of livegyaan is its live tutoring sessions as it provides students a chance to raise the doubt whenever they have one as it will help them to understand the topic in detail.

In the coming future we will be launching over live platform but currently we have fully recorded sessions which are designed in such a way that the student gets to understand the topic in a very short duration of time. This way individuals who also want to get connected with us can get full access to our valuable resources and excel in their career.

SCUPO

Jayesh Gupta and Malika Singh

Scupo Is an online event marketing and branding platform built on top of a network of College,Youth and Community Events. The platform allows brands to market to events through a first time automated digital process while getting reliable ROI and Statistics from an event. Scupo aims at simplifying the process of running a community and hosting and partnering with events to engage a community of students and youth. Scupo has successfully been able to get student,

college and youth fests and events with raising sponsorship from brands like OnePlus, Fujifilm Instax, Jet Brains, Gatsby and Gitlab. Scupo also provides an environment for Event Organizers with not only sponsorship but online tools such as ticketing, payments, attendee, marketing and affordable goodies

Scupo was founded in 2018 and is incubated with SSCBS Innovation and Incubation Foundation. The Founders Jayesh Gupta and Malika Singh are Computer Science and Engineering Students at Maharaja Agrasen Institute of Technology, New Delhi. They are one of the youngest founders to be incubated also with NASSCOM 10,000 Startups.

Scupo is currently on market and helping events and brands a like to create the perfect atmosphere for Event Sponsorship and Community Management. They are on track of being partnered with big events with over 5000 Attendees. Scupo will also be hosting the first Gitlab Meetup in Delhi as its Exclusive partner, helping establish an active community as well as getting students engaged with tech leaders.

Scupo till this point has been bootstrapped and has been recognised by global Platforms such as TiE Global Summit 4 and NASSCOM. Scupo in the future looks towards raising their first round of funding and expanding their technology to include the ability for brands to manage community, campus ambassador programs and Community Meet-ups. If you are a College/Youth Event Organizer looking for help with your event, log on to www.scupo.in where brands and organizers alike can get the ease and results with their event needs.

Smart India Hackathon 2019

MHRD, AICTE, i4c and Persistent Systems have come together to organise Smart India Hackathon (SIH) 2019 - a unique Open Innovation Model for identifying new and disruptive technology innovations to solve the challenges faced in our country. Total 20 teams from MAIT were shortlisted for the finale under SIH 2019 Software edition held on 2-3 March 2019. MAIT is ranked third Institute with most team selection in Software edition of SIH 19. As per the result declared by SIH 19, 8 teams of MAIT won prize of Rs One Lac under the Ministry/Organization for their Problem Statement and one team won Special award (Runner up).

Winners of Software Edition of Smart India Hackathon 2019

SNO	Team Name	Team Members	Roll No.	Company/ Ministry	City	Prize
1	Linguistic Pandas	Shivani Dalmia	06314802717	Ministry of Culture	Jaipur	Winner (Rs One Lac)
2	Syzygy	Heena Garg	03314802715	Department of Atomic Energy	Nagpur	Winner (Rs One Lac)
		Aakash Chawla	00114802715			
		Abhishek Gupta	20614802715			
		Ayushi Saxena	20314802715			
		Gyan Vardhan	03014802715			
		Shachi Saini	09614802715			

3	Hack 'O' Holics	Nimisha Mittal	41696402717	Ministry of AYUSH	Kanpur	Winner (Rs One Lac)
		Shubham Goyal	10314802716			
		Bipin Kalra	01314803116			
		Siddharth Kathuria	06814803116			
		Vatsal Agarwal	07814803116			
		Yash Aggarwal	42614803116			
		Saumya Wardhan	06614803116			
4	Update 2.0	PARAS RAWAT	41514802716	DIPP	Kanpur	Winner (Rs One Lac)
		MAYURI GUPTA	40714802716			
		PIYUSH GUPTA	41714802716			
		SHUBHI JAIN	36414802716			
		YASH AGGARWAL	40214802716			
		MOHIT SONI	41914802716			
6	Ode_to_code	Prerna Jain	20314802716	Orissa	Landran ,Mohali	Winner (Rs 50,000)
		Anurag Sharma	01814802716			
		Jatin Gera	20714802716			
		Virender Singh	20514802716			
7	MRDOTAPP	Ritika Tilwalia	05514802717	Future Generali	Greater Noida	1st Runner Up
		Manthan Keim	03714802717			
		Abhishek Maheshwari	44314802717			

IMPORTANT RESEARCH AREAS

Dr. Deepak Gupta, Dr. Neeraj Garg, Dr. Ashish Khanna

1. Deep Neural Networks for Biomedical Data and Imaging

Deep Learning has a great impact in advanced real-world problems since it is able to deal with complex, and big amount of data. One of recent successful applications of deep learning is biomedical imaging and there is a remarkable research effort using medical image data (obtained via MR, tomography, X-Ray, pathology, microscopy, breast CAD, etc.) to perform especially diagnosis-oriented studies considering vital diseases such as human brain disorders diseases (i.e. Alzheimer's, Parkinson, Sleep Disorders) or cancer (i.e. breast cancer, lung cancer, skin cancer). The literature often reports effective results, and thus use of deep learning for biomedical imaging is a key research hot topic.

Deep Learning is essentially a collection of advanced neural networks such as convolutional neural networks (CNN), deep belief networks (DBN), or auto-encoder neural networks. CNN is known as the most famous among them but all of these deep learning techniques can be successfully applied in biomedical imaging studies. In some cases, it has been also possible to combine them in hybrid-modeled solutions for improved results. Here, the key questions for understanding performance of such deep neural networks could be (1) How effective can these neural networks detect a disease, via biomedical imaging? (2) How fast and early can they perform diagnosis? (3) How can they accomplish the same performance for different types of diseases? (4) How can these neural networks overcome the known diagnosis methods? (5) How can they contribute to the current and future of medical, by moving over the biomedical imaging?

2.Intelligent Biomedical Data Analysis and Processing

Today the human lives in the age of Information and technology. Information is the key, the power, and the engine that moves the world's economy. The world is moving with markets data, medical epidemiologic sets, Internet browsing records, geological surveys data, complex engineering models, and so on. Health Sciences are fully embedded in information technology. Health science and Biology are very complex fields and have made a long walk from the ancient times, but processes involved in biology, medicine and physiology are much too intricate to be faithfully modeled. In the early eighties, AI in medicine was the main concern while developing medical expert systems in specialized medical domains aimed at supporting diagnostic decision-making. The main problems addressed at this early stage of expert system research concerned knowledge acquisition, knowledge representation, reasoning and explanation. Now there are many modern hospitals and health care institutions, which are well equipped with monitoring and other advanced data collection devices. The need of knowledge on the domain or on the data analysis process becomes essential in biomedical applications, as medical decision making needs to be supported by arguments based on basic medical and pharmacological knowledge. The new tool for analyses of biomedical applications is "Intelligent Data Analysis (IDA)". IDA can be defined as the use of specialized statistical, pattern recognition, machine learning, data abstraction, and visualization tools for analysis of data and discovery of mechanisms that created the data. The main idea underlying in the concept of Intelligent Data Analysis is extracting knowledge from very large amount of data, with a very large number of variables, data that represents very complex, non-linear, real-life problems. Moreover, IDA can help starting from the raw data,

coping with prediction tasks without knowing the theoretical description of the underlying process, classification tasks of new events based off of past ones, or modeling the aforementioned unknown process. Classification, prediction, and modeling are the cornerstones that Intelligent Data Analysis can bring to us.

3.Role of Fog, Edge and Pervasive Computing in Intelligent IoT driven applications

With the rapid growth and emerging development in artificial technology, novel hybrid and intelligent Internet of Things (IoT), the Edge, Fog driven and Pervasive computing techniques are essential part of our daily lives. These technologies can be utilizing in various engineering, industrial, smart farming, video security surveillance, VANETs and vision augmented driven applications. These applications required real time processing of associated data and works on principle of computational resource-oriented metaheuristic and machine learning algorithms. Due to physical size limitations; the small computing IoT and mobile devices are having resource limited constraints with low computing power and unable to manage good quality of service and related parameters for distinguished applications. To overcome the limitations of such mobile devices edge/fog and pervasive computing have been proposed as promising research area to carried out high end infrastructures usages and provides computation, storage and task execution effectively for end device users. As edge/fog computing is implemented at network edges, it promises low latency as well as agile computation augmenting services for device users. To successfully support intelligent IoT applications, therefore, there is a significant need for 1) exploring the efficient deployment of edge/fog/pervasive computing services at the network nodes level, 2) identify the novel algorithm related to fog/edge/pervasive computing for resource allocation with low constraint and power usage, and 3) designing collaborative and distributed architectures specialized for edge/fog/pervasive computing.

4. Deep Network Based Industrial Internet of Things Applications

With the rapid growth of connected technologies, the industrial world is transforming in a trend that conforms to a number of headlined names including the fourth industrial revolution, smart manufacturing, and Industrial Internet of Things (IIoT). Sensor technology has been around in industries for over a decade but the emergence of Big Data coupled with manufacturers' increased software proficiencies, pressures on inventory levels and lead times have led many businesses to procure sensor-enabled machinery. That situation has enabled researchers to search for combining advanced technologies for better outcomes in the context of industrial applications.
Industry 4.0 enables industrial advancements with the help of advanced computing, analytics, low-cost sensing, and new levels of connectivity enabled through the Internet. Some of known technologies supporting this revolution are cloud services, big data analytics, and pervasive, intelligent, sensing technologies. In modern industry, productivity, quality, reliability, and safety heavily depend on the performance of the sensors employed. They form an interface between the production equipment and the surrounding environment providing feedback based on the results of the executed operations. The significant benefits of using intelligent sensing technology in industries are accuracy and consistency, which enable functions such as picking, placing, labeling, and printing to be performed at higher production rates, leading to low wastage, minimal down time, and better-quality control. Though intelligent sensors are indispensable in Industry 4.0, there are still existing obstacles for sensors to be widely adopted in the production environment. For

example, it is not possible to distinguish between correct and incorrect information provided by a sensor, unless additional information provided by another sensor is used. Also, in addition to fulfilling their primary role, sensors used in industry have to possess additional functionality features such as self-diagnostics, self-calibration, autonomous operation with minimum power consumption, wired or wireless sensor network (WSN) compatibility, and a small form factor. It is also certain that there is a need for extremely robust and reliable industrial sensors. In order to meet all the aforementioned requirements, such sensors need to possess a certain level of intelligence or smartness. Considering today's conditions that may need better analyzing of great amount of data. One trendy and less followed idea regarding that is employment of Deep Learning, which is current, big approach of the field of Artificial Intelligence. These days, Deep Learning has a great importance because of its network models achieving effective results in multidisciplinary applications. Moving from that, there is an opportunity to ensure high level of accurate intelligence or smartness required for sensors in Industry 4.0 applications. Power of deep networks can be used for better organization of intelligent sensors, optimizing their roles within the industrial system and even enabling them to have support from an advanced system giving layered role models for multi-sensors.