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Alumni Section

Emerging Technologies that fresher has to learn

Java is a powerful general-purpose **programming language**. It is **used** to develop desktop and mobile applications, big data processing, embedded systems, and so on.

Its features like microservices architecture makes it more powerful. Java annotations make microservices much easier when powered by a framework spring boot.

Hibernate is also a feature of java which is open source and based on ORM (Object Relational mapping) tools. It is multithreaded, robust, portable and secure language.

Android is an open source and Linux-based Operating System for mobile devices such as smartphones and tablet computers. Now a day's android comes with most popular technologies like **Flutter, Artificial intelligence and machine learning, chatbots, IOT**.

Flutter framework allows developing apps with a native interface for platforms like Android and iOS. So now a day's developer uses this framework for native development due to its flexibility and combinability.

GraphDB:

- Graph databases uses graph structures for semantic queries with nodes, edges and properties to represent and store data.
- The graph relates the data items in the store to a collection of nodes and edge.
- The edges representing the relationship between the nodes.
- The relationships allow data in the store to be linked together directly and, in many cases retrieved with one operation.
- Graph databases hold the relationships between data as a priority.

Popular Graph DB's:

1. Graph DB Lite
2. Neo4j
3. Map graph
4. Arango dB
5. Microsoft SQL Server.

"Now a day's deeper knowledge and understanding of a concept through the act of doing is more important than theoretical knowledge".

Emerging Technologies that fresher has to learn

According to present job scenarios and popular technologies, below technologies have good growing opportunities:

1. Artificial Intelligence

It covers technologies that are used for prediction purpose.The technology stack of AI constitutes

- Machine Learning
- Deep Learning
- Computer Vision
- Human Computer Interaction
- Robotics

2.Data Science

Data Science is all about cleaning,analysing,organizing,preparing and visualizing the data.

It requires the following things to be included:

- Statistics
- Machine Learning
- Data mining
- Data Analytics
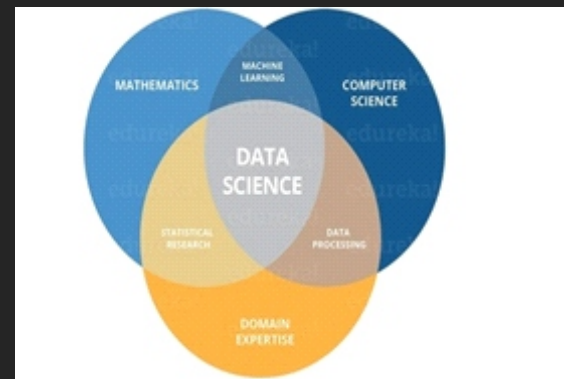
3.Big Data and Cloud Computing

- The importance of data in the life of every individual and consistent improvement in social networks and ecommerce traffic.

4. Android Development

As the internet users are more comfortable with using android apps than websites,the demand of android development becomes very high.The two popular ways of building android apps are through:

- Java
- Kotlin

5.Business Intelligence and Data Visualization

For every business,there is a lot to deal with data.Data visualization becomes essential on every business and there is large demand in this area.

The popular tools of BI and Data Visualization are:

- Tableau
- PowerBI

6.Devops

Devops is the combination of Development and operations team in a software organization, which is advanced version to agile development.

7. MicroServices

It is the way of modularizing the services of a software product into independent modules. Microservices enables to complete the software product quickly without depending on other services.

8. Blockchain

Blockchain technology is the decentralized computing environment,where distributed computing plays an important role here. Cryptocurrency is the major element that pronounces the importance of blockchain.

AI-created people much-needed ammunition for social media trolls, propagandists [how to identify]

At the rate with which the technology is advancing, sky is the limit. Now, you can have fake people pose as real in the digital world and it would take more than an eagle-eye vision to spot the difference. The popularity of fake people is such that there are businesses selling fake persons for as little as $2.99.

If you wonder what might be its use-case, spies, social media trolls right-wing propagandists stand to benefit as they tend to hide behind faceless identities. With the help of AI-created fake people, a touch of authenticity is added so they no longer "appear" anonymous.

How AI creates fake people

The New York Time used Nvidia's GAN software to create fake portraits that if you look at a glance won't raise any red flags. GAN, which stands for generative adversarial network, is a new type of AI, which has advanced to a whole new level. It basically learns from the photos of real people fed to a computer program, which it then studies and then creates its own photos of people who do not exist in the real world.

But as the advance in face fakery are made, it is going to get harder to tell real photos apart. The GAN software has different values that can be adjusted to meet the desired end result. From the size and shape of the eyes to age, perspective, mood, gender and even race and ethnicity.

So you give an input facial image, and the style-based generator can learn its distribution and apply its characteristics to a new image. This was not possible with previous GANs as we could not control what specific features needs to be regenerated. The new generator can control the effect of a particular style — from high-level facial attributes such as pose, identity to shape — without changing any other features.

Between now and the time when GANs were first introduced in 2014, the technology has certainly come a long way, but is not completely devoid of flaws. Watch a brief video below to understand how it's done.

Identifying fakes

The AI has improved now, from a time when it labeled two Blacks as "gorillas" to certain hints that are often missed by the human eye. The NYT pointed out, fashion accessories can cause a problem in fake portrait and glasses are common accessories. Sometimes, at the cost of recreating imperfect symmetrical features, the AI can have distinct features that do not match. There could also be some random artifacts in an image, that only when pointed out you will be able to notice. The Times said abstract or blurry backgrounds are often giveaways of fake portraits.

IBT — AI-CREATED FAKE PORTRAITS HARD TO SPOT - NOT IMPOSSIBLE

AI, ML, 5G, IoT will be most important tech in 2021: Study

Artificial intelligence (AI), machine learning, 5G and Internet of Things (IoT) would be the most important technologies in 2021, according to a new study by the Institute of Electrical and Electronics Engineers (IEEE). The technical professional organisation on Monday released the results of a survey of Chief Information Officers (CIO) and Chief Technology Officers (CTO) in the US, the UK, China, India and Brazil. The survey was on the most important technologies for 2021, the impact of the COVID-19 pandemic on the speed of their technology adoption and the industries expected to be most impacted by technology.

On which would be the most important technologies, nearly one-third of the total respondents (32 per cent) said AI and ML followed by 5G (20 per cent) and IoT (14 per cent), according to an IEEE statement. Manufacturing (19 per cent), healthcare (18 per cent), financial services (15 per cent) and education (13 per cent) are the industries that most believe would be impacted by technology, according to the CIOs and CTOs surveyed. At the same time, more than half (52 per cent) of CIOs and CTOs see their biggest challenge as dealing with aspects of COVID-19 recovery in relation to business operations.

These challenges include a permanent hybrid remote and office work structure (22 per cent), office and facilities reopenings and return (17 per cent), and managing permanent remote working (13 per cent). However, 11 per cent said the agility to stop and start IT initiatives as this unpredictable environment continues would be their biggest challenge.

Another 11 per cent cited online security threats, including those related to remote workers, as the biggest challenge they see. CIOs and CTOs surveyed have sped up adopting some technologies due to the pandemic. More than half (55 per cent) of respondents have accelerated adoption of cloud computing, 52 per cent have accelerated 5G adoption and 51 per cent have accelerated AI and ML.

The adoption of IoT (42 per cent), augmented and virtual reality (35 per cent) and video conferencing (35 per cent) technologies have also been accelerated due to the global pandemic. Compared to a year ago, CIOs and CTOs overwhelmingly (92 per cent) believe their company is better prepared to respond to a potentially catastrophic interruption such as a data breach or natural disaster.

"Whats more, of those who say they are better prepared, 58 per cent strongly agree that COVID-19 accelerated their preparedness," the statement said. Asked which technologies would have the greatest impact on global COVID-19 recovery, one in four (25 per cent) of those surveyed said AI and ML.

The top two concerns for CIOs and CTOs when it comes to the cybersecurity of their organisation are security issues related to the mobile workforce including employees bringing their own devices to work (37 per cent) and ensuring the IoT is secure (35 per cent).

This is not surprising, since the number of connected devices such as smartphones, tablets, sensors, robots and drones is increasing dramatically. Slightly more than one-third (34 per cent) of CIO and CTO respondents said they can track and manage 26-50 per cent of devices connected to their business, while 20 per cent of those surveyed said they could track and manage 51-75 per cent of connected devices.

Stretchable skin sensor could help you touch things in VR

Virtual reality doesn't quite match up to the "reality" label without tactile sensations, but that might not be an issue for too much longer. Cornell scientists have developed a new form of stretchable skin sensor that uses fiber optics to provide a sense of touch. It's inspired by silica-based fiber sensors that look for subtle wavelength changes to measure elements like temperature.

In a prototype glove, each finger has a stretchable light guide that combines one transparent polyurethane core as well as an LED-linked core loaded with absorbent dyes. When you deform the light guide through bending your fingers or encountering pressure, the dyes serve as "spatial encoders" that light up and register exactly what's happening (and importantly, where).

The technology is still quite rudimentary at the moment. The team's glove is a 3D-printed one-off with Bluetooth, a battery and basic circuitry.

The potential uses are clear, however. Future VR gloves (not to mention AR) could give you feedback when you touch and grab virtual objects. It might not perfectly mimic real life, but you'd at least know when you came into contact with something. It could also give robots a sense of touch that helps them react to their environment and better handle delicate objects. At this point, smell might be the only sense that's conspicuously lacking in VR — and that might be coming sooner then you think.
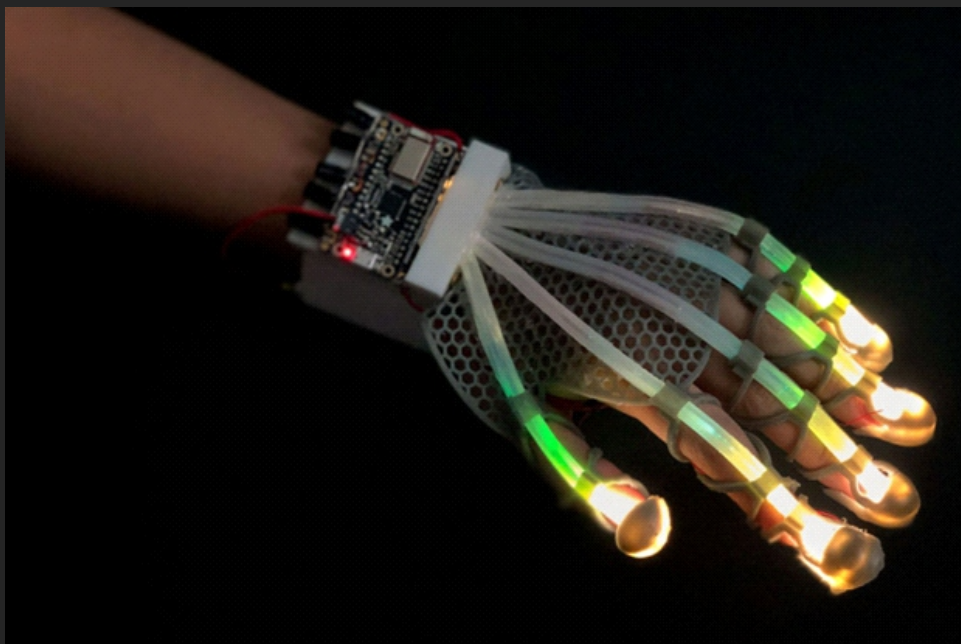
The pandemic has probably killed VR arcades for good

A lagging trend of the past few months has been witnessing startups that COVID-19 seemed poised to kill end up scaling back some of those deep cuts and taking off again. Not all spaces have been quite so lucky; in particular, lately we've seen a host of location-based virtual reality startups shut their doors.

Virtual reality arcades weren't exactly crushing it pre-pandemic; the small industry was already a bit of a Hail Mary for the virtual reality market, which has failed to push consumers to adopt headsets on their own and saw arcades as a way to warm up the general public to VR's role in entertainment. Lackluster consumer interest and the throughput difficulties associated with quickly moving users through experiences were among the biggest challenges facing VR arcades.

This week, following a report from protocol, Apple confirmed its acquisition of Spaces, a virtual reality arcade startup that had been forced to close its in-person arcades amid COVID-19 and had attempted a pivot to creating virtual environments for video chat software. An Apple acquisition is hardly a mark of failure, but it is unlikely that the company has any interest in reviving the startup's arcade business.

Earlier this month, The Wall Street Journal reported that the U.S. subsidiary of Sandbox VR had filed for bankruptcy. Sandbox VR has raised quite a bit of money on the promise that they could revamp several industries at once. The idea was that mall operators on the decline would give great deals to some of these startups to set up physical storefronts as a loss leader to bring in a younger generation of consumers, while they could capitalize on mixed reality social media video to bring a level of viral growth to their VR offerings.

In July, Upload VR discovered documents that suggested Disney had terminated the lease of virtual reality startup The Void's Downtown Disney location following months of COVID-19-related closures.

It was impossible to forecast the current pandemic when many of these investments were being made, but virtual reality arcades had already shown they were far from a sure bet. In late 2018, IMAX shut the doors of the last of its seven virtual reality arcades after investing tens of millions into its VR efforts.

With the future of in-person entertainment unclear, the question is whether virtual reality arcades have any chance of a rebound.

The fact is many of these startups were pushing up against current realities on multiple fronts and were attempting to seriously shift the landscape of 21st century digital entertainment, attempts that seemed daunting from the start.

As massive movie theater chains struggle to see how the pandemic will affect their industries in the long-term, it isn't surprising that many of these startups have failed to see a light at the end of the tunnel and have shut down operations or been sold off. I suspect investors will be reluctant to back new efforts in this space and that the time horizon of COVID-19 will force current entrants toward pivots that look dramatically different from pre-COVID-19-era business models. (One caveat is that the VR arcade market certainly looks different in the United States compared to markets in countries like China and Japan where virtual reality arcades seem to fit a bit more snugly into popular gaming culture.)

If VR arcades survive or are reborn, it will be due to some pretty massive shifts in consumer behavior and VR adoption.

Quantum Computing: Navigating Towards The Future of Computers

Computing power has reached its saturation point. If we continue following the same path soon, we may not have enough power to run the machines of the world. The solution to this lies in quantum computing. The origins of quantum computing go back in 1981 when renowned physicist Richard Feynman asked in a Massachusetts Institute of Technology conference that, "Can we simulate physics on a computer?" While it is not totally based on physics, quantum computing does work on the principles of quantum mechanics. Here it uses two properties called superposition and entanglement.

What makes it unique?

Current conventional computer systems are built around the idea of binary bits and Boolean logic. A bit can be physically represented as a switch with a value of 0 (off) or 1 (on). When these switches are connected using Boolean logic gates (and, or, xor, and others) they can perform all the complex operations of a modern microprocessor. In contrast, quantum computer use qubits (quantum bits) can also be in both states at the same time, a quantum property called superposition. In addition, qubits are also capable of pairing, which is known as entanglement. Here, the state of one quit cannot be described independently of the state of the others that allows instantaneous communication. As per an IDC report, 25 percent of the Fortune Global 500 will gain a competitive edge from quantum computing by 2023.

Meanwhile, tech giants like Google, Microsoft, and IBM are battling to be the first to make a working, practically useful quantum computer. Every month there are extensive updates from these companies about their work. Recently Google had announced its quantum computer (which uses quantum annealing) is 100 million times faster than any classical computer in its lab. Further, the interest in quantum computing has been mirrored by investments in this field by players from a broad array of industries.

Quantum Computer vs. Conventional Computer

Quantum computers have four fundamental capabilities that differentiate them from today's conventional computers:

1. quantum simulation, in which quantum computers model complex molecules;

2. optimization (that is, solving multi variable problems with unprecedented speed);

3. quantum artificial intelligence, with better algorithms that could transform machine learning across industries as diverse as pharma and automotive;

4. prime factorization, which could revolutionize encryption.

Busting myths

It is important to note that quantum computers are very fragile. Any vibration will impact the atoms and cause decoherence. Also, at present, quantum computers need highly sophisticated hardware and supporting infrastructure. For this, some of the existing models use superconductivity to create and maintain a quantum state. This implies that qubits must be kept at a temperature near absolute zero using a dilution refrigerator. This is why the inside of D-Wave Systems' quantum computer is -460 degrees Fahrenheit. So, companies may need a cloud model to access quantum services instead of installing their own version of quantum computers on-premises. Therefore, not all can have their quantum systems, at least not in the near future.

Moreover, people need to realize that while quantum computers are the future, but they do not replace the standard ones either. Instead, they should be thought of as devices that enhance the usability of conventional general-purpose computers. According to this model, a core application is executed on a traditional computer that can also handle data storage and other infrastructure-related tasks. At the same time, the quantum part can be applied to deal with only the subset of the overall responsibility that's best suited to its particular strengths.

High-Speed Network Solutions for the Next Generation of Connected Vehicles

I n response to growing data acquisition and computational needs, in-vehicle networks are going to have to go through some radical changes. The inclusion of ever greater numbers of on-board sensors, combined with uptake of a plethora of new data-intensive multimedia technologies, will set major challenges for the networking hardware incorporated into our cars. There will be implications in terms of supporting adequate bandwidth, as well as cabling weight, system complexity and overall cost.

Back in the 1980s, the average car had just a handful of electronic control units (ECUs), while today there can easily be well over a hundred present. The advent of advanced driver assistance systems (ADAS) and in-vehicle infotainment (IVI) have already led to a substantial ramp up in the data overheads of vehicle models. At first this was mainly seen in luxury models, but it has now proliferated further down into medium end and economy models too. Figure 1 gives an indication of the scope of functionality that is now being expected.

The migration towards semi-autonomous driving, with a much greater breadth of features consequently being added to the ADAS capabilities initially available, means that this is still only the beginning. A vast range of new functionalities will soon be required - in particular increasing use of cameras (featuring heightened pixel resolutions), plus other forms of imaging technology (such as LiDAR) and various traffic-sign recognition mechanisms. In addition to such developments, there are various wireless protocols which will be used for providing both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) connectivity that also need to be taken into account. All of these will have heavy data demands on the supporting communications network.

Many automotive systems are of course time-critical. The effects of improper timing can lead to potentially life-threatening situations. Vehicle stability control and collision avoidance are both classic examples of where the timeliness of information transmission is of prime importance to ensuring the safety of passengers and other road users.

It should also be noted that the cable harnessing currently constitutes the second heaviest part of a modern vehicle (after the chassis itself) and is among the most expensive too. Finding a way to implement weight and cost savings is therefore essential, as it will lead to a reduction in the vehicle's price tag and significant improvements its fuel economy being realised. This will thereby increase its appeal to customers and help it to comply with increasingly stringent environmental legislation. Automotive engineers recognise that there are huge operational advantages to be gained if data communication infrastructure can be made more streamlined. Ideally, this will be centred around a single all-encompassing protocol (although this will admittedly take time to actually happen). Because of the accelerated data rates that it can deliver and its deterministic operation, Ethernet is emerging as the main protocol for future in-vehicle networking activity.
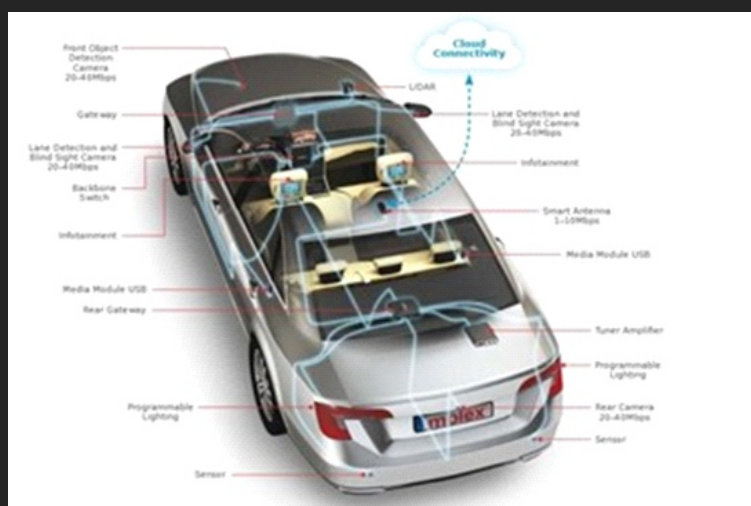
Researchers use AI to create the Milky Way's family tree

Artificial intelligence (AI) has helped in creating the first complete family tree of Earth's home galaxy – the Milky Way.

An international team of researchers, led by astrophysicists DiederikKruijssen of the University of Heidelberg and Joel Pfeffer of Liverpool John Moores University, published their work in *Monthly Notices of the Royal Astronomical Society*.

The researchers used AI to analyse large groups of stars with as many as million stars, orbiting the Milky Way.

"The Milky Way hosts over 150 such clusters, many of which formed in the smaller galaxies that merged to form the galaxy that we live in today," a Royal Astronomical Society (RAS) release noted.

With the help of the latest models and observations, the researchers managed to use the clusters as "fossils" to generate the history of galaxies, it added.

"The main challenge of connecting the properties of globular clusters [large group of stars] to the merger history of their host galaxy has always been that galaxy assembly is an extremely messy process, during which the orbits of the globular clusters are completely reshuffled," Kruijssen explained in a RAS release.

To simplify the complex system, the team developed advanced computer simulations called E-MOSAICS to capture the formation of Milky Way-like galaxies, and then used this knowledge on specific groups of globular clusters in the Milky Way.

By applying AI on these groups of globular clusters, the researchers were able to predict the merger times of the Milky Way's ancestor galaxies with high precision. The process also revealed a previously unknown collision between the Milky Way and an enigmatic galaxy, which the researchers named 'Kraken', the release stated.

"The merger with Kraken took place 11 billion years ago, when the Milky Way was four times less massive." Kruijssen said. "The collision with Kraken must have been the most significant merger the Milky Way ever experienced," he added.

From their findings, the researchers were able to create the Milky Way's merger history. According to them, over the course of its history, the Milky Way cannibalised about five galaxies with more than 100 million stars, and about fifteen with at least 10 million stars.

The identified ancestor galaxies include Sagittarius, Sequoia, Kraken, Helmi streams, Gaia-Enceladus-Sausage, along with the Milky Way's main originator, according to RAS.

How a machine learning model collects data without compromising privacy?

Smart home devices like speakers and smart watches collect and share data with other devices and systems over the network. These Internet of Things (IoT) devices are equipped with sensors and software that store a user's private information like body measurements and location.

This stored data is used by the device makers to improve their products and services.

An improvement in a machine learning (ML) model, called 'federated learning', is said to enable companies to develop new ways of collecting anonymous data without compromising their privacy, according to researchers at Missouri University of Science and Technology.

What is 'federated learning'?

Federated learning is a ML method used to train an algorithm across multiple decentralised devices or servers holding data samples. It doesn't exchange data with the devices, meaning there is no central dataset or server that stores the information.

Standard ML models require all data to be centralized in a single server. Implementation of federated learning eliminates the need for maintaining a storage hub.

The term was first introduced in a 2016 Google study titled 'Communication-efficient learning of deep networks from decentralized data.'

Google emphasized mobile phones and tablets, stating that modern devices contain special features like speech recognition and image models that can store large amounts of data.

Since then, Google has used the technique is various products, including Gboard, which provides text and phrase suggestions to keyboard. Google had said the suggestions may be sent to its other services, excluding what was typed or spoken by the user.

How this works

Federated learning aims to train an algorithm, like deep neural networks, on multiple local datasets contained in local nodes, without explicitly exchanging data. The general principle involves simply exchanging parameters between these nodes. Parameters include number of federated learning rounds, total number of nodes, and learning rate.

The distinct advantage of the model is its ability to reduce privacy and security risks by limiting the attack surface to only the device, rather than the device and the cloud, Google stated in the study.

Federated learning is said to have application in healthcare, where hospitals and pharmaceutical companies can exchange data for treating diseases without sharing private clinical information.

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