

Department of MCA

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ARTIFICIAL INTELLIGENCE

Tech – On – Tap

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Computer Science is an exciting, fast moving and diverse field. It pervades many areas from science to industry and plays a vital role in all aspects of society. The developments covers the many facets of modern computer science, from the understanding theory to the design of practical systems. To realize this, the department of MCA fosters research as an important factor in the student’s curriculum. To showcase students research interest and active participation, the department publish E – Journal. Tech – on – Tap is a monthly E-Journal, prepared by the students of MCA department, explores the emerging trends and recent advancements in the field of computer science research.

This month Tech – On – Tap focuses on Artificial Intelligence. Artificial intelligence refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.

Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the most simple to those that are even more complex. The goals of artificial intelligence include learning, reasoning, and perception.

AI is continuously evolving to benefit many different industries. Machines are wired using a cross-disciplinary approach based in mathematics, computer science, linguistics, psychology, and more.

The student of III MCA is working on many application of AI as part of their research lab. This month E – Journal is a compiled version of the background study of their research work.

SL NO	TITLE	PG NO
1	Deep learning	3
2	Cyber Defense	4
3	AI-optimized hardware	5
4	Artificial Intelligence In Drug Discovery And Development	6
5	Robot-Ants	7
6	Intelligent Virtual Agents	8
7	Reinforcement Learning	9
8	Artificial Intelligence For Speech Recognition	10
9	Implementing Pivot Solutions In Sap Hana Using Sql Script	11
10	Machine Learning In Bioinformatics	12
11	Aiop	13
12	The Dawn Of Quantum Computing With AI	14
13	Tensorflow	15
14	Artificial Intelligence In Power Station	16
15	Machine Learning For Targeted Disaster Relief Management	17
16	Hacking The Human Brain: Lab-Made Synapses For Artificial Intelligence	18
17	Emerging Market Technology Trend	19
18	Virtual Agent	20
19	Virtual And Augmented Reality	21
20	Cyber Defence Artificial Intelligence	22
21	Conversational Artificial Intelligence	23
22	AI For Speech Recognition	24
23	Artificial Intelligence	25
24	How AI Helps In The Recruiting Process	26
25	Artificial Intelligence (AI) In Your Everyday Life	27

DEEP LEARNING

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INTRODUCTION

Deep learning (also known as deep structured learning, hierarchical learning or deep machine learning) is the study of artificial neural networks and related machine learning algorithms that contain more than one hidden layer are based on the (unsupervised) learning of multiple levels of features or representations of the data. Higher level features are derived from lower level features to form a hierarchical representation. They are part of the broader machine learning field of learning representations of data.

PROPOSED SYSTEM

In a simple case, there might be two sets of neurons: one set that receives an input signal and one that sends an output signal. When the input layer receives an input it passes on a modified version of the input to the next layer. In a deep network, there are many layers between the input and the output (and the layers are not made of neurons but it can help to think of it that way), allowing the algorithm to use multiple processing layers, composed of multiple linear and non-linear transformations

Deep learning is part of a broader family of machine learning methods based on learning representations of data. An observation (e.g., an image) can be represented in many ways such as a vector of intensity values per pixel, or in a more abstract way as a set of edges, regions of particular shape, etc. Some representations are better than others at simplifying the learning task (e.g., face recognition or facial expression recognition). Various deep learning architectures such as deep neural networks, convolutional deep neural networks, deep belief networks and recurrent neural networks have been applied to fields like computer vision, automatic speech recognition, natural language processing, audio recognition and bioinformatics where they have been shown to produce state-of-the-art results on various tasks.

CONCLUSION

Artificial Intelligence, machine learning and deep learning are basically machine perception. It is the power to interpret sensory data. Two main ways we interpret things are by naming what we sense; e.g. we hear a sound as we say ourselves "That's my daughter's voice." Or we see a haze of photons and we say "That's my mother's face." If we don't have names for things, we can still recognize similarities and dissimilarities. You might see two faces and know that they were mother and daughter, without knowing their names; or you might hear two voices and know that they came from the same town or state by their accent.

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INTRODUCTION

Cyber defence is a computer network defence mechanism which includes response to actions and critical infrastructure protection and information assurance for organizations, government entities and other possible networks. Cyber defence focuses on preventing, detecting and providing timely responses to attacks or threats so that no infrastructure or information is tampered with. With the growth in volume as well as complexity of cyber-attacks, cyber defence is essential for most entities in order to protect sensitive information as well as to safeguard assets.

CYBER DEFENSE

Cyber defense is a computer network defense mechanism that focuses on preventing, detecting and providing timely responses to attacks or threats to infrastructure and information. AI and ML are now being used to move cyber defense into a new evolutionary phase in response to an increasingly hostile environment.

ADVANTAGES

AI can handle the volume. Artificial intelligence automates the process of detecting advanced threats.

AI cybersecurity can learn over time. AI can identify malicious attacks based on the behaviors of applications and the behavior of the network as a whole.

Artificial intelligence identifies unknown threats. Hundreds of millions of malicious attacks are launched every year.

CONCLUSION

Recurrent neural networks, which are capable of processing sequences of inputs, can be used in combination with ML techniques to create supervised learning technologies, which uncover suspicious user activity and detect up to 85% of all cyber-attacks.

Start-ups such as Dark trace, which pairs behavioral analytics with advanced mathematics to automatically detect abnormal behavior within organizations and Cylance, which applies AI algorithms to stop malware and mitigate damage from zero-day attacks, are both working in the area of AI-powered cyber defense.

Deep Instinct, another cyber defense company, is a deep learning project named “Most Disruptive Start-up”, protects enterprises’ endpoints, servers, and mobile devices.

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AI-OPTIMIZED HARDWARE

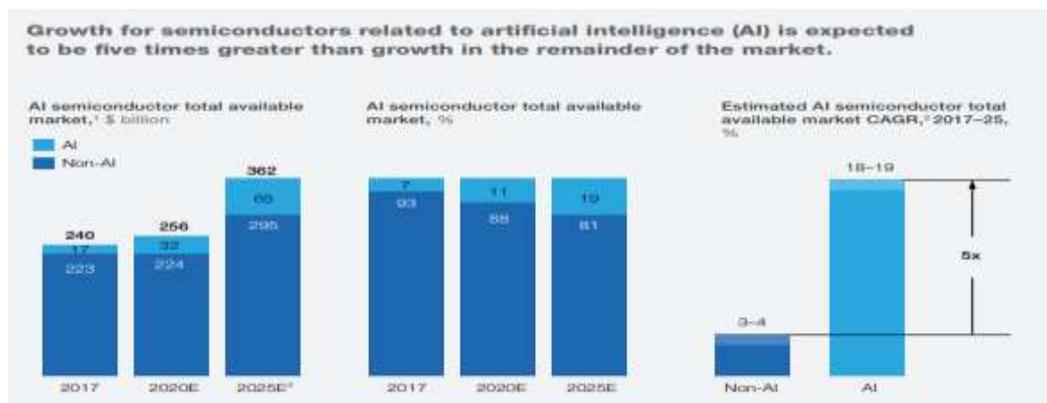
AMALI SUNITHA P (17MCA03)

INTRODUCTION

AI technology makes hardware much friendlier. Through new graphics and central processing units and processing devices specifically designed and structured to execute AI-oriented tasks. And if you haven't seen them already, expect the imminent appearance and wide acceptance of chips that can be inserted right into your portable devices and elsewhere.

AI CHIPS EVERYWHERE

AI-optimized silicon is popping up everywhere. It's already in your phone, and the three major cloud players all have their own versions of dedicated AI hardware. The growth of AI chips mirrors the use of AI itself, since we'll always want quick access to intelligent results.



Companies' works on AI-specific hardware: Google's tensor processing units (TPU), which they offer over the cloud and costs just a quarter compared to training a similar model on AWS. Microsoft is investing in field programmable gate arrays (FGPA) from Intel for training and inference of AI models. FGPA's are highly configurable, so they can easily be configured and optimized for new AI algorithms. Intel has a bunch of hardware for specific AI algorithms like CNN's.

CONCLUSION

Today, AI's ever increasing sophistication is pushing the boundaries of the industry's existing hardware systems as users find more ways to incorporate various sources of data from the edge and more. Today's systems have achieved improved AI performance by infusing machine-learning capabilities with high-bandwidth CPUs and GPUs, specialized AI accelerators and high-performance networking equipment.

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ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY AND DEVELOPMENT

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INTRODUCTION

Artificial Intelligence (AI) has recently been developed into a sizzling topic in the area of medical care industry. The biopharmaceutical industries are making efforts to approach AI to enhance drug discovery process, reduce research and development expenses, diminish failure rates in clinical trials and ultimately generate superior medicines. The accessibility of immense statistics in life sciences and a speedy development in machine learning algorithms led to an evolution of AI-based companies focused on drug discovery over the recent years.

AI INITIATIVES

- (a) Mobile platform to improve health outcomes-the ability to recommend patients by means of real time data collection and thus improve patient outcomes.
- (b) Personalized medicine-the ability to evaluate big database of patient so as to recognize cure options using a cloud-based system.
- (c) Acquisitions galore-New start-up companies are combining the artificial intelligence and healthcare to nourish the innovation requirements of large biotech firms.

EXAMPLE

Microsoft has developed an artificial intelligence based machine to support doctors in finding proper cure for cancer. Microsoft has been working on a project to launch a machine called Hanover. The aim of this machine is to memorize the available information database required to treat cancer and thus help to predict the amalgamation of drugs that will be most efficacious for the diagnosis of individual patient. One such project is based on the use of AI in the therapy of a fatal cancer named myeloid leukemia. Alternative study shows that researchers at Stanford University have developed an AI based algorithm that can identify skin cancer as good as a professional doctor. The program uses a technique known as deep learning for recognizing nearly 130,000 images of moles, rashes, which helps to identify skin cancer.

CONCLUSION

AI can provide radical ideas for medication and therapies through data retrieved from genomics, proteomics and other life science disciplines that could bring advancement in the drug discovery and development process. The modern technological milieu in combination with existing machine learning algorithm/artificial neural network techniques provides exhilarating opportunities for major biopharmaceutical industrial revolution in the forthcoming years. The exquisiteness to start implementing AI technologies in the biomedicines can be a breakthrough for the future market of biopharmaceutical organizations.

REFERENCE

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INTRODUCTION

Individually, ants have only so much strength and intelligence. However, as a colony, they can use complex strategies to complete sophisticated tasks and evade larger predators.

At EPFL, robotics researchers in Professor Jamie Paik's Laboratory have reproduced this phenomenon, developing tiny robots that display minimal physical intelligence on an individual level but that are able to communicate and act collectively. Despite being simple in design and weighing only 10 grams, each robot has multiple locomotion modes to navigate any type of surface. Collectively, they can quickly detect and overcome obstacles and move objects much larger and heavier than themselves.

ROBOTS INSPIRED BY TRAP-JAW ANTS

These three-legged, T-shaped origami robots are called Tribots. They can be assembled in only a few minutes by folding a stack of thin, multi-material sheets, making them suitable for mass production. Completely autonomous and untethered, Tribots are equipped with infrared and proximity sensors for detection and communication purposes. They could accommodate even more sensors depending on the application.

The first author, Zhenishbek Zhakypov says - "Their movements are modelled on those of Odontomachus ants. These insects normally crawl, but to escape a predator, they snap their powerful jaws together to jump from leaf to leaf". The Tribots replicate this catapult mechanism through an elegant origami design that combines multiple shape-memory alloy actuators. As a result, a single robot can produce five distinct locomotion gaits: vertical jumping, horizontal jumping, somersaulting to clear obstacles, walking on textured terrain and crawling on flat surfaces -- just like these creatively resilient ants. Roles: leader, worker and explorer

Despite having the same anatomy, each robot is assigned a specific role depending on the situation. 'Explorers' detect physical obstacles in their path, such as objects, valleys and mountains. After detecting an obstacle, they inform the rest of the group. Then, the 'leader' gives the instructions. The 'workers,' meanwhile, pool their strength to move objects. Each Tribot, just like Odontomachus ants, can have different roles. However, they can also take on new roles instantaneously when faced with a new mission or an unknown environment, or even when other members get lost. This goes beyond what the real ants can do.

FUTURE APPLICATIONS

In practical situations, such as an emergency search mission, Tribots could be deployed in group. And thanks to their multi-locomotive and multi-agent communication capabilities, they could locate a target quickly over a large surface without relying on GPS or visual feedback. Since they can be manufactured and deployed in large numbers, having some 'casualties' would not affect the success of the mission.

With their unique collective intelligence, our tiny robots can demonstrate better adaptability to unknown environments; therefore, for certain missions, they would outperform larger, more powerful robots.

INTELLIGENT VIRTUAL AGENTS

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INTRODUCTION

Intelligent virtual agents are built on the laws of artificial intelligence (AI), and are programmed to interact with humans. It is an animated, human-like graphical chat bot commonly displayed on website home pages and advertisement landing pages.

Virtual agents are embedded with a predefined script and responses and serves as an online customer service representative which includes an extensive list of possible different questions and gestures, allowing the bot to react and respond to human input in a relatively human way. Siri, Cortana & Alexa are the examples of virtual agents with whom we interact on a daily basis.

TYPICAL USAGE OF VIRTUAL AGENT

The term Virtual Agent is typically used by the professional chatbot industry. Sometimes it starts with a prefix *intelligent* or *interactive*, such as Intelligent Virtual Agent (IVA) or Interactive Virtual Agent. The term is also used by scientists, especially within the human-computer fields, human-robot and even human-human interaction. Computer sense of “not physically existing but made to appear by software” is attested from 1959.

Core capabilities of virtual agents

Repeatable tasks and 24/7 customer service including:



Virtual agents are widely used in smart home manager, customer service, and support. These agents are able to make intelligent conversation, can respond to queries and work 24/7. Some of the companies that are dominant in this market are Apple, Amazon, Microsoft, Google, and IBM.

The main advantage of Virtual Agents is that customers can receive help 24/7 and no longer must wait for some call center to open in the morning.

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REINFORCEMENT LEARNING

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INTRODUCTION

Reinforcement learning, in the context of artificial intelligence, is a type of dynamic programming that trains algorithms using a system of reward and punishment. A reinforcement learning algorithm, or agent, learns by interacting with its environment. The agent learns without intervention from a human by maximizing its reward and minimizing its penalty. Reinforcement learning is an approach to machine learning that is inspired by behaviorist psychology. It is similar to how a child learns to perform a new task. Reinforcement learning contrasts with other machine learning approaches in that the algorithm is not explicitly told how to perform a task, but works through the problem on its own. As an agent, which could be a self-driving car or a program playing chess, interacts with its environment, receives a reward state depending on how it performs, such as driving to destination safely or winning a game. The agent over time makes decisions to maximize its reward and minimize its penalty using dynamic programming. The advantage of this approach to artificial intelligence is that it allows an AI program to learn without a programmer spelling out how an agent should perform the task. Some of commonly used RL algorithms are: Q-Learning: Q-Learning is an off-policy, model-free RL algorithm based on the well-known Bellman Equation



CONCLUSION

Reinforcement learning is used for operations automation, machinery and equipment control and maintenance, energy consumption optimization. The finance industry also acknowledged the capabilities of reinforcement learning for powering AI-based training systems. Although trial-and-error training of robots is time-consuming, it allows robots to better evaluate real-world situations, use their skills for completing tasks, or reacting to unexpected consequences appropriately. In addition, RL provides opportunities for e Commerce players in terms of revenue optimization, fraud prevention, and customer experience enhancement via personalization.

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INTRODUCTION

Making machines more like human beings has always been a strong desire of man. This desire has led to the emergence of disciplines like artificial intelligence (AI) which emulate human behavior in machines. The concepts used in AI include the principles outlined by man machine interfacing (MMI) which allows the creation of machines that are more usable for humans. Speech and gestures are the natural means of communication used by humans to interact with each other.

Speech technology is currently at a stage where it can be used but only in a constrained way which, although does not provide seamless interaction, does mean a step towards it. Speech recognition technology is required by a machine to be able to interpret human speech. Although speech recognition technology has been under development for many years it had not been established enough to be used with PCs until recently. Accuracy and speed are two major factors that are necessary to make speech interfaces practical for frequent use. Hardware used in personal computers is now advanced enough to supply enough processing power to be able to run speech recognition at a usable speed. Accuracy of speech recognizers is also improving. Some commercial speech recognizers can now handle continuous speech with an accuracy of more than 90%. Speech synthesis is required to allow computers to communicate back to the user in speech. Speech synthesis tools are also now widely available; examples of such tools are Microsoft's Speech API and Speech Works Speechify.

HOW TO RECOGNIZE SPEECH?

Simple inquiries about bank balance, movie schedules, and phone call transfers can already be handled by telephone-speech recognizers. Voice activated data entry is particularly useful in medical or darkroom applications, where hands and eyes are unavailable. Speech could be used to provide more accessibility for the handicapped (wheelchairs, robotic aids, etc.) and to create high-tech amenities (intelligent houses, cars, etc.)The 1990s shows the first commercialization of spoken language understanding systems. Computers can now understand and react to humans speaking in a natural manner in ordinary languages within a limited domain.

FUTURE OF AI FOR SPEECH RECOGNITION

The following are a few of the advances in speech recognition, artificial intelligence, powerful chips, virtual environments, and flat-screen wall monitors that are likely to produce this intelligent interface. IBM has a Super Human Speech Recognition Program to greatly improve accuracy, and in the next decade Microsoft's program is expected to reduce the error rate of speech recognition, matching human capabilities. MIT (Massachusetts Institute of Technology, US) is planning to demonstrate their Project Oxygen, which features a voice-machine interface. Amtrak, Wells Fargo, Land's End, and many other organizations are replacing keypad-menu call centers with speech-recognition systems because they improve customer service and recover investment in a year or two.

IMPLEMENTING PIVOT SOLUTIONS IN SAP HANA USING SQL SCRIPT

JOTHIS MARIA (17MCA11)

INTRODUCTION

PIVOT rotates a table-valued expression by turning the unique values from one column in the expression into multiple columns in the output and performs aggregations where they are required on any remaining column values that are wanted in the final output. Pivoting is a common technique, especially for reporting, and it has been possible to generate pivoted result sets with SQL using Hana.

BUSINESS CASE

One of our client, a multinational company which is primarily into coating products was looking for a flexible and optimal solution based on SAP HANA for pricing waterfall analysis. As part of this solution we need to derive the values of various pricing item buckets such as rebates, commissions, discounts etc. for each of the billing items.

One of the challenging requirements in this entire solution is to convert the tabular data of invoice items into Pivot structure to show each pricing bucket in a separate column against the invoice items. The entire solution need to be dynamic since the exact columns in the Pivot results can change during time.



CONCLUSION

Understanding of how Dynamic SQL works will be deepened with clear explanations in this white paper and algorithms. You will be alerted to potential performance problems that are not mentioned in the documentation and you will expand your repertoire of tuning solutions and troubleshooting techniques by learning how to use numerous hidden parameters and other undocumented features.

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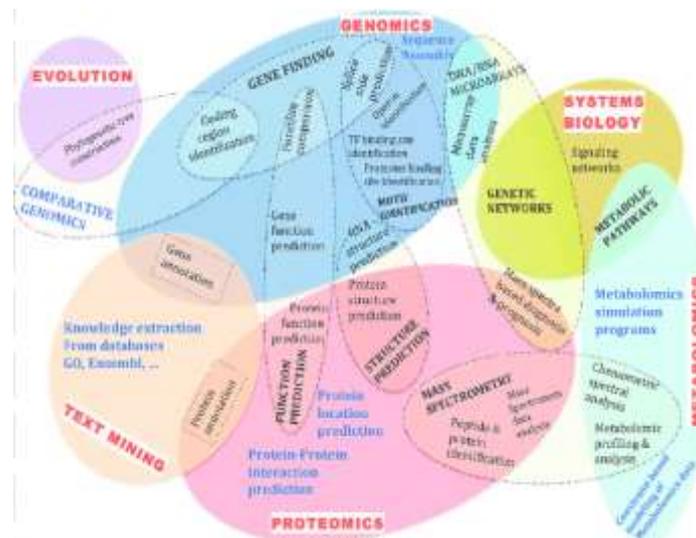
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INTRODUCTION

The exponential growth of the amount of biological data available raises two problems: on one hand, efficient information storage and management and, on the other hand, the extraction of useful information from these data. The second problem is one of the main challenges in computational biology, which requires the development of tools and methods capable of transforming all these heterogeneous data into biological knowledge about the underlying mechanism. These tools and methods should allow us to go beyond a mere description of the data and provide knowledge in the form of testable models. By this simplifying abstraction that constitutes a model, we will be able to obtain predictions of the system. There are several biological domains where machine learning techniques are applied for knowledge extraction from data. Figure 1 shows a scheme of the main biological problems where computational methods are being applied. We have classified these problems into five different domains:



Text mining – Machine learning help in extraction

GENOMICS

Genomics is the study of DNA of Proteomics: Proteomics is the study of organisms. Machine Learning systems can help proteins and amino acids. Proteomics is in finding the location of protein-encoding gen- applied to problems related to proteins like -es in a DNA structure. Gene prediction is per-protein side-chain prediction, protein is formed by using two types of searches named modeling, and protein map prediction.

Microarrays: Microarrays are used to collect data about large biological materials. Machine learning can help in the data analysis, pattern prediction and genetic induction. It can also help in finding different types of cancer in genes. System Biology – It deals with the interaction of biological components in the system. These components can be DNA, RNA, proteins and metabolites. Machine Learning help in modelling these interactions.

INTRODUCTION

Artificial intelligence for IT operations (AIOps) is an umbrella term for the use of big data analytics, machine learning and other artificial intelligence technologies to automate the identification and resolution of common information technology (IT) issues. The systems, services and applications in a large enterprise produce immense volumes of log and performance data. AIOps uses this data to monitor assets and gain visibility into dependencies within and outside of IT systems. An AIOps platform should bring three capabilities to the enterprise:

AUTOMATE ROUTINE PRACTICES

Routine practices include user requests as well as non-critical IT system alerts. For example, AIOps can enable a help desk system to process and fulfill a user request to provision a resource automatically. AIOps platforms can also evaluate an alert and determine that it does not require action because the relevant metrics and supporting data available are within normal parameters.

RECOGNIZE SERIOUS ISSUES FASTER AND WITH GREATER ACCURACY THAN HUMANS.

IT professionals might address a known malware event on a noncritical system, but ignore an unusual download or process starting on a critical server because they are not watching for this threat. AIOps addresses this scenario differently, prioritizing the event on the critical system as a possible attack or infection because the behavior is out of the norm, and deprioritizing the known malware event by running an antimalware function.

STREAMLINE THE INTERACTIONS BETWEEN DATA CENTER GROUPS AND TEAMS.

AIOps provides each functional IT group with relevant data and perspectives. Without AI-enabled operations, teams must share, parse and process information by meeting or manually sending around data. AIOps should learn what analysis and monitoring data to show each group or team from the large pool of resource metrics.

CONCLUSION

When properly implemented and trained, an AIOps platform reduces the time and attention of IT staff spent on mundane, routine, everyday alerts. IT staff teaches AIOps platforms, which then evolve with the help of algorithms and machine learning, recycling knowledge gained over time to further improve the software's behavior and effectiveness. AIOps tools also perform continuous monitoring without a need for sleep. Humans in the IT department focus on serious, complex issues and on initiatives that increase business performance and stability.

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INTRODUCTION

Artificial intelligence and quantum computers are the very two enthralling frontiers. Every day, it seems to be an innovation with the most advanced quantum computers. So, before you allay with any myth in the new artificial intelligence technologies that would make quantum computing better in 2019, somewhat it's good to be a little pushy in the right direction for creating better quantum computing devices. Nevertheless, it would be a small increment but still a huge focal point in the arena of AI.

Quantum computers work solely on quantum physics that compute calculations much faster than a supercomputer. You must be equipped with the computer system using bits and bytes. Unlike a conventional system, a quantum computer uses Qubits to store information.

However, it's a long way to go in terms of dealing with demurs of Quantum computing in regards to maintain the coherence of the qubits or expel the noisy and not needed computations.

What does Quantum really mean?

“Quantum” is a scary word, especially when you apply it to the inner workings of a computer, which are complicated as it is. Here's what you need to know about the quantum realm and the way computers work: “quantum” itself refers to the fact that energy comes in specific quantities, like tiny packages of energy. In the same way that an atom is the base building block for matter, a quantum of energy is the base building block for energy. However, because quanta of energy are so small, the word quantum now generally applies to realms of very small things. The cool and perplexing part of quantum physics is that in the quantum realm, a particle or piece of information can be in two different states at the exact same time. When a quantum system is in two states at the same time, the system is said to be in a state of ‘superposition.’ Superposition has immense significance for quantum computing.

Quantum computing is one of those things that boggles the mind. It's hard to grasp: computing power that is exponentially faster than today's supercomputers, capable of tackling the world's most challenging problems with unimaginable speed and power.

Experts say that with the most advanced quantum computers, it would only take days, hours or even minutes to solve problems that would take billions of years using classical computers (yes, you read that right: billions of years...). Or: quantum computers may one day be able to perform more calculations simultaneously than there are atoms in the known universe.

That level of performance is still theoretical, and a long way off. Yet after decades of pursuing this holy grail of computing, quantum computers are finally on the brink of viability – and that's huge news. Although quantum computing is still in its infancy, there's no question that a new age of computing has arrived – and it promises to impact every sector of society before long.

INTRODUCTION

TensorFlow is a free and open-source software library for dataflow and differentiable programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks. It is used for both research and production at Google. TensorFlow was developed by the Google Brain team for internal Google use. It was released under the Apache License 2.0 on November 9, 2015.

TRAIN AND ESTIMATE THE MODEL

It is called Tensorflow because it takes input as a multi-dimensional array, also known as tensors. You can construct a sort of flowchart of operations (called a Graph) that you want to perform on that input. The input goes in at one end, and then it flows through this system of multiple operations and comes out the other end as output. This is why it is called TensorFlow because the tensor goes in, it flows through a list of operations, and then it comes out the other side.

CONCLUSION

TensorFlow is a great library that can be used for numerical and graphical computation of data in creating deep learning networks and is the most widely used library for various applications like Google Search, Google Translate, Google Photos and many more. There are numerous and amazing things that people have done using machine learning, some of which include applications relating to health care, recommendation engines for movies, music, personalized ads, and social media sentiment mining to name a few. With these advancements in machine learning and artificial intelligence that seem mind-boggling, TensorFlow is a tool that is helping to achieve these goals.

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ARTIFICIAL INTELLIGENCE IN POWER STATION

R. BHAVYASHREE (17MCA21)

INTRODUCTION

An electric power system is a network of electrical components used to supply, transmit and use electric power. Fuzzy Logic Controller: Simply put, it is a fuzzy code designed to control something, generally mechanical input. They can be in software or hardware mode and can be used in anything from small circuits to large mainframes.

ARTIFICIAL INTELLIGENCE TECHNIQUES

A. Artificial Neural Networks

Artificial Neural Networks are systems designed based on organic thought processes which convert a set of inputs into a set of outputs by a network of neurons. Each neuron produces one output as a function of inputs. These systems are used in real world applications wherein the need for classification of patterns and pattern recognition arises.

B. Fuzzy Logic

Fuzzy logic or Fuzzy systems are logical systems for standardisation and formalisation of approximate reasoning. It is similar to human decision making with an ability to produce exact and accurate solutions from certain or even approximate information and data. The reasoning in fuzzy logic is similar to human reasoning. Fuzzy logic is the way like which human brain works, and we can use this technology in machines so that they can perform somewhat like humans. Fuzzification provides superior expressive power, higher generality and an improved capability to model complex problems at low or moderate solution cost.

C. Expert Systems:

Expert systems are basically computer programs, the process of writing codes for these programs is simpler than actually calculating and estimating the value of parameters used in generation, transmission and distribution. Any modifications even after design can be easily done because they are computer programs. Virtually, estimation of these values can be done and further research for increasing the efficiency of the process.

CURRENT APPLICATIONS OF AI IN POWER SYSTEMS

- Replacing human workers for dangerous and highly specialized operations.
- Operation in hazardous environments, such as radioactive locations in nuclear plants, access to tight spaces, etc.
- Expert systems use the interface mechanism and knowledge to solve problems which cannot be or difficult to be solved by human skill and intellect.

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MACHINE LEARNING FOR TARGETED DISASTER RELIEF MANAGEMENT

RAKSHITHA G L (17MCA22)

INTRODUCTION

In case of any disaster, the first step is to formulate a critical response team to help those in distress. Before the team goes into action, it is important to analyse and assess the extent of damage and to ensure that the right aid goes first to those who need it the most. They can immediately and efficiently filter these images, which would have required months to be sorted manually. AI can identify objects and features such as damaged buildings, flooding, blocked roads from these images. They can also identify temporary settlements which may indicate that people are homeless, and so the first care could be directed towards them.

PROPOSED SYSTEM

Artificial intelligence and machine learning tools can also aggregate and crunch data from multiple resources such as crowd-sourced mapping materials or Google maps. Machine learning approaches then combine all this data together, remove unreliable data, and identify informative sources to generate heat maps. Their Open Data Program is a special program for disaster response. Digital Globe releases pre- and post-event imagery for select natural disasters each year.

Following the Nepal Earthquakes in 2015, Rescue Global and academicians from the Orchid Project used machine learning to carry out rescue activities. They took pre and post-disaster imagery and utilized crowd-sourced data analysis and machine learning to identify locations affected by the quakes that had not yet been assessed or received aid. This information was then shared with relief workforces to facilitate their activities.

CONCLUSION

Recent advances in machine learning and artificial intelligence are allowing researchers, engineers, and scientists to access and analyse new and bigger data sources than ever before. For example, large-scale behaviour and movement data. In short, the role of AI in disaster relief is to help governments and relief agencies parse through large volumes of complex, fragmented data to generate useful information that they can act on more quickly than before.

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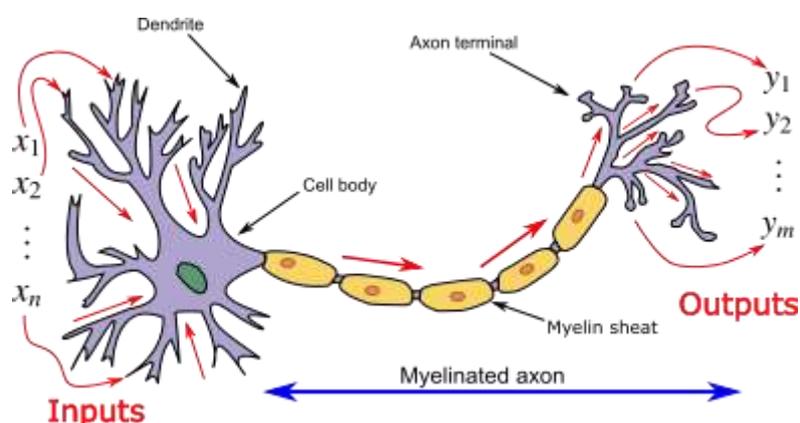
HACKING THE HUMAN BRAIN: LAB-MADE SYNAPSES FOR ARTIFICIAL INTELLIGENCE

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INTRODUCTION

One of the greatest challenges facing artificial intelligence development is understanding the human brain and figuring out how to mimic it. Now, one group reports in ACS Nano that they have developed an artificial synapse capable of simulating a fundamental function of our nervous system -- the release of inhibitory and stimulatory signals from the same "pre-synaptic" terminal.

THE HUMAN NERVOUS SYSTEM



The human nervous system is made up of over 100 trillion synapses, structures that allow neurons to pass electrical and chemical signals to one another. In mammals, these synapses can initiate and inhibit biological messages. Many synapses just relay one type of signal, whereas others can convey both types simultaneously or can switch between the two. To develop artificial intelligence systems that better mimic human learning, cognition and image recognition, researchers are imitating synapses in the lab with electronic components. Most current artificial synapses, however, are only capable of delivering one type of signal. So, Han Wang, Jing Guo and colleagues sought to create an artificial synapse that can reconfigurably send stimulatory and inhibitory signals.

The researchers developed a synaptic device that can reconfigure itself based on voltages applied at the input terminal of the device. A junction made of black phosphorus and tin selenide enables switching between the excitatory and inhibitory signals. This new device is flexible and versatile, which is highly desirable in artificial neural networks. In addition, the artificial synapses may simplify the design and functions of nervous system simulations.

VIRTUAL AGENT

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INTRODUCTION

A virtual agent (sometimes called an intelligent virtual agent, virtual rep or Chabot) is used to describe a program based in artificial intelligence (AI) that provides automated customer service. Virtual agent can also refer to a human customer service agent who works remotely from his employer's location.

VIRTUAL AGENT BENEFITS

Virtual agent software has improved over the past five years with advances in AI and cognitive computing programs. Current conversational technology allows virtual agents to go far beyond interactive voice response (IVR) systems; virtual agents understand customer intent and can provide personalized answers to customer questions in a humanlike manner. Virtual agents typically communicate with customers via email or live chat on corporate websites. For the latter, an avatar is often used to provide a visual representation of the virtual agent.

Still, most companies use virtual agents to handle highly repeatable tasks. For complicated tasks, live customer service agents are required. In the world of customer relationship management (CRM) software, virtual agents are used to provide 24/7 customer service including answering questions on accounts, help with a password, providing recommendations or following up on sales and marketing leads via email correspondence.

For example, a virtual sales agent can be used to email potential customers to request a meeting with a live sales agent. When a customer agrees to a meeting, the virtual agent can obtain a phone number and collect the information a sales rep might need to conduct a live conversation.

This is enormously useful for sales and marketing teams, as they typically only focus on leads deemed "high quality." With a virtual agent, all leads can be followed up on, which could result in higher sales. In addition, virtual agents cost significantly less than human employees.

HOW TO USE VIRTUAL AGENT

Companies interested in adopting virtual agent software through a cloud service provider or software vendor must invest time and resources into "training" the virtual agent. This initial setup period may take months to complete, depending on the level of confidence the company desires. Virtual agents are based on machine learning technology, which improves over time as the system ingests more data and "learns" through continued use.

CONCLUSION

Virtual agents can only provide information that has been "fed" to the AI system, and if the system contains bad data, customers will receive false information. This makes the setup phase critical.

VIRTUAL AND AUGMENTED REALITY

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INTRODUCTION

Virtual and augmented reality technologies have entered a new near-commodity era, accompanied by massive commercial investments. These are special times for virtual reality (VR) and augmented reality (AR). These technologies have just entered the life and the imagination of general audiences in a spectacular way. Only two years ago, hardly anybody—apart from some specialists and geeks—had experienced head-mounted displays, and such headsets were still considered futuristic and expensive gadgets, limited to research or purpose-built application use. But today, anybody can purchase a complete VR setup at various consumer electronics price points at a neighbourhood or online electronics retailer. These devices come complete with sophisticated and effective display and tracking technologies, and showcase impressive 3D contents and experiences, realistic and artistic. AR is following suit, with great promise and technologically advanced prototypes from major industrial players that are heavily invested in the technology.

This new era of VR and AR brings with it new issues to consider, not only scientifically but also on the side of societal impact, with potential ethical questions arising from the higher realism of VR content compared to conventional games that could lead to behavioural changes in real life, or health issues stemming from long-term use of VR/AR displays. It brings new business and mass-market opportunities, with different focus areas (entertainment, education, training, etc.). It also engages a new and young generation of passionate audiences discovering this field, eager to learn more about the best practices, the guidelines, and its current and future challenges.

CONCLUSION

Therefore, it is believed that this is a good moment to take a step back for a bigger picture and examine aspects of this discipline front and back, gathering knowledge from the past but also projecting into the near and far future of VR/AR technologies.

CYBER DEFENCE ARTIFICIAL INTELLIGENCE

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INTRODUCTION

Cyber defence is a computer network defence mechanism that focuses on preventing, detecting and providing timely responses to attacks or threats to infrastructure and information. AI and ML are now being used to move cyber defence into a new evolutionary phase in response to an increasingly hostile environment: Breach Level Index detected a total of over 2 billion breached records during 2017. Seventy-six percent of the records in the survey were lost accidentally, and 69% were an identity theft type of breach.

Recurrent neural networks, which are capable of processing sequences of inputs, can be used in combination with ML techniques to create supervised learning technologies, which uncover suspicious user activity and detect up to 85% of all cyber-attacks.

Start-ups such as Dark trace, which pairs behavioural analytics with advanced mathematics to automatically detect abnormal behaviour within organizations, which applies AI algorithms to stop malware and mitigate damage from zero-day attacks, are both working in the area of AI-powered cyber defence.

Deep Instinct, another cyber defence company, is a deep learning project named “Most Disruptive Start-up” by NVidia’s Silicon Valley ceremony, protects enterprises’ endpoints, servers, and mobile devices.

The practical implementation of AI cyber security systems may lead to changes and new approaches on cyber system engineering and cyber defence architectures.

CONCLUSION

New AI applications are emerging on Intent Based Network Security (IBNS), on AI platforms for cyber defence or immune computer systems which have the ability to self-adapt. On the other hand, the rise of AI-enabled cyber-attacks is expected to cause an increase of sophisticated cyber threats. Ongoing and future research activities should be explored in countering complex cyber threats, malware reverse engineering and projection to enhance a cyber-situation awareness among many others.

HOW ARTIFICIAL INTELLIGENCE (AI) IS TRANSFORMING MOBILE TECHNOLOGY?

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INTRODUCTION

The average individual looks at their phones for more than 2.5 hours and makes about 35,000 decisions, in a single day. The fact is, we often use one to help with the other. Our smartphones help us with the choices we need to make. Even now, Artificial Intelligence (AI) is an enormous part of how you use your smartphone. And the support you receive from your mobile phone is about to increase dramatically. AI is making your phone into the world's best wingman.

ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)

Recently Artificial Intelligence (AI) and Machine Learning (ML) has created a huge impact on human interaction with machines and devices. Whether it is any type of industry ranging from travel, utility, machinery, telecom, or advertisement industry, AI and ML have enhanced the smartphone experience in a huge way. Both Android and iOS mobile platforms are integrating AI and ML in various apps. Artificial intelligence and machine learning are much more than a smart technology, as it brings all the emerging technologies especially in technology, telecom, and media industry. Looking at the development of the new technologies like Chabot, self-driving cars, virtual assistants, etc. Moreover, in the coming years, there will be an incredible flow of AI and ML which can only be seen in the sci-fi movies. These are all the changes given below on how AI and ML will bring to the mobile technology:

- Empowering Search Engines Artificial Intelligence Combined with the Internet of Things(IOT)
- Smartphone Camera Are Getting Better in Subject Detection
- Face Unlock to Power More Smartphones
- High App Authentication
- Creating App Marketing

CONCLUSION

Seeing the progressive growth of the AI in today's time, it can be depicted that there is a clear emphasis on the influencers and advertisements that are using micro-targeting to expand their reach. AI will soon be incorporated with 5G smartphones, that means the users can leverage complete benefits of AI that has the potential to collect, store, and process real-time data. AI also gives an advanced personalized experience, thus, businesses will surely take advantage of this technology to grow their business and increase their ROI. The future is going to more smart for smartphones with AI and surely mobile economy will grow tremendously with time.

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INTRODUCTION

Over 2.5 billion people are using messaging services, with roughly a dozen major platforms claiming various geographic and demographic strongholds. Five of the 10 all-time apps are messaging apps, and 75 percent of smartphone users use at least one chat app.

While the big selling point of messaging apps is immediate access to a pool of billions of users, the voice assistant market came into existence.

Conversational AI refers to the use of messaging apps, speech-based assistants and chatbots to automate communication and create personalized customer experiences at scale. Conversational interactions are driven by words, whether in full sentences or in a menu. And, unlike social media, they can support engaging, two-way interactions with private audiences. When combined with automation and artificial intelligence (AI), these interactions can connect humans and machines through virtual assistants and chatbots. AI: Computers That Talk

Conversational AI systems are computers that people can interact with simply by having a conversation, our most natural form of interaction. In short, it is what allows us to talk to voice-driven technologies like Amazon Alexa and ask about the weather, order products online, and even call a cab, simply by using the language we already know.

With conversational AI, voice-enabled devices like Amazon Echo are finally starting to enable the sort of magical interactions we've dreamed of for decades (think: Star Trek computer). Through a voice user interface (VUI), voice services like Alexa can communicate with people in ways that feel effortless, solve problems, and get smarter over time.

The sophistication of your bot, and therefore your conversational AI capabilities, is largely determined by the sophistication of the artificial intelligence you employ on the backend. Tech companies like Microsoft, Google and Amazon are working hard to democratize advanced AI so that businesses can tap into their capabilities to introduce increasingly complex experiences.

Tech titans like Apple, Amazon, Baidu, Facebook, Google, IBM and Microsoft are engaged in an arms race. Each is allocating tremendous resources to drive AI progress, and to turn ideas that were once derided as fantasy into reality. Most are acquiring start-ups with specialized tech and expertise, committing tremendous capital to make technical breakthroughs, and at times rolling out those innovations to the public through consumer products and cloud services.

Conversational AI will change every aspect of when, where and how you engage and communicate with your customers.

INTRODUCTION

Speech recognition is technology that can recognize spoken words, which can then be converted to text. A subset of speech recognition is voice recognition, which is the technology for identifying a person based on their voice.

Facebook, Amazon, Microsoft, Google and Apple — five of the world's top tech companies — are already offering this feature on various devices through services like Google Home, Amazon Echo and Siri.

With a number of voice recognition products on the market, we decided to look into the business implication of voice recognition. By researching the speech recognition technology of these companies, we try to answer the following questions for our readers:

- How is speech recognition driving business value for these companies?
- Why are they investing in speech recognition?
- What could this technology look like in a few years?

We start with some context on how and why the tech giants are developing voice recognition technology. Followed by a rundown of voice recognition technology from Facebook, Amazon, Microsoft, Google and Apple.

POTENTIAL REASONS FOR DEVELOPING SPEECH RECOGNITION TECHNOLOGY

Technology companies are recognizing interests in speech recognition technologies and are working toward making voice recognition a standard for most products. One goal of these companies may be to make voice assistants speak and reply with greater accuracy around context and content.

Research shows that the use of virtual assistants with speech recognition capabilities is forecast to keep increasing in the next year, from 60.5 million people in the United States in 2017 to 62.4 million in 2018, By 2019, 66.6 million Americans are projected to be using speech or voice recognition technology.

CONCLUSION

To build a robust speech recognition experience, the artificial intelligence behind it has to become better at handling challenges such as accents and background noise. Today, developments in natural language processing and neural network technology have improved the speech and voice technology, so much so that today it is reportedly on par with humans. In 2017. For example, the word error rate for Microsoft's voice technology has been recorded at 5.1 percent by the company, while Google reports that it has reduced its rate to 4.9 percent.

RABIA FIRDOUS (172MCA34)

New e-skin innovation gives robots and prosthetics an exceptional sense of touch.

INTRODUCTION

Robots and prosthetic devices may soon have a sense of touch equivalent to, or better than, the human skin with the Asynchronous Coded Electronic Skin (ACES), an artificial nervous system developed by a team of researchers at the National University of Singapore (NUS).

The new electronic skin system achieved ultra-high responsiveness and robustness to damage, and can be paired with any kind of sensor skin layers to function effectively as an electronic skin. Drawing inspiration from the human sensory nervous system, the NUS team spent a year and a half developing a sensor system that could potentially perform better. While the ACES electronic nervous system detects signals like the human sensor nervous system, it is made up of a network of sensors connected via a single electrical conductor, unlike the nerve bundles in the human skin. It is also unlike existing electronic skins which have interlinked wiring systems that can make them sensitive to damage and difficult to scale up.

ACES can detect touches more than 1,000 times faster than the human sensory nervous system. For example, it is capable of differentiating physical contacts between different sensors in less than 60 nanoseconds -- the fastest ever achieved for an electronic skin technology -- even with large numbers of sensors. ACES-enabled skin can also accurately identify the shape, texture and hardness of objects within 10 milliseconds, ten times faster than the blinking of an eye. ACES' simple wiring system and remarkable responsiveness even with increasing numbers of sensors are key characteristics that will facilitate the scale-up of intelligent electronic skins for Artificial Intelligence (AI) applications in robots, prosthetic devices and other human machine interfaces.

"Scalability is a critical consideration as big pieces of high performing electronic skins are required to cover the relatively large surface areas of robots and prosthetic devices," explained Asst Prof Tee. "ACES can be easily paired with any kind of sensor skin layers, for example, those designed to sense temperatures and humidity, to create high performance ACES-enabled electronic skin with an exceptional sense of touch that can be used for a wide range of purposes," he added.

For instance, pairing ACES with the transparent, self-healing and water-resistant sensor skin layer also recently developed by Asst Prof Tee's team, creates an electronic skin that can self-repair, like the human skin. This type of electronic skin can be used to develop more realistic prosthetic limbs that will help disabled individuals restore their sense of touch.

Other potential applications include developing more intelligent robots that can perform disaster recovery tasks or take over mundane operations such as packing of items in warehouses. The NUS team is therefore looking to further apply the ACES platform on advanced robots and prosthetic devices in the next phase of their research.

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HOW AI HELPS IN THE RECRUITING PROCESS

SHILPA. S (172MCA35)

INTRODUCTION

Artificial Intelligence has the potential to streamline the job search process and take over time-consuming tasks for humans. There are several ways artificial intelligence helps candidates and companies during a job search and throughout the recruiting and hiring process.

Candidates can use artificial intelligence job-seeking tools to find open positions that match their particular skill-set and discover organizations with the culture they want. This alone can save candidates an incredible amount of effort in an already time-consuming activity. Similarly, AI can conduct candidate outreach much more efficiently for companies so they can find candidates actually suited for the role.

When the CV screening process is automated, it is much more efficient—appreciated by candidates and human resources departments alike. Additionally, since recruiters won't get bogged down in the CV review process, they have more time to nurture relationships with candidates. AI-powered chatbots are responsive and quick to support a candidate during the application process. Having a chatbot handle inquiries from candidates is another way artificial intelligence frees up the time for human personnel to handle tasks only they can tackle.

UNILEVER USING AI IN RECRUITMENT PROCESS

Unilever recruits more than 30,000 people a year and processes around 1.8 million job applications. This takes a tremendous amount of time and resources. As a multinational brand operating in 190 countries, applicants are based all around the world. Finding the right people is an essential ingredient for success.

To tackle this problem, Unilever partnered with Pymetrics , a specialist in AI recruitment, to create an online platform, which means candidates can be initially assessed from their own homes, in front of a computer or mobile phone screen.

First, they are asked to play a selection of games that test their aptitude, logic, and reasoning, and appetite for risk. Machine learning algorithms are then used to assess their suitability for whatever role they have applied for, by matching their profiles against those of previously successful employees.

The second stage of the process involves submitting a video interview. Again, the assessor is not a human being but a machine learning algorithm. The algorithm examines the videos of candidates who answering questions for around 30 minutes, and through a mixture of natural language processing and body language analysis, determines who is likely to be a good fit. referring to the video interview analytics , “Every screenshot gives us many data points about the person, so we work with a number of partners and use a lot of proprietary technology with those partners, and then we select 3,500 or so people ” After spending a day with real leaders and recruiters, Unilever selects about 800 people who will be offered a job.

ZULFIN ARA (17MCA37)

INTRODUCTION

The entire tech world is debating the consequences of artificial intelligence and the part AI is going to play in shaping our future. While we might think that AI is at least a few years away from causing any considerable effects on our lives, the fact remains that it is already having an enormous impact on us.

Artificial intelligence has the potential to offer \$15.7 trillion to the global economy by 2030. Think of all those times Amazon recommended a book to you or Netflix suggested a film or TV show. Those recommendations are based on algorithms that examine what you've bought or watched. The algorithms learn from those purchases, using them to suggest other things you might enjoy. Artificial intelligence lies behind those algorithms. Simple artificial intelligence even filters your incoming emails, diverting spam away from your inbox. It works better than software rules because it learns what could be spam based on the content of the email.

Artificial intelligence goes so much further than recommending a book or filtering your emails. Let's take a look at the other ways we can measure the impact of artificial intelligence in everyday life.

EXAMPLES OF ARTIFICIAL INTELLIGENCE

1. Email Filters and Smart Replies in Gmail

Google uses AI to ensure that nearly all of the email landing in your inbox is authentic. Smart replies offer users a way to respond to emails with simple phrases like "Thanks!" or "Let's do it!" with the click of a button.

2. Google Predictive Searches

When you begin typing a search term and Google makes recommendations for you to choose from, that's AI in action.

3. Product Recommendations

Amazon and other online retailers use AI to gather information about your preferences and buying habits. Then, they personalize your shopping experience by suggesting new products tailored to your habits.

4. Mobile Banking

AI is used by many banks to personalize your experience on their mobile apps. For example, according to Biz Journals, the Wells Fargo app analyzes account information in order to provide personalized alerts such as: Bill pay reminders, Pre-overdraft alerts, Transfer prompts.

5. Financial Institutions Fraud Prevention

Another way that banks use AI is by sending mobile alerts to help prevent against fraud.

