TECHERA2022

“Make it work, make it right, make it fast.”

Guido Van Rossum

Madanapalle Institute of Technology & Science
(UGC- Autonomous)

Department of Computer Science & Engineering

MESSAGE FROM THE CORRESPONDENT

I feel exhilarated that the Department of Computer Science &Engineering of MITS is bringing out a magazine called TECHERA from the year 2022. This Magazine brings out the intellectual brilliance in various new techniques introduced in Information Technology industry.

``HARD WORK, SINCERITY, DEDICATION AND ENTHUSIASTIC DEVOTION TO WORK WILL FETCH YOU UNBOUND SUCCESS, MAY THE LORD SHOWER HIS BLESSINGS ON YOU``

I heartily congratulate the students and the staffs of CSE Department and Wish thema grand success.

Dr. N. Vijaya Bhaskar Choudary
Correspondent

MESSAGE FROM THE PRINCIPAL

I feel delighted about the magazine “TECHERA” to be hosted by the Department of Computer Science& Engineering of MITS. On this magnanimous occasion, I congratulate all the students and faculty members of department for their great efforts and coordination in bringing out the magazine a great success.

Principal

Dr. C. Yuvaraj

MESSAGE FROM THE HEAD OF THE DEPARTMENT

TECHERA is dedicated for addressing the emerging topics and challenges in the area of technology. **TECHERA** is to create great awareness on new innovative ideas and technologies. I wish the readers of **"TECHERA"** for their support and also can provide the useful feedback to improve the standards of magazine.

Dr. R. Kalpana
Head of the Department (CSE)

EDITORIAL DESK

The annual release of the department magazine **"TECHERA – 2022",** mark the spirit of exploration among students in an environment of erudition.

This year's edition of "**TECHERA - 2022**" focuses on current trends in Computer Science and Information Technology which are the major rays of hope for developing a new world of science. It is a collection of information and facts, featuring the recent developments of fascinating and conceptual communication.

The editorial team owes its gratitude to all who have made "**TECHARA - 2022", a** scintillating event.

Editors
Dr. R. Kalpana
Dr Mahaboob Basha S

ABOUT MITS

Madanapalle Institute of Technology & Science is established in 1998 in the picturesque and pleasant environs of Madanapalle and is ideally located on a sprawling 26.17- a c r e campus on Madanapalle - Anantapur Highway (NH-205) near Angallu, about 10km away from Madanapalle.

MITS, originated under the auspices of Ratakonda Ranga Reddy Educational Academy under the proactive leadership of and **Dr. N. Vijay Bhaskar Choudary, Secretary & Correspondent** of the Academy.

MITS is governed by a progressive management that never rests on laurels and has been striving conscientiously to develop it as one of the best centers of Academic Excellence in India. The Institution's profile is firmly based on strategies and action plans that match changing demands of the nation and the student’s fraternity. MITS enjoys constant support and patronage of NRI's with distinguished academic traditions and vast experience in Engineering &Technology.

ABOUT DEPARTMENT

The Department of Computer Science & Engineering offers 4-year degree, which is established in the year 1998. The course is flexible and has been structured to meet the evolving need soft the IT industry. The Department is offering M.Tech Computer Science & Engineering from the academic year 2007- 2008. The Department has obtained UGC-Autonomous Status in the year 2014 and is running the Programs successfully meeting all the requirements. The College Academic Council, Board of Studies of the department strive to provide quality education and most advanced curriculum and syllabus to make the students industry ready and excel in the contemporary business world.

The B.Tech. Programs under Department of Computer Science & Engineering was Accredited by the National Board of Accreditation (NBA)of All India Council for Technical Education(AICTE)

VISION

To excel in technical education and research in area of Computer Science &Engineering and to provide expert, proficient and knowledgeable individuals with high enthusiasm to meet the Societal challenges

MISSION

M1: To provide an open environment to the students and faculty that promotes professional and personal growth.

M2: To impart strong theoretical and practical background across the computer science discipline with an emphasis on software development and research.

M3: To inculcate the skills necessary to continue their education after graduation, as well as for the societal needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Program Educational Objectives (PEOs) of the department of CSE are given below:

PEO1: Gain Successful Professional career in IT industry as an efficient software engineer.

PEO2: Succeed in Master / Research programmers to gain knowledge one merging technologies in Computer Science and Engineering.

PEO3: Grow as a responsible computing professional in their own area of interest with intellectual skills and ethics through lifelong learning approach to meet societal needs.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Computer Science and Engineering Graduates will be able to:

PSO1: Apply mathematical foundations, algorithmic principles and computing techniques in the modelling and design of computer - based systems

PSO2: Design and develop software in the areas of relevance under realistic constraints.

PSO3: Analyze real world problems and develop computing solutions by applyingconcepts of Computer Science.

CONTENT

1 MACHINE LEARNING

Introduction:

Machine learning (ML) is a branch of artificial intelligence (AI) that enables computers to "self-learn" from training data and improve over time, without being explicitly programmed. Machine learning algorithms are able to detect patterns in data and learn from them, in order to make their own predictions. In short, machine learning algorithms and models learn through experience.

In traditional programming, a computer engineer writes a series of directions that instruct a computer how to transform input data into a desired output. Instructions are mostly based on an IF-THEN structure: when certain conditions are met, the program executes a specific action.

While artificial intelligence and machine learning are often used interchangeably, they are two different concepts. AI is the broader concept – machines making decisions, learning new skills, and solving problems in a similar way to humans – whereas machine learning is a subset of AI that enables intelligent systems to autonomously learn new things from data.

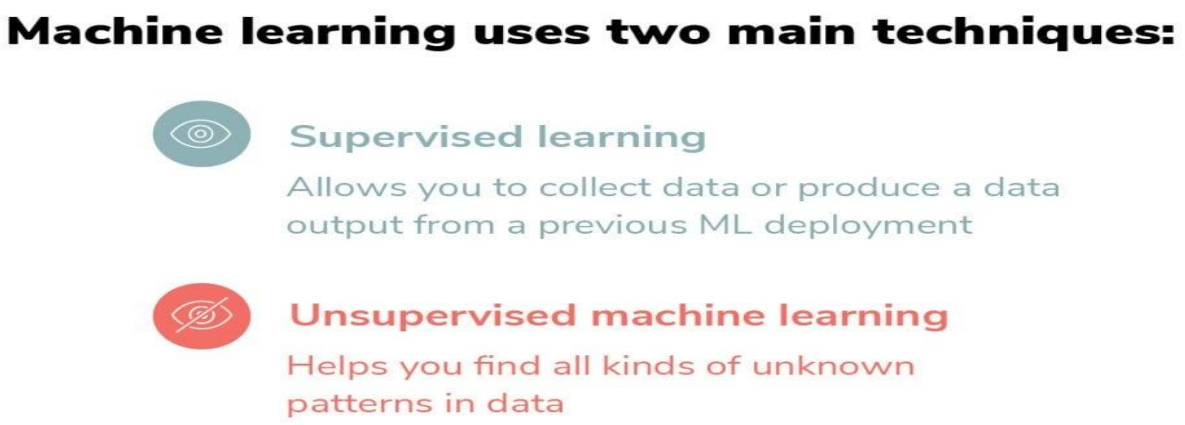
How machine learning works

The early stages of machine learning (ML) saw experiments involving theories of computers recognizing patterns in data and learning from them. Today, after building upon those foundational experiments, machine learning is more complex.

While machine learning algorithms have been around for a long time, the ability to apply complex algorithms to big data applications more rapidly and effectively is a more recent development. Being able to do these things with some degree of sophistication can set a company ahead of its competitors.

Machine learning is a form of artificial intelligence (AI) that teaches computers to think in a similar way to how humans do: Learning and improving upon past experiences. It works by exploring data and identifying patterns, and involves minimal human intervention.

Almost any task that can be completed with a data-defined pattern or set of rules can be automated with machine learning. This allows companies to transform processes that were previously only possible for humans to perform—think responding to customer service calls, bookkeeping, and reviewing resumes.



Machine learning uses two main techniques:

Supervised learning allows you to collect data or produce a data output from a previous ML deployment. Supervised learning is exciting because it works in much the same way humans actually learn.

In supervised tasks, we present the computer with a collection of labelled data points called a training set (for example a set of readouts from a system of train terminals and markers where they had delays in the last three months).

Unsupervised machine learning helps you find all kinds of unknown patterns in data. In unsupervised learning, the algorithm tries to learn some inherent structure to the data with

only unlabelled examples. Two common unsupervised learning tasks are clustering and dimensionality reduction.

- In clustering, we attempt to group data points into meaningful clusters such that elements within a given cluster are similar to each other but dissimilar to those from other clusters. Clustering is useful for tasks such as market segmentation.
- Dimension reduction models reduce the number of variables in a dataset by grouping similar or correlated attributes for better interpretation (and more effective model training).

How is machine learning used?

From automating tedious manual data entry, to more complex use cases like insurance risk assessments or fraud detection, machine learning has many applications, including client-facing functions like customer service, product recommendations (see Amazon product suggestions or Spotify's play listing algorithms), and internal applications inside organizations to help speed up processes and reduce manual workloads.

A major part of what makes machine learning so valuable is its ability to detect what the human eye misses. Machine learning models are able to catch complex patterns that would have been overlooked during human analysis.

Thanks to cognitive technology like natural language processing, machine vision, and deep learning, machine learning is freeing up human workers to focus on tasks like product innovation and perfecting service quality and efficiency.

You might be good at sifting through a massive but organized spreadsheet and identifying a pattern, but thanks to machine learning and artificial intelligence, algorithms can examine much larger sets of data and understand patterns much more quickly.

What is the best programming language for machine learning?

Most data scientists are at least familiar with how R and Python programming languages are used for machine learning, but of course, there are plenty of other language possibilities as well, depending on the type of model or project needs. Machine learning and AI tools are often software libraries, toolkits, or suites that aid in executing tasks. However, because of its widespread support and multitude of libraries to choose from, Python is considered the most popular programming language for machine learning.

In fact, according to GitHub, Python is number one on the list of the top machine learning languages on their site. Python is often used for data mining and data analysis and supports the implementation of a wide range of machine learning models and algorithms.

Supported algorithms in Python include classification, regression, clustering, and dimensionality reduction. Though Python is the leading language in machine learning, there are several others that are very popular. Because some ML applications use models written in different languages, tools like machine learning operations (MLOps) can be particularly helpful.

Conclusion

Finally, when it comes to the development of machine learning models of your own, you looked at the choices of various development languages, IDEs and Platforms. Next thing that you need to do is start learning and practicing each machine learning technique. The subject is vast, it means that there is width, but if you consider the depth, each topic can be learned in a few hours. Each topic is independent of each other. You need to take into consideration one topic at a time, learn it, practice it and implement the algorithm/s in it using a language choice of yours. This is the best way to start studying Machine Learning. Practicing one topic at a time, very soon you would acquire the width that is eventually required of a Machine Learning expert.

Article By
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2 SOCRATIC

Introduction

Socratic is an education tech company that offers a mobile app for students. The app uses AI technology to help students with their homework by providing educational resources like videos, definitions, Q&A, links and more.

Socratic was first launched as a web product in 2013 by Chris Pedregal and Shreya's Bhansali, in New York City, United States. They launched their app under the same name in 2016.

In March 2018, Socratic was acquired by Google for an undisclosed amount. The acquisition was made public in August 2019, when the Founder and CTO (now engineering manager) Shreya's Bhansali announced that the company had joined Google. The wake of news was accompanied by a redesigned iOS app.

Starting from August 2018, Socratic became no longer available for user contributions; past contributions were kept, but it was no longer possible to ask, answer, or edit questions

About the Technology

The Socratic app utilizes artificial intelligence to accurately predict which concepts will help a student solve their question. Over months, millions of real student questions were analysed and classified. Then the app uses that data to guess on future questions and provide specific education content.

The app works by letting students take a photo of a homework question, a feature that was later added to Google Lens. Using Optical character recognition (OCR), the app is able to read their photo and classify it using the technology described above. Students receive various "cards" in the app with different learning resources such as definitions, YouTube videos, Q&A, and original content and illustrations written by the Socratic.org web community.

In January 2017, Socratic added additional Math features to the app, including step-by-step equation help and graphs.

Methods

The main characteristic of the Socratic method is that it is not "teaching “I n the conventional sense of the word. Teacher is an observer, a helper, guide but not the purveyor of knowledge. Lectures with "undeniable “facts and truths and rote memorization or, in other words, "guiding the students “is replaced with shared dialogues between students and teachers where both are responsible for pushing the dialogue forward through questioning.

The Socratic method has five stages:

Wonder (posing questions such as: what is courage, what is virtue, etc.);

- Hypothesis (an answer to the wonder, one gives his opinion or claim about the
- question which becomes a hypothesis of the dialogue);
- Elenchus, refutation and cross-examination (the core of Socratic practice; the hypothesis is called into question and the counterexample is given to prove ordisapprove the hypothesis;
- Acceptance/rejection of the hypothesis (participants accept or rejectthe counterexample);
- Action (acting on the findings of the inquiry);

Advantages

- Student learn to listen actively.
- Examine on issue in depth.
- Motivates and gives a sense the achievement when it is understood.
- Suitable for promoting critical thinking.
- Learners are challenged when this technique is used properly.
- Built upon what others say.

Disadvantage

- If the language structures are not understood, an organized presentation is

- Difficult.
- May use concepts which are too sophisticated for the students and the language
- Teacher.
- Overthinking
- Misconception
- Incorrect decision.

Conclusion

The Socratic Method is an approach that can help encourage student learning effectively. Socrates trained his students to investigate and question logical principles and beliefs and to be critical thinkers. The Method is a pedagogy that uses guided questions, dialog, and refutation to help students critically reflect on their understanding of a particular issue. As students reflect, the instructor's questions stimulate them to reject misconceptions and gain an understanding of what they know and also what they don't know. The usage and the application of the Socratic Learning Method can improve students 'curiosity and passion for learning.

Article By
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3 AI SECURITY

AI security refers to tools and techniques that leverage artificial intelligence (AI) to autonomously identify and/or respond to potential cyber threats based on similar or previous activity.

What is AI security?

Artificial intelligence is defined as having machines do “smart” or “intelligent” things on their own without human guidance. As such, AI security involves leveraging AI to identify and stop cyber threats with less human intervention than is typically expected or needed with traditional security approaches.AI security tools are often used to identify “good” versus “bad” by comparing the behaviors of entities across an environment to those in a similar environment. On a basic level, artificial intelligence (AI) security solutions are programmed to identify “safe” versus “malicious” behaviors by cross-comparing the behaviors of users across an environment to those in a similar environment. This process is often referred to as “unsupervised learning” where the system creates patterns without human supervision. For some AI platforms, like Vectra, “deep learning” is another key application for identifying malicious behaviors. Inspired by the biological structure and function of neurons in the brain, deep learning relies on large, interconnected networks of artificial neurons. These neurons are organized into layers, with individual neurons connected to one another by a set of weights that adapt in response to newly arriving inputs.

Sophisticated AI cybersecurity tools have the capability to compute and analyses large sets of data allowing them to develop activity patterns that indicate potential malicious behavior. In this sense, AI emulates the threat-detection aptitude of its human counterparts. In cybersecurity, AI can also be used for automation, triaging, aggregating alerts, sorting through alerts, automating responses, and more.

AI is often used to augment the first level of analyst work.

Common usage and adoption

AI security tools work to discover, predict, justify, act, and learn about potential cybersecurity threats, without needing much human intervention.

Common AI security tool capabilities include:

- Symantec's Targeted attack analytics (TAA) tool
- Sophos' Intercept X tool
- Dark trace Antigena
- IBM QRadar Advisor

Why dose AI security matters?

According to Gartner, AI security is a 2020 technology trend to watch. Here are a few reasons why AI security will continue to matter moving forward:

AI security Augments the Shrinking Cyber Workforce Resourcing has historically been a challenge in many SOCs. When it comes to manpower alone, the cybersecurity industry's projected talent gap is expected to see 3.5 million unfilled jobs by 2021. While some argue that AI machines can or will fill this gap, a more scalable solution is to adopt AI

security tools that augment the workflows of existing employees. This can greatly free up sparse resources by cutting down on time needed for threat hunting and alert triage or correlation, for example. Cybersecurity workers are then able to focus on other important tasks that cannot be automated through AI. AI security helps save time hunting for threats in addition to the growing talent gap, it's clear that current security analysts often struggle to find the time needed to detect new threats. Respondents to a recent SANS Institute SOC survey admitted to relying on time- and resource-intensive methods for threat hunting, which often results in alert fatigue.

Potential AI Security Disadvantages

AI security is Not a Sliver Bullet:

The cybersecurity industry is infamous for latching on to methodologies as silver bullet solutions, rather than considering the most useful applications. This has been the case for AI security tools, with some cybersecurity pros considering AI security to be the end-all/be-all for threat detection. An over-reliance on AI for poorly matched use cases – like fully replacing cybersecurity workers, for example – only burdens the enterprise with unnecessary risk, and should be avoided.

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4 FOG COMPUTING

Introduction

Decentralization and flexibility are the main difference between fog computing and cloud computing. Fog computing, also called fog networking or fogging, describes a decentralized computing structure located between the cloud and devices that produce data. This flexible structure enables users to place resources, including applications and the data they produce, in logical locations to enhance performance.

The structure's goal is to locate basic analytic services at the edge of the network, closer to where they are needed. This reduces the distance across the network that users must transmit data, improving performance and overall network efficiency.

Fog computing security issues also provide benefits for users. The fog computing paradigm can segment bandwidth traffic, enabling users to boost security with additional firewalls in the network.

Fog computing maintains some of the features of cloud computing, where it originates. Users may still store applications and data offsite, and pay for not just offsite storage, but also cloud upgrades and maintenance for their data while still using a fog computing model. Their teams will still be able to access data remotely.

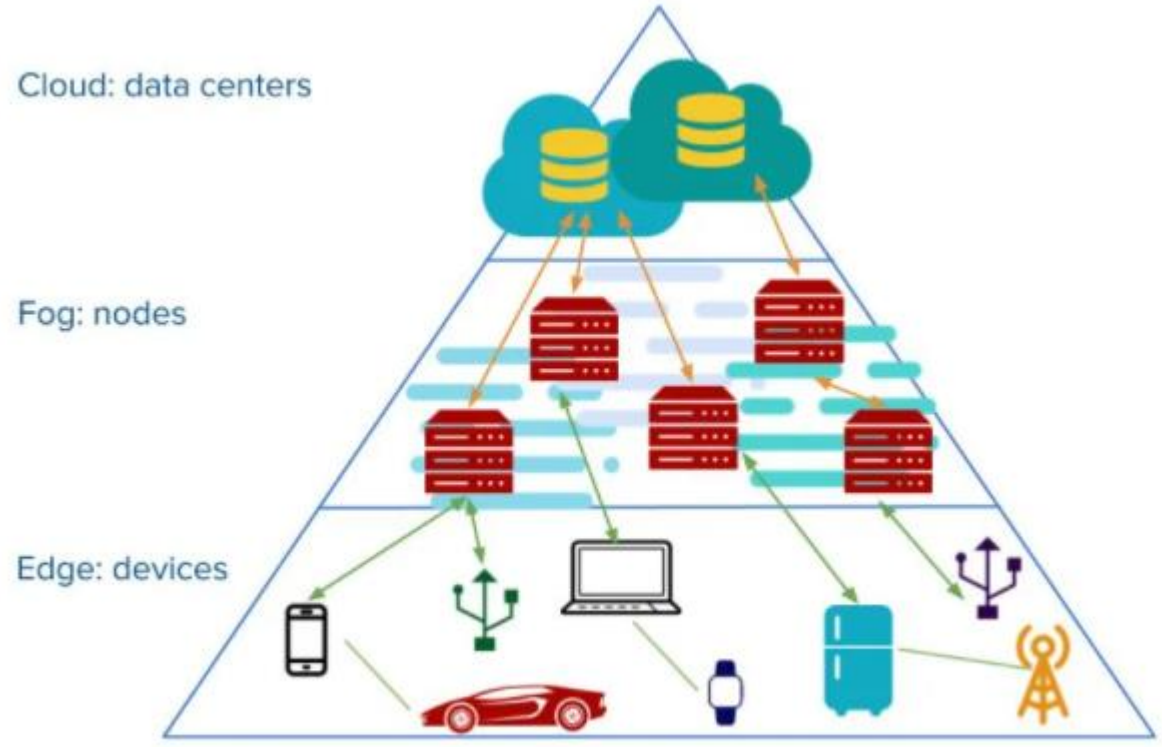
How Does Fog Computing Work?

Fog computing implementation involves either writing or porting IoT applications at the network edge for fog nodes using fog computing software, a package fog computing program, or other tools. Those nodes closest to the edge, or edge nodes, take in the data from other edge devices such as routers or modems, and then direct whatever data they take in to the optimal location for analysis.

In connecting fog and cloud computing networks, administrators will assess which data is most time-sensitive. The most critically time-sensitive data should be analysed as close as possible to where it is generated, within verified control loops.

The system will then pass data that can wait longer to be analysed to an aggregation node. The characteristics of fog computing simply dictate that each type of data determines which fog

node is the ideal location for analysis, depending on the ultimate goals for the analysis, the type of data, and the immediate needs of the user.



Fog Computing Advantages and Disadvantages

Advantages of fog computing include:

Minimize latency. Keeping analysis closer to the data source, especially in verticals where every second counts, prevents cascading system failures, manufacturing line shutdowns, and other major problems. The ability to conduct data analysis in real-time means faster alerts and less danger for users and time lost.

Conserve network bandwidth. Many data analytics tasks, even critical analyses, do not demand the scale that cloud-based storage and processing offers. Meanwhile, connected devices constantly generate more data for analysis. Fog computing eliminates the need to transport most of this voluminous data, saving bandwidth for other mission critical tasks.

Reduce operating costs. Processing as much data locally as possible and conserving network bandwidth means lower operating costs.

Enhance security. Whether in transmission or being stored, it is essential to protect IoT data. Users can monitor and protect fog nodes using the same controls, policies, and procedures deployed across the entire IT environment and attack continuum to provide enhanced cybersecurity.

Improve reliability. Because IoT devices are often deployed under difficult environmental conditions and in times of emergencies, conditions can be harsh. Fog computing can improve reliability under these conditions, reducing the data transmission burden.

Deepen insights, without sacrificing privacy. Instead of risking a data breach sending sensitive data to the cloud for analysis, your team can analyze it locally to the devices that collect, analyze, and store that data. This is why the nature of data security and privacy in fog computing offers smarter options for more sensitive data.

Boost business agility. Only by knowing what resources customers need, where they need those resources, and when the support is needed can businesses respond to consumer demand quickly. Fog computing allows developers to develop fog applications rapidly and deploy them as needed. Fog computing technology also allows users to offer more specific services and solutions to their customers and locate data and data tools where they are best processed—all based on existing computing capabilities and infrastructure.

Fog computing challenges include a heavy reliance on data transport. The rollout of the 5G network has improved this issue, but limited availability, lower speeds, and peak congestion are all issues. Both speed and security at fog nodes are other potential issues that demand attention.

Conclusion

Fog Computing aims to reduce processing burden of cloud computing. Fog computing is bringing data processing, networking, storage and analytics closer to devices and applications that are working at the network's edge. that's why Fog Computing today's trending technology mostly for IoT Devices.

Article By

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5 DEEP LEARNING

What is deep learning?

Deep learning is a type of machine learning and artificial intelligence (AI) that imitates the way humans gain certain types of knowledge. Deep learning is an important element of data science, which includes statistics and predictive modeling. It is extremely beneficial to data scientists who are tasked with collecting, analyzing and interpreting large amounts of data; deep learning makes this process faster and easier.

At its simplest, deep learning can be thought of as a way to automate predictive analytics. While traditional machine learning algorithms are linear, deep learning algorithms are stacked in a hierarchy of increasing complexity and abstraction.

To understand deep learning, imagine a toddler whose first word is *dog*. The toddler learns what a dog is -- and is not -- by pointing to objects and saying the word *dog*. The parent says, "Yes, that is a dog," or, "No, that is not a dog." As the toddler continues to point to objects, he becomes more aware of the features that all dogs possess. What the toddler does, without knowing it, is clarify a complex abstraction -- the concept of dog -- by building a hierarchy in which each level of abstraction is created with knowledge that was gained from the preceding layer of the hierarchy.

How deep learning works

Computer programs that use deep learning go through much the same process as the toddler learning to identify the dog. Each algorithm in the hierarchy applies a nonlinear transformation to its input and uses what it learns to create a statistical model as output. Iterations continue until the output has reached an acceptable level of accuracy. The number of processing layers through which data must pass is what inspired the label *deep*.

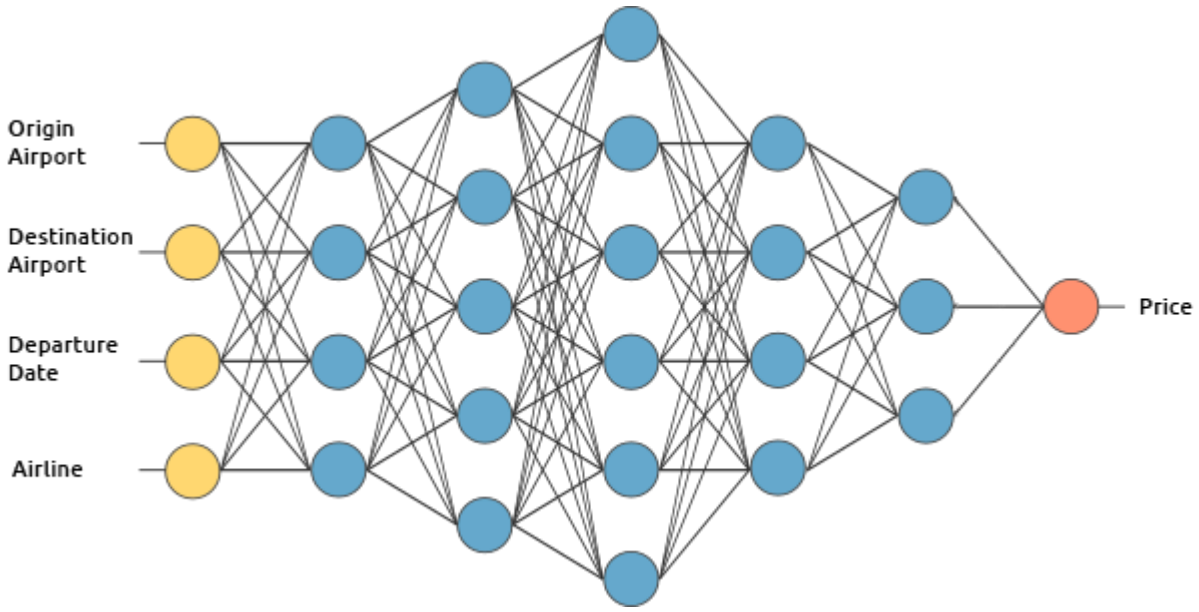
In traditional machine learning, the learning process is supervised, and the programmer has to be extremely specific when telling the computer what types of things it should be looking for to decide if an image contains a dog or does not contain a dog. This is a laborious process

called *feature extraction*, and the computer's success rate depends entirely upon the programmer's ability to accurately define a feature set for *dog*. The advantage of deep learning is the program builds the feature set by itself without supervision. Unsupervised learning is not only faster, but it is usually more accurate.

Initially, the computer program might be provided with training data -- a set of images for which a human has labeled each image *dog* or *not dog* with metatags. The program uses the information it receives from the training data to create a feature set for *dog* and build a predictive model. In this case, the model the computer first creates might predict that anything in an image that has four legs and a tail should be labeled *dog*. Of course, the program is not aware of the labels *four legs* or *tail*. It will simply look for patterns of pixels in the digital data. With each iteration, the predictive model becomes more complex and more accurate.

Unlike the toddler, who will take weeks or even months to understand the concept of *dog*, a computer program that uses deep learning algorithms can be shown a training set and sort through millions of images, accurately identifying which images have dogs in them within a few minutes.

To achieve an acceptable level of accuracy, deep learning programs require access to immense amounts of training data and processing power, neither of which were easily available to programmers until the era of big data and cloud computing. Because deep learning programming can create complex statistical models directly from its own iterative output, it is able to create accurate predictive models from large quantities of unlabeled, unstructured data. This is important as the internet of things (IoT) continues to become more pervasive because most of the data humans and machines create is unstructured and is not labeled.



Deep learning methods

Various methods can be used to create strong deep learning models. These techniques include learning rate decay, transfer learning, training from scratch and dropout.

Learning rate decay. The learning rate is a hyper parameter -- a factor that defines the system or set conditions for its operation prior to the learning process -- that controls how much change the model experiences in response to the estimated error every time the model weights are altered. Learning rates that are too high may result in unstable training processes or the learning of a suboptimal set of weights. Learning rates that are too small may produce a lengthy training process that has the potential to get stuck.

The learning rate decay method -- also called *learning rate annealing* or *adaptive learning rates* -- is the process of adapting the learning rate to increase performance and reduce training time. The easiest and most common adaptations of learning rate during training include techniques to reduce the learning rate over time.

Transfer learning. This process involves perfecting a previously trained model; it requires an interface to the internals of a pre-existing network. First, users feed the existing network new data containing previously unknown classifications. Once adjustments are made to the

network, new tasks can be performed with more specific categorizing abilities. This method has the advantage of requiring much less data than others, thus reducing computation time to minutes or hours.

Advantages of Deep Learning

Feature Generation Automation. ...

- Works Well with Unstructured Data. ...
- Better Self-Learning Capabilities. ...
- Supports Parallel and Distributed Algorithms. ...
- Cost Effectiveness. ...
- Advanced Analytics. ...
- Scalability.

Conclusion

Deep learning helps computers to derive meaningful links from a plethora of data and make sense of unstructured data. Here, the mathematical algorithms are combined with a lot of data and strong hardware to get qualified information. With this method, information from digital data can be automatically extracted, classified and analyzed.

Although deep learning has been around for several years, the trend has only really picked up in the last three to four years. The reason for this was among other things better hardware resources, more sophisticated algorithms and optimized neural networks. Deep learning is not a new approach but a development of the older approach of artificial neural networks.

Article By
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6 INTERNET OF THINGS

What is IoT?

The Internet of Things (IoT) describes the network of physical objects— "things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools. With more than 7 billion connected IoT devices today, experts are expecting this number to grow to 10 billion by 2020 and 22 billion by 2025. Oracle has a network of device partners.

Why is Internet of Things (IoT) so important?

Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects—kitchen appliances, cars, thermostats, baby monitors—to the internet via embedded devices, seamless communication is possible between people, processes, and things.

By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper connected world, digital systems can record, monitor, and adjust each interaction between connected things. The physical world meets the digital world—and they cooperate.

What technologies have made IoT possible?

While the idea of IoT has been in existence for a long time, a collection of recent advances in a number of different technologies has made it practical.

- **Access to low-cost, low-power sensor technology.** Affordable and reliable sensors are making IoT technology possible for more manufacturers.
- **Connectivity.** A host of network protocols for the internet has made it easy to connect sensors to the cloud and to other "things" for efficient data transfer.

- **Cloud computing platforms.** The increase in the availability of cloud platforms enables both businesses and consumers to access the infrastructure they need to scale up without actually having to manage it all.
- **Machine learning and analytics.** With advances in machine learning and analytics, along with access to varied and vast amounts of data stored in the cloud, businesses can gather insights faster and more easily. The emergence of these allied technologies continues to push the boundaries of IoT and the data produced by IoT also feeds these technologies.
- **Conversational artificial intelligence (AI).** Advances in neural networks have brought natural-language processing (NLP) to IoT devices (such as digital personal assistants Alexa, Cortana, and Siri) and made them appealing, affordable, and viable for home use.

What are IoT applications?

Business-ready, SaaS IoT Applications

IoT Intelligent Applications are prebuilt software-as-a-service (SaaS) applications that can analyze and present captured IoT sensor data to business users via dashboards. We have a full set of IoT Intelligent Applications.

IoT applications use machine learning algorithms to analyze massive amounts of connected sensor data in the cloud. Using real-time IoT dashboards and alerts, you gain visibility into key performance indicators, statistics for mean time between failures, and other information. Machine learning–based algorithms can identify equipment anomalies and send alerts to users and even trigger automated fixes or proactive counter measures.

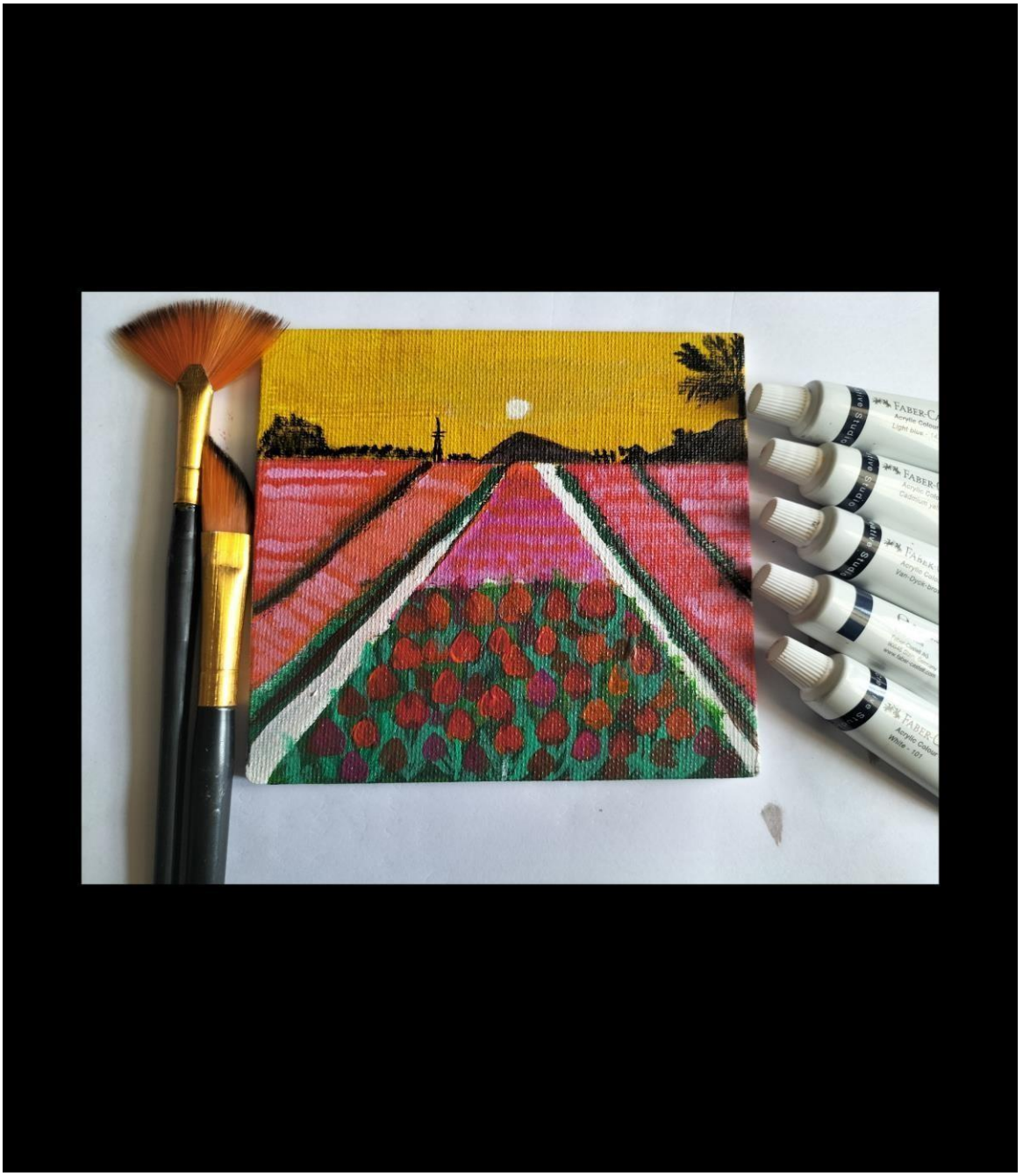
With cloud-based IoT applications, business users can quickly enhance existing processes for supply chains, customer service, human resources, and financial services. There’s no need to recreate entire business processes.

Conclusion

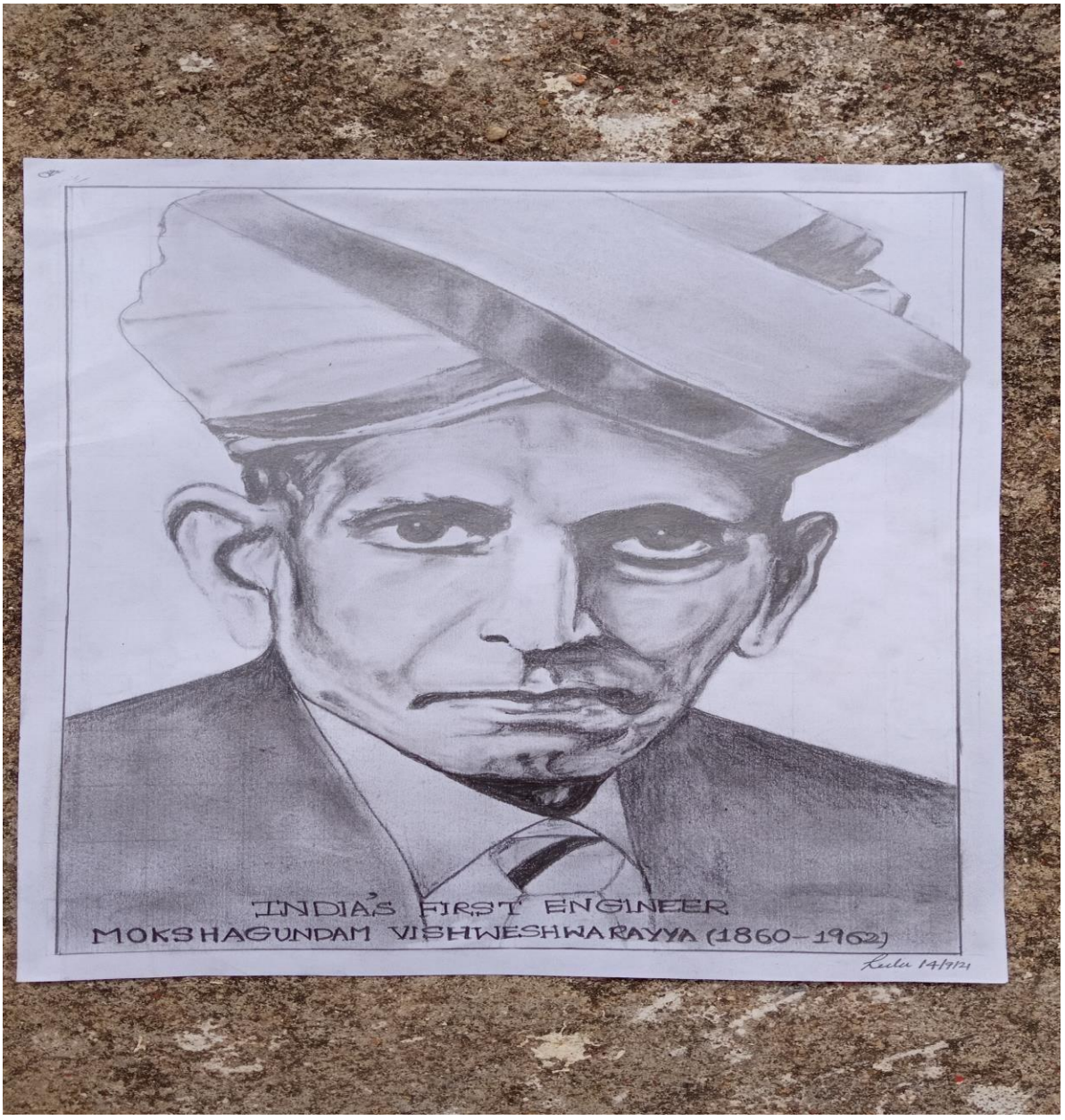
Along with an exponential growth in connected devices, each *thing* in IoT communicates packets of data that require reliable connectivity, storage, and security. With IoT, an organization is challenged with managing, monitoring, and securing immense volumes of data and connections from dispersed devices. But this challenge doesn't have to be a roadblock in a cloud-based environment.

In addition to scaling and growing a solution in one location, cloud computing enables IoT solutions to scale globally and across different physical locations while lowering communication latency and allowing for better responsiveness from devices in the field. AWS offers a suite of IoT services with complete security, including services to operate and secure endpoints, gateways, platforms, and applications as well as the traffic traversing across these layers. This integration simplifies secure use and management of devices and data that continually interact with each other, allowing organizations to benefit from the innovation and efficiencies IoT can offer while maintaining security as a priority.

Article By
C Rakshitha
19691A05B8



Art by
P. Monisha



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