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Permanently Affiliated to Savitribai Phule Pune University Vide Letter No.:CA/1542 &

Approved by AICTE, New Delhi- Vide Letter No.: 740-89-32(E) ET/98 AISHE Code-C-41622



# KBT-DIGI DEPARTMENT OF COMPUTER ENGINEERING

Presents

## TECHNICAL MAGAZINE

• VOL 4 • ISSUE 1 • 2021-22 •

### CONTENT

04 OpenShift

08 Using AI and old reports to  
understand new medical images

11 How COVID-19 accelerated the  
move to hybrid cloud.

14 IT security at home

17 Machine Learning

23 Coding and future generation

26 Blockchain

# Department of Computer Engineering

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## Vision

To be the center for excellence for training the world-class engineers to work with multi-disciplinary domain based on the state-of-the-art of technology enabled academic system blended with industrial and business practices. ....

## Mission

To educate and train undergraduate students in Computer Engineering by instilling excellence to fulfill professional and social requirements in business and industry on the platform of scientifically designed academic processes.

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## Editorial Team

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# Program Educational Objectives

- 1.To inculcate computational and programming skills in the field of Computer Engineering.**
- 2.To prepare the graduates to fulfill professional requirements in industry.**
- 3.To motivate students to solve problems related to society.**



# OPENSIFT: AN CLOUD DEVELOPMENT PLATFORM



## Introduction:

Red Hat OpenShift Container Platform is a containerized application platform that allows enterprises to accelerate and streamline application development, delivery, and deployment on premise or in the cloud. As OpenShift and Kubernetes continue to become widely adopted, developers are increasingly required to understand how to develop, build, and deploy applications with a containerized application platform. While some developers are interested in managing the underlying infrastructure, most developers want to focus on developing applications and using OpenShift for its simple building, deployment, and scaling capabilities.

## Architecture:

OpenShift Container Platform has a microservices-based architecture of smaller, decoupled units that work together. It runs on top of a Kubernetes cluster, with data about the objects stored in etcd, a reliable clustered key-value store. The controller pattern means that much of the functionality in OpenShift Container Platform is extensible. The way that builds are run and launched can be customized independently of how images are managed, or how deployments happen. The controllers are performing the "business logic" of the system, taking user actions and transforming them into reality. By customizing those controllers or replacing them with your own logic, different behaviors can be implemented.

From a system administration perspective, this also means the API can be used to script common administrative actions on a repeating schedule. Those scripts are also controllers that watch for changes and take action. OpenShift Container Platform makes the ability to customize the cluster in this way a first class behavior.

### Layers:

The Docker service provides the abstraction for packaging and creating Linux-based, lightweight container images. Kubernetes provides the cluster management and orchestrates containers on multiple hosts. OpenShift Container Platform adds:

- ✓ Source code management, builds, and deployments for developers
- ✓ Managing and promoting images at scale as they flow through your system

- ✓ Application management at scale
- ✓ Team and user tracking for organizing a large developer organization
- ✓ Networking infrastructure that supports the cluster



### Benefits

Containers are highly efficient vehicles for developing and deploying apps. As container usage ramps up, the complexity of managing containers across the totality of your IT infrastructure rises exponentially - making a container management platform essential at the enterprise level.

- ✓ Innovate and go to market faster.
- ✓ Accelerate application development.
- ✓ Enterprise-grade, container-based platform with no vendor lock in.
- ✓ Enable DevOps and department-wide collaboration
- ✓ Self-service provisioning

### **Who uses OpenShift?**

- ✓ Google
- ✓ Amazon
- ✓ Accenture
- ✓ Runtastic
- ✓ Proshore
- ✓ The Walt Disney
- ✓ DBS C2E
- ✓ Ericsson
- ✓ TOKIGAMES TECH

### **OpenShift Integrations**

- ✓ New Relic
- ✓ Travis CI
- ✓ Datadog
- ✓ Cloud9 IDE
- ✓ MongoLab
- ✓ Zulip
- ✓ Wrecker
- ✓ Logentries

### **Conclusion**

OpenShift offers a platform for managing your containers across a variety of operating environments, significantly reducing the time necessary to build, deploy, and scale them. As an open source next-generation virtualization tool, OpenShift provides you with the all the functionality you need to optimize containerization usage with your existing IT resources.

### **References**

1. Joe Fernandes (November 7, 2016). "Why Red Hat Chose Kubernetes for OpenShift". Red Hat Blog. Retrieved August 2, 2021.
2. Caban, William (2019). Architecting and Operating OpenShift Clusters: OpenShift for Infrastructure and Operations Teams. Chapter 2: Apress
3. Installing a cluster on bare metal". OpenShift 4.2 Documentation. Red Hat. Retrieved August 2, 2021.

4. "OpenShift Origin Cartridge Developer's Guide". 2016-04-27. Archived from the original on 2016-05-07. Retrieved 2016-04-27.

5. Henry, William (February 21, 2019). "Podman and Buildah for Docker users". Red Hat Developer Blog. Red Hat. Retrieved August 2, 2021

**-Neeraj Nawale.**

**Fourth Year.**

# USING AI AND OLD REPORTS TO UNDERSTAND NEW MEDICAL IMAGES

Getting a quick and accurate reading of an X-ray or some other medical images can be vital to a patient's health and might even save a life. Obtaining such an assessment depends on the availability of a skilled radiologist and, consequently, a rapid response is not always possible. For that reason, says Ruizhi "Ray" Liao, a postdoc and a recent PhD graduate at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL), "we want to train machines that are capable of reproducing what radiologists do every day." Liao is first author of a new paper, written with other researchers at MIT and Boston-area hospitals, that is being presented this fall at MICCAI 2021, an international conference on medical image computing.

Although the idea of utilizing computers to interpret images is not new, the MIT-led group is drawing on an underused resource – the vast body of radiology reports that accompany medical images, written by radiologists in routine clinical practice – to improve the interpretive abilities of machine learning algorithms. The team is also utilizing a concept from information theory called mutual information – a statistical measure of the interdependence of two different variables – in order to boost the effectiveness of their approach.



Here's how it works: First, a neural network is trained to determine the extent of a disease, such as pulmonary edema, by being presented with numerous X-ray images of patients' lungs, along with a doctor's rating of the severity of each case. That information is encapsulated within a collection of numbers. A separate neural network does the same for text, representing its information in a different collection of numbers. A third neural network then integrates the information between images and text in a coordinated way that maximizes the mutual information between the two datasets. "When the mutual information between images and text is high, that means that images are highly predictive of the text and the text is highly predictive of the images," explains MIT Professor Polina Golland, a principal investigator at CSAIL.

Liao, Golland, and their colleagues have introduced another innovation that confers several advantages: Rather than working from entire images and radiology reports, they break the reports down to individual sentences and the portions of those images that the sentences pertain to. Doing things this way, Golland says, "estimates the severity of the disease more accurately than if you view the whole image and whole report. And because the model is examining smaller pieces of data, it can learn more readily and has more samples to train on."

While Liao finds the computer science aspects of this project fascinating, a primary motivation for him is "to develop technology that is clinically meaningful and applicable to the real world."

To that end, a pilot program is currently underway at the Beth Israel Deaconess Medical Center to see how MIT's machine learning model could influence the way doctors managing heart failure patients make decisions, especially in an emergency room setting where speed is of the essence.

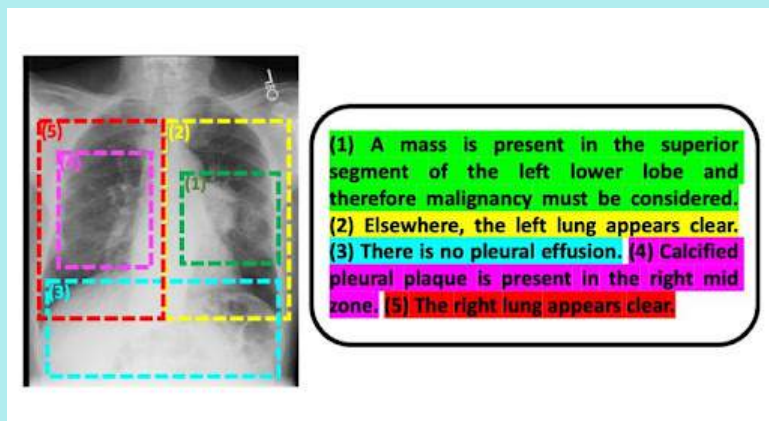
The model could have very broad applicability, according to Golland. "It could be used for any kind of imagery and associated text – inside or outside the medical realm. This general approach, moreover, could be applied beyond images and text, which is exciting to think about."

Liao wrote the paper alongside MIT CSAIL postdoc Daniel Moyer and Golland; Miriam Cha and Keegan Quigley at MIT Lincoln Laboratory; William M. Wells at Harvard Medical School and MIT CSAIL; and clinical collaborators Seth Berkowitz and Steven Horng at Beth Israel Deaconess Medical Center.

The work was sponsored by the NIH NIBIB Neuroimaging Analysis Center, Wistron, MIT-IBM Watson AI Lab, MIT Deshpande Center for Technological Innovation, MIT Abdul Latif Jameel Clinic for Machine Learning in Health (J-Clinic), and MIT Lincoln Lab.

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# HOW COVID-19 ACCELERATED THE MOVE TO HYBRID CLOUD



The changes wrought in business by the impact of the pandemic make business agility and flexibility the leading necessities in your digital

transformation process. A single solution just cannot offer the required flexibility to adapt to rapidly changing business conditions.

If they were not already headed that way, many IT departments are now finding it necessary to accelerate their migration to multi-cloud architectures because of the novel coronavirus.

In fact, IDC says that by 2022, more than 90 percent of enterprises worldwide will rely on a mix of on-premises or dedicated private clouds, multiple public clouds, and legacy platforms to meet their infrastructure needs.

It even predicts that a rising desire by companies to mitigate future disruptions by being more flexible, agile, and resilient could make 2021 "the year of multi-cloud."

"We are seeing the coronavirus situation accelerating enterprise interest and adoption of cloud," says Deepak Mohan, research director at IDC. "The term we're hearing most often in this context is resilience. IT organizations leveraging cloud environments are able to adapt better to the current crisis because they can easily scale or shift and continue to deliver services. Those that have taken more constrained approaches have had challenges."

Mohan notes the evolution of enterprise organizations from preferring on-premises deployments to investing heavily in public clouds and finally landing on a blend of the two has been decades in the making. Coronavirus and the current disruption is accelerating this process, he says. But Mohan believes companies are seeing the urgency of not having all their eggs in one basket but instead spreading the risk around to avoid single points of sluggishness or failure. And this is increasingly driving IT organizations to more diversified options, including multi-cloud.

### **Cloud everywhere becomes the norm**

"We think 2021 becomes a turning point where, instead of just talking about cloud-first, organizations are evolving toward having cloud everywhere," Mohan says. "A major part of that will involve building broad cloud strategies to assure more flexibility and resiliency in the future."

Of course, Mohan and other industry experts point out that migrating applications from on-premises architecture to more than one public or private cloud is not cheap or easy. It takes time and money—something smaller organizations do not always have, especially in a down economy. But this situation is increasingly helping to make the case for this investment.

Volterra, a start-up focused on distributed cloud services, recently conducted a global survey of more than 400 IT executives and found that while nearly all (97 percent) planned to distribute workloads across two or more clouds, most struggle to support and secure multi-cloud and edge deployments.

"The increasing deployment of technologies, including AI, machine learning, and IoT, are causing apps and data to be progressively spread across multiple clouds and edge sites," says Ankur Singla, CEO and founder of Volterra.

"Our report found 98 percent of IT leaders think it is very important to have a consistent operational experience between the edge and public and private clouds. But the data shows there are tremendous obstacles preventing that, mostly around establishing secure and reliable connections between providers, trying to navigate different support and consulting processes, and having to work with various platform services."

#### **REFERENCES:**

- <https://www.hpe.com/us/en/in-sights/articles/how-covid-19-accelerated-the-move-to-hybrid-cloud-2005.html>
- <https://www.hpe.com/us/en/in-sights/articles/top-10-technology-articles-of-2020-2012.html>

-Pooja Bodke

TE

# IT SECURITY AT HOME: HARD BUT NOT IMPOSSIBLE



You probably can't provide security for workers at home that matches that of your office, but you can come close. Here are some ideas.

When the COVID-19 quarantine hit in mid-March, it created an unprecedented situation in which the number of remote workers skyrocketed beyond anything anticipated.

"The only analog of this scale I would say is 9/11, and that was fairly regional," says Sean Gallagher, a threat researcher at Sophos. "It wasn't a national thing like this is, and it wasn't nearly for this period of time."

Gallagher was working remotely from Baltimore for a New York company. All his fellow employees in New York were displaced for several weeks.

"We had to figure out how to operate without the office for nearly a month," he says. "But that was very regionally specific. This is a much broader problem."

## **Regional vs. global**

The nearest thing most companies may have experienced to COVID-19 is something like a hurricane or other natural disaster, all of which are regional. This crisis has scaled beyond any plans companies had in place to deal with remote workers—and with that has come a level of insecurity that has also been unimaginable.

"It's not something that might've been in most companies' disaster recovery continuity business plan," says Gallagher.

"But it is certainly not unprecedented in terms of the need to be able to flexibly handle ongoing operations with employees not in the office."

Moreover, the vast move to remote work is an exacerbation of the human element that "is often—frankly always—the most uncontrollable component of cybersecurity risk," says Bob Moore, director of server software and product security at Hewlett Packard Enterprise.

All large organizations can arrange for some users to work from home, but until recently, few ever tried to have nearly everyone work from home. If existing security tools and procedures are inadequate, what do you really need to do to make the situation acceptable?

We asked a handful of security experts three questions. Here are their answers.

### **What can you do to secure your own remote working space? VPN, antivirus, two-factor authentication**

Common instructions came from every computing security specialist we spoke with, starting with the need to equip your computer with a virtual private network (VPN) so that all of your activities are done on your company's network, not on your own, looser, more vulnerable one. This is just one difference between office security and remote security.

"In a workplace environment, you typically have a well-structured, highly controlled work environment where there are tight measures and controls on the type of traffic that can flow, what type of authentication is used, and what type of data can be stored," says Tim Ferrell, cybersecurity architect at HPE. Others agree.

"Whereas at home, you're basically just either doing Comcast or AT&T or something like that, and you don't get the behind-the-scenes where we examine the traffic that's coming in. We can't tell if there's malware that's been downloaded or where it's been clicked, and we can't keep an eye on events in the background."

**REFERENCES:**

- <https://www.hpe.com/us/en/insights/articles/enterprise-it-security-at-home--hard-but-not-impossible-2006.html>
- <https://www.hpe.com/us/en/insights/articles/top-10-technology-articles-of-2020-2012.html>

-Pooja Bodke  
TE



# MACHINE LEARNING



## What is Machine Learning?

We all know that humans learn from their past experiences and machines follow instructions given by human. Machine learning is about machines learn from their past data and acts much faster and it is also about understanding and reasoning, ML solves complex problems by it. That is, it learns the data builds the prediction model and when the new data point comes in it can easily predict for it more the data, better the model higher will be the accuracy.

Machine learning (ML), reorganized as a separate field, started to flourish in the 1990s. The field changed its goal from achieving artificial intelligence to tackling solvable problems of a practical nature.

It shifted focus away from the symbolic approaches it had inherited from AI, and toward methods and models borrowed from statistics and probability theory.

The difference between ML and AI is frequently misunderstood. ML learns and predicts based on passive observations, whereas AI implies an agent interacting with the environment to learn and take actions that maximize its chance of successfully achieving its goals. As of 2020, many sources continue to assert that ML remains a subfield of AI. Others have the view that not all ML is part of AI, but only an 'intelligent subset' of ML should be considered AI.

## **How machine learning works:**

1. **A Decision Process:** In general, machine learning algorithms are used to make a prediction or classification. Based on some input data, which can be labelled or unlabeled, your algorithm will produce an estimate about a pattern in the data.

2. **An Error Function:** An error function serves to evaluate the prediction of the model. If there are known examples, an error function can make a comparison to assess the accuracy of the model.

3. **An Model Optimization Process:** If the model can fit better to the data points in the training set, then weights are adjusted to reduce the discrepancy between the known example and the model estimate. The algorithm will repeat this evaluate and optimize process, updating weights autonomously until a threshold of accuracy has been met.

## **Machine learning model:**

Input is given to learning model which then gives the output according to the algorithm applied, if it's right we take the output as a final result else we provide feedback to the training model and ask it to predict until it learns.

## **Machine learning methods:**

Machine learning classifiers fall into three primary categories.

### **Supervised machine learning**

Supervised learning, also known as supervised machine learning, is defined by its use of labeled datasets to train algorithms that to classify data or predict outcomes accurately. As input data is fed into the model, it adjusts its weights until the model has been fitted appropriately. This occurs as part of the cross validation process to ensure that the model avoids overfitting or underfitting.

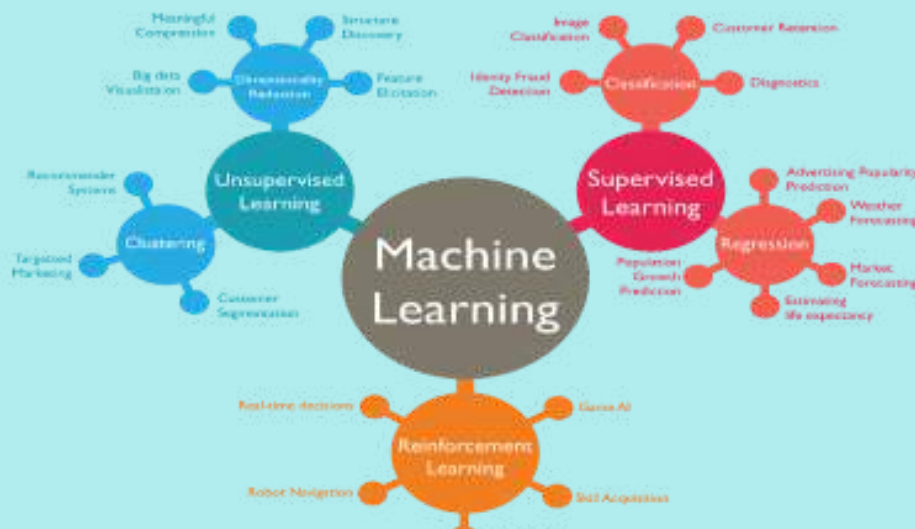
Supervised learning helps organizations solve for a variety of real-world problems at scale, such as classifying spam in a separate folder from your inbox.

### Unsupervised machine learning

Unsupervised learning, also known as unsupervised machine learning, uses machine learning algorithms to analyze and cluster unlabeled datasets. These algorithms discover hidden patterns or data groupings without the need for human intervention. Its ability to discover similarities and differences in information make it the ideal solution for exploratory data analysis, cross selling strategies, customer segmentation, image and pattern recognition

### Reinforcement learning

Reinforcement learning is an area of machine learning concerned with how software agents ought to take actions in an environment so as to maximize some notion of cumulative reward. Due to its generality, the field is studied in many other disciplines, such as game theory, control theory, operations research, information theory, simulation-based optimization, multi-agent systems, swarm intelligence, statistics and genetic algorithms. In machine learning, the environment is typically represented as a Markov decision process (MDP). Many reinforcement learning algorithms use dynamic programming techniques.



## Why is machine learning important?

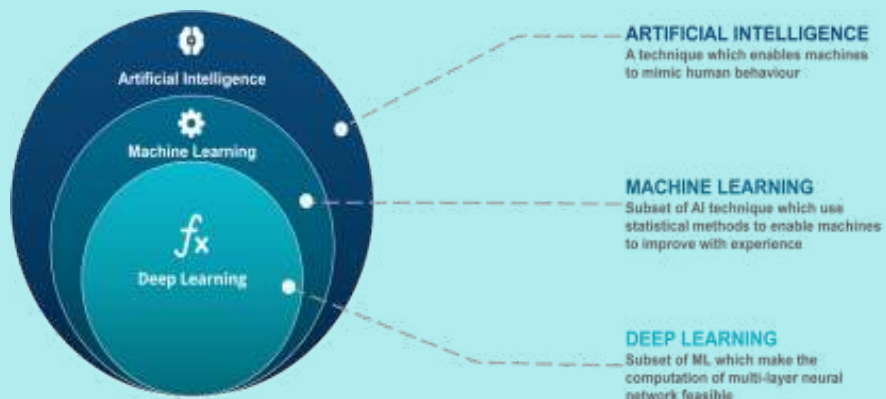
Resurging interest in machine learning is due to the same factors that have made data mining and Bayesian analysis more popular than ever. Things like growing volumes and varieties of available data, computational processing that is cheaper and more powerful, and affordable data storage.

All of these things mean it's possible to quickly and automatically produce models that can analyze bigger, more complex data and deliver faster, more accurate results - even on a very large scale. And by building precise models, an organization has a better chance of identifying profitable opportunities - or avoiding unknown risks.

## Applications of Machine learning

**Speech Recognition:** It is also known as automatic speech recognition (ASR), computer speech recognition, or speech-to-text, and it is a capability which uses natural language processing (NLP) to process human speech into a written format. Many mobile devices incorporate speech recognition into their systems to conduct voice search e.g. Siri- provide more accessibility around texting.

**Customer Service:** Online chatbots are replacing human agents along the customer journey.



They answer frequently asked questions (FAQs) around topics, like shipping, or provide personalized advice, cross-selling products or suggesting sizes for users, changing the way we think about customer engagement across websites and social media platforms. Examples include messaging bots on e-commerce sites with virtual agents, messaging apps, such as Slack and Facebook Messenger, and tasks usually done by virtual assistants and voice assistants.

**Computer Vision:** This AI technology enables computers and systems to derive meaningful information from digital images, videos and other visual inputs, and based on those inputs, it can take action. This ability to provide recommendations distinguishes it from image recognition tasks. Powered by convolutional neural networks, computer vision has applications within photo tagging in social media, radiology imaging in healthcare, and self-driving cars within the automotive industry.

**Recommendation Engines:** Using past consumption behavior data, AI algorithms can help to discover data trends that can be used to develop more effective cross-selling strategies. This is used to make relevant add-on recommendations to customers during the checkout process for online retailers.

**Automated stock trading:** Designed to optimize stock portfolios, AI-driven high frequency trading platforms make thousands or even millions of trades per day without human intervention.

**Other applications:** Agriculture, Anatomy, Adaptive website, Banking, Bioinformatics, Computer networks, Computer vision, economics, Internet fraud detection, Machine perception, Machine translation, Marketing, Medical diagnosis, etc.

### **Limitations**

Although machine learning has been transformative in some fields, machine learning programs often fail to deliver expected results.

Reasons for this are numerous: lack of (suitable) data, lack of access to the data, data bias, privacy problems, badly chosen tasks and algorithms, wrong tools and people, lack of resources, and evaluation problems.

## References

[1] [https://en.wikipedia.org/wiki/Machine\\_learning#:~:text=Machine%20learning%20\(ML\)%20is%20the,by%20the%20use%20of%20data.&text=Machine%20learning%20algorithms%20build%20a,explicitly%20programmed%20to%20do%20so](https://en.wikipedia.org/wiki/Machine_learning#:~:text=Machine%20learning%20(ML)%20is%20the,by%20the%20use%20of%20data.&text=Machine%20learning%20algorithms%20build%20a,explicitly%20programmed%20to%20do%20so).

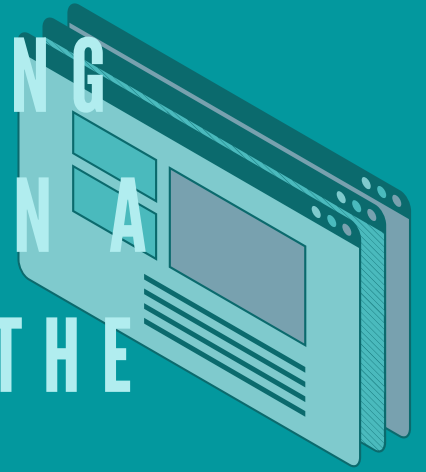
[2] <https://www.ibm.com/in-en/cloud/learn/machine-learning>.

[3] <https://images.app.goo.gl/XGAGWKZbGPEEjRQ39>

[4] <https://images.app.goo.gl/9hNkGAXykurBDixq7>

Article by: Vaishnavi Pawar  
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# HOW CODING IS CHANGING THE FUTURE FOR KIDS IN A WORLD THAT'S RIDING THE TECH WAVE AHEAD!



The constant evolution of technology has challenged mankind to look for meaning beyond their traditional practices. Whether it be the education system or the daily life routine, upgradation in all sectors has become an ongoing process. The technology-led generation demands for the student to be smart not only in their academics but also in their approach towards how they perceive situations and problems.

The necessity for practical learning has become a driving force for schools and institutions to adapt to integrated learning methods that focus on experiential learning.

Coding has emerged as one such tool that has been on its way to being embedded with education as it focuses on the key 21st-century skills like logical thinking, critical thinking, problem-solving skills, etc. These skills will expand the creative horizon in the minds of young students, motivating them to come up with amazing ideas around the buzzing situations.

## **Coding-Mozart of the modern education system:**

According to one popular estimate reported by the World Economic Forum, 65% of the students entering primary education now will work in a job that does not exist today.

The biggest influencing parameter supporting this estimate is technology. Multi-fold advancement in technology has stimulated the need for attention we should be paying to school-going students.

Embedding technology within the education system will allow students to broaden their perspectives and make them aware of their surroundings. The introduction of NEP 2020 is going to be one of the remarkable steps taken in the history of the Indian education system, where students from grade 6 will be exposed to technology through coding. Students have been working and playing around technology through STEM programs, AI, 3D Printing, Drone Aviation, and more, which has enhanced their decision-making ability and provides them a platform for showcasing their innovative skills. Coding is being considered as one of the most powerful tools because of its ability to not only help the kids become masters at technology, but also improve their 21st-century skills.

No matter what the profession, skills like creativity, problem-solving, critical thinking will help the young minds in any field they choose. There are many ways where robots cannot compete with us. This is the reason why coding has been integrated with the Indian education system and is considered to be an important skill among K-12 students worldwide.

#### **The rise of technology:**

The pandemic has forced people to adapt to digital methods in almost all cases. Whether it be education, groceries, medicines, food, or utilities, technology has become the saviour when it comes to connecting people with services. This is the main reason why technology-related sectors continue to rise exponentially even in times when most of the other industries have collapsed. As they say, "With great power comes great responsibility", technology being a boon in the time of pandemic also means more people must contribute towards the same.



It is projected that around 58 million jobs will be created in Artificial Intelligence (AI) alone. The continued progress in technology-related domains keeps on dominating the preference list, encouraging professionals to opt for a field where no recession is likely to come any time soon and where there is also opportunity. The need for a robust IT infrastructure is also a reason why there is a need for technical professionals who can make the system secure and safe from hackers. Technology is no way is going to stop astonishing us with its wonders. In the times to come, human and personality skills will be carried out by robots, automations, and AI.

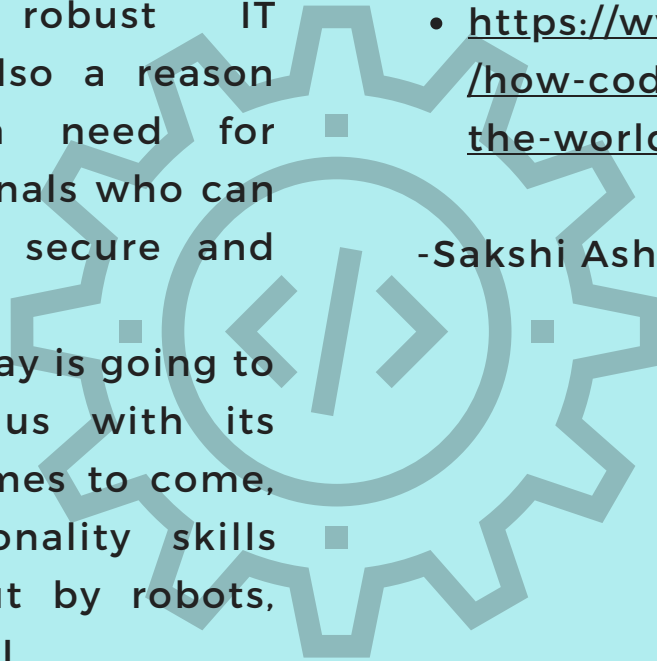
Automation and AI have brought a new dimension to living standards and have had an impact on the restructuring of employability conditions. The future workforce will be required to be smarter and more skilled in the latest technologies like Artificial Intelligence, Robotics, Machine Learning, IoT, etc.

It is high time we buckle up and prepare our current generation to get ready for future challenges.

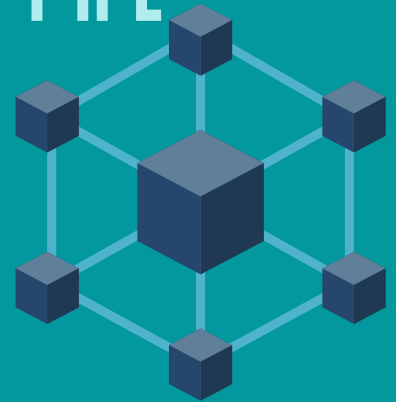
#### **References :**

- <https://www.preface.ai/blog/others/why-coding-is-important/#:~:text=Coding%20teaches%20you%20how%20to,pieces%20together%20with%20a%20solution>
- <https://www.idtech.com/blog/how-coding-can-change-the-world>

-Sakshi Ashok Chavan (SE)



# BLOCK-CHAIN STATE OF THE ART :ARCHITECTURE, APPLICATION



Hey , we can apply block-chain in government sector, also in bank sector too. By using it we can say good-bye to corruption and many more myths are spreading around our society . From this article you will be cleared the fundamental concept of block-hain and it's architecture.

BLOCK-CHAIN the name itself has it's meaning that it's something related to block's and they are connected through the chain . Let's discuss it in detailed manner

## **INTRODUCTION:**

In today's digital era , either in business or in any other communication, the stackholder want to transact without any intermediary and expect trust and reliability through technology design.

TRUSTWORTHY is one of the expensive thing in this world and BLOCK-CHAIN has achieved it from the past. Intially it is used in cryptocurrencies like bitcoin , etherum etc .

The emergence of block-chain has a tremendous impact on IT industries . Many Large companies such as IBM has been consistently working to provide with good platform to provide the service.

## **EVOLUTION IN BLOCKCHAIN**

Business industries started striving to reshape their business models to gain benefit from this technology .The block chain can be used by its three types of implementation environment

## **PERMISSIONED BLOCKCHAIN:**

This environment provides closed network that define the participants and their roles. This is particularly developed by the industries for their private commercial uses.

## **PUBLIC BLOCKCHAIN:**

This is an open-source environment that any one can access , use and participate in e.g. BITCOIN

## **HYBRID BLOCKCHAIN:**

It's a category derived from the two basic block chain mentioned above . In this blockchain the control over the data read and write is defined for the number of the participants. It is used by the industry who collaborate with each other for project .Hence , they participate in the environment with restricted access to carry out their task.

## **ARCHITECTURE**

Blockchain is a technology where a multiple parties involved in communication can perform different transaction without third part.

Verification and validation of these transactions are carried out by special kinds of nodes called as miners .Execution of current transaction depends upon the previously committed transaction. These transaction are stored in the data structure called as BLOCK. The chain of block is create by hash of the previous block. The block is divided into two components.

- **BLOCK HEADER**
- **LIST OF TRANSACTION**

**1. The block header :** The first component is the hash code of the previous block which links the current block with the previous one. The second component is comprising of mining statistics that are used to create the block. And the last component is the Markle tree root (that is nothing but the hash code of the current block) which is the base for verifying the integrity of all transactions residing in the block.

To generate a hash code of the current block, we use the hash code of the previous block. Hence, if an attacker tries to modify the block contents, he/she has to modify all the hash code of the rest of the chain which is practically difficult to carry out. Thus, it makes the Blockchain tampered proof.

## **2.VALID TRANSACTION :**

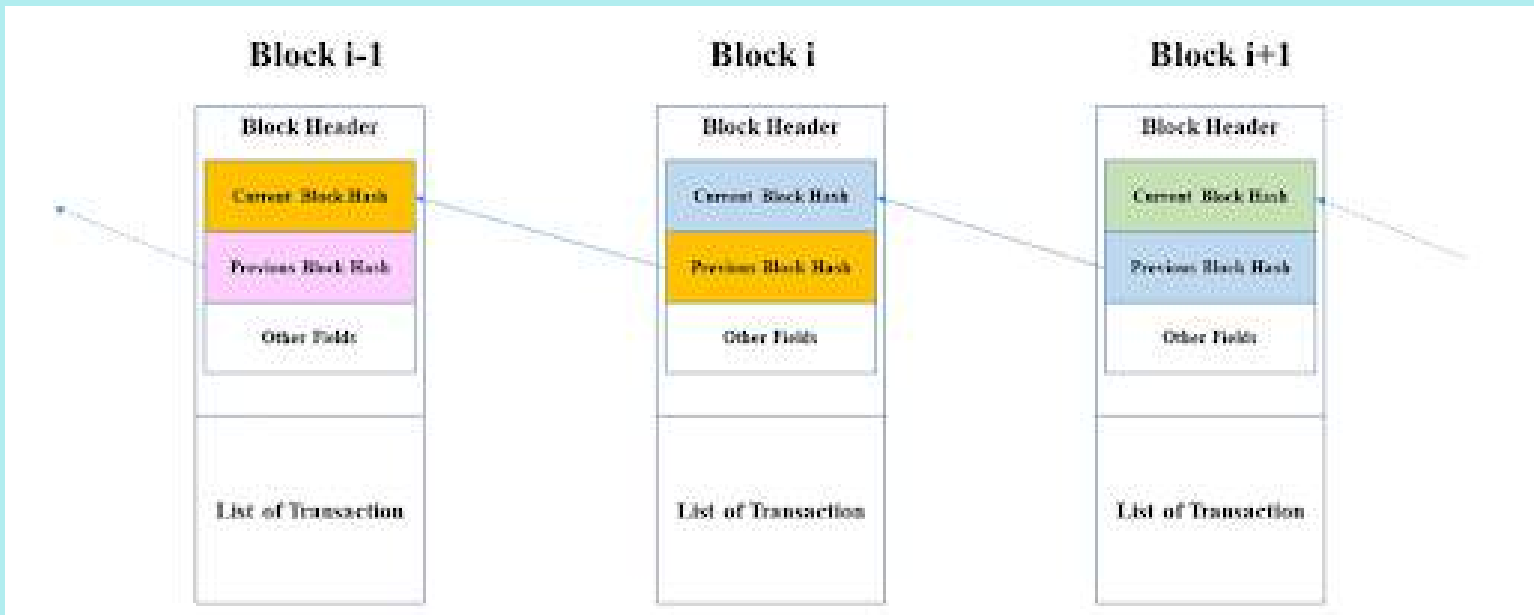
The number of transactions in a block depends upon the block and transaction size. Authorization and authentication of the transactions are done by asymmetric cryptography. Once a transaction is included in the chain, it cannot be removed . Blocks are chained together, where each block includes a hash of the previous block, and a chain of blocks (Blockchain) is created. Block will be accepted in the chain if it is valid and has proof of work, which is a computationally difficult hash generated by the mining procedure.

As it has a secure hashing technique (E.g. SHA 256) with secure hash pointers pointing to the previous hash, it ensures that, if any of the blocks is modified, all succeeding blocks will have to be recomputed.

## **3.Orphan block:**

Miners try to mine blocks on their own with the list of transactions that are yet to be added. Once a block is mined by a miner, it broadcasts to all other nodes in the network for verifications. Out of so many blocks in the network, the block with the highest consensus will be accepted to be added into the network. Other block(s) are considered as orphan block(s) and discarded later by the network. Orphan blocks have some transactions which have already been included in the valid block just added but may have some transactions which have not been considered yet. Such transactions are to be taken care of in further mining processes.

## BLOCK - DIAGRAM :



## STATE OF THE ART :

Distributed Ledger Technology (DLT): Ledger plays an important role in commerce to record the information such as the valuation, properties traceability, financial transactions, etc. In the traditional approach also, ledgers have been very important. Due to the wide use of computers and digitization, ledgers have been shifted from papers to digital forms. In a simple computerized system also, ledgers have been validated and maintained by third parties.

The distributed approach enables the collaborative formation of digital distributed ledgers with the properties and capabilities of creation and modification by multiple parties involved. A distributed ledger is basically a database asset that can be mutually shared across multiple networks, institutions, and over geographical locations (Walport,2016). All participants within a network can have their own identical copy of the ledger. Any changes/updates to the ledger are reflected in all copies within the predefined time interval.

The ledger is kept secured and accurate through the use of cryptographic algorithms such as digital signatures and hash functions. The control over the ledger for modification or creation is defined by the mutual agreement called consensus. This will define who can do what within the shared ledger.

**Smart Contract:** Smart contract is treated as a computer algorithm that allows to carry out mutual understanding in form of an agreement between multiple stakeholders without the intervention of any of the involved parties or third party. It is a contract in which the terms of the agreement between the buyer and the seller are written in the line of code that executes according to pre-defined requirements . In simple term, the smart contract is a self-executable line of code which is implemented/maintained/regulated on terms and agreements made between two or more parties.

Distributed ledgers are applied and executed through smart contracts.

Blockchain technology relies on smart contracts to implement business logic on the shared ledger.

### **APPLICATION :**

1. **Blockchain with 5G industrial automation:** The Internet of Things (IoT) and 5-Generation network (5G) are the need of this era. Particularly when there is a diversity of consumers and a variety of digital applications. The 5G- enabled IoT (5G-IoT) will connect trillions of IoT devices communicating with each other in a real-time manner without any third-party interventions which enable the deployment of an application having a massive number of devices without worrying about network traffic or network related issues. However, the 5G-enabled IoT devices environment suffers from privacy and security issues because of having a centralized system that is more vulnerable to attackers.

To resolve the same, Blockchain integration comes out as a promising technology as it offers a secure, transparent, reliable, an tempered-proof environment for 5G-enabled IoT due to its distributed and peer-to-peer . 5G industrial-IoT for the enhancement of performance in terms of security, privacy, immutability, and transparency.

## **2. Blockchain in 5G Healthcare:**

Healthcare is one of the most important industries that directly influences human lives. 5G brings so many opportunities for the digital healthcare industry. Remote surgeries, telesurgeries, and remote medical practices are being possible through 5G. Wherein, issues of privacy, security, and immutability can be resolve with the integration of Blockchain in 5G healthcare. Many researchers have discussed, proposed, and claims the deployment possibilities for integration of Blockchain with 5G healthcare to resolve the issues of security, privacy, immutability, and transparency.

## **REFERNCES:**

WWW.SCIENCEDIRECT.COM  
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