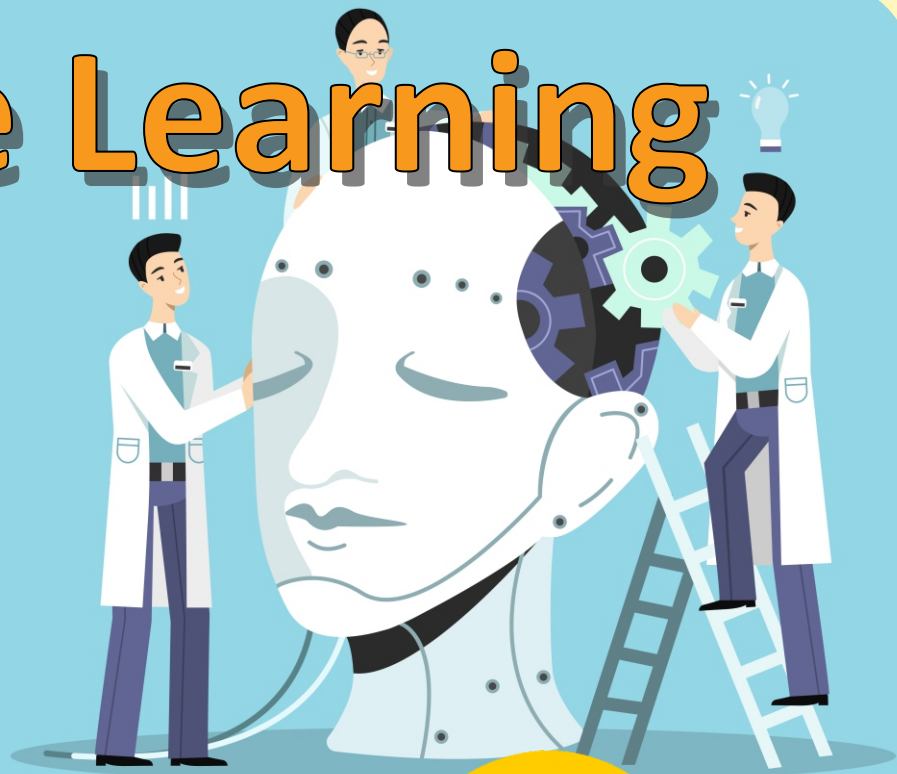# Gbyte 3.1

Department of Computer Science & Engineering

Machine Learning with

aws

Amazon Web Services

GOEL Institute of Technology & Management Lucknow

Approved by AICTE, New Delhi
Affiliated to Dr. APJ Abdul Kalam Technical University Lucknow

GITM
GOEL INSTITUTE OF TECHNOLOGY & MANAGEMENT
Cultivating Global Future

GOEL INSTITUTE OF TECHNOLOGY AND MANAGEMENT,LUCKNOW

AFFILIATED FROM Dr. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW , U.P

DEPARTMENT Of COMPUTER SCIENCE AND ENGINEERING

Campus:

Established in 2008
Approved by AICTE, New Delhi
Affiliated to Dr. APJ Abdul Kalam Technical University Lucknow

Department:

Quality Focused & Global Standard academic system
Highly qualified & well experienced faculty members
Faculty participation in research & Phd Programs
Excellent placement record
Departmental club CompuNerds
Department E-Magazine Gbyte 2.4
Alliance with NPTEL, CSI, EICT Academy, Spoken Tutorial

Laboratories:

- DBMS Lab
- Computer Network Lab
- JAVA Programming Lab
- C/C++ Programing Lab
- R & D Lab

- Algorithms Lab
- Computer Graphics Lab
- Project Lab
- MATLAB Lab

Placement (2021-22):

Major Recruiters: Capgemini, TCS, Accenture, Cedcoss, Svayam Infoware Pvt Ltd, Mentor Infotech Solutions etc.

Highest Package: 3.80 Lakhs
Students Placed: 85% (2021-22)
Companies Visited in Campus: 4
Entrepreneur - 2
Higher Studies- 4

Industry MOU:

1) Softpro India Pvt. Ltd.
2) E&ICT Academy IIT (Kanpur)
3) Infoseek Pvt. Ltd.

STUDENT ACHIEVEMENTS & AWARDS:

- Student participation & paper Presentation in various National & International Conferences.

- Students awarded in various National Level Technical Project Competitions.

- HACKATHON -2021 Screening.

- Active participation in Sports Up to Zonal & State Level.

Innovation & Entrepreneurship:

- Students innovative projects.
- Demonstration in TECHNOVATION HACKATHON -(SIH-2021).
- Regular interaction with Alumni Entrepreneur

ORACLE Academy Program Member

COMPUTER SOCIETY OF INDIA ESTD. 1965

RED HAT ACADEMY
Bridging the Gap Between Education and Industry

DEAR READERS

It gives us immense pleasure to issue a "G-Byte e-magazine" for the month of April, 2022. This is a quarterly e-magazine issued by the Department of Computer Science and Engineering for displaying the activities and initiatives taken by the Department. This edition of the magazine includes a glance at all the activities, accomplishments, and initiatives taken by the Department in the second quarter of the year 2022.

INSTITUTE VISION

Bring together rural and urban students providing them quality education to become complete professionals

INSTITUTE MISSION

❖ To inculcate professional excellence in students with ethical and moral values.

❖ To arrange and maintain state of the art infrastructure to excel in studies.

❖ To nurture academic atmosphere to cater the needs of academics fraternity.

❖ To enhance industry institute interaction with close relationship with alumnus.

DEPARTMENT VISION

To provide a congenial environment for learning in discipline of Computer Science and Engineering, and to mobilize students towards serving a globalized technological society

DEPARTMENT MISSION:

- To ensure that every engineering student is procient with necessary computer skills.

- To familiarize students with latest developments in Computer Science and Information Technology and motivate them to embrace all challenges and be future ready.

- To inculcate strong ethical values, research capabilities, professional behavior and leadership abilities so as to work with commitment for progress of the nation.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: The Students graduating from the department shall be made proficient in all the necessary computer skills to make them job ready for national and multi-national companies.

PEO2: The Students graduating from the department shall be made familiarize with the latest development in computer science so that they can pursue their carrier in higher studies.

PEO3: The Students graduating from the department shall inculcate professional behaviour and leadership capabilities in their character to start up their own business or develop as entrepreneur.

PEO4: The Students graduating from the department shall be fed with strong ethical values so that they can become the boon for society.

PROGRAM SPECIFIC OUTCOMES (PSOS)

PSO1: *To provide relevant knowledge of mathematical and algorithmic skills with core subjects of computer science engineering elevated with standard tools and technologies along powered by ethical and behavioural attitude in practice to have perfect suitability for industry, academia and research interfaces.*

PSO2: *To inculcate the ability of using abstractions and modelling techniques for formulating real world engineering problems of various domains and design solutions. ne learning, computer vision and etc.*

PSO3: *To enhance knowledge and skills of understanding, analysing and developing strategies utilizing the advancement of computer science engineering in upcoming area like data science, cloud computing, machi-*

Chairman's MESSAGE

Er. Mahesh Goel
Chairman/Trustee

With the grace of god and blessings of our visionary grandparents Sri Roop Chand Agarwal and our father Shri Ramji Lal Agarwal, we formed a Trust Sri Roop Chand Ramji Lal Educational Trust (RCRL) with a vision to educate youth from all walks of life.

I am glad to say that in 10 years of this service to the nation, Goel roup of Institutions under RCRL Trust have been delivering education to all age of young minds in almost all fields of education.

Our emphasis is that even though students come from different backgrounds but when they go out, they are perfect professional and worthy citizen of this great country India.

I assure that Trust would fulfill the requirement of all the institutes to make its student successful professional to serve the society and country at large & I can proudly say that you send your toddler to the group and it may come out as a matured professional.

I welcome you to be a part of our journey to acquire knowledge that provides benefits to both self and mankind.

Vice Chairman's MESSAGE

Mr. Murari Lal Goel
Vice Chairman

In an era of globalization, a well planned infrastructure and faculty is a must for a Conducive teaching-learning process in the campus and a good connectivity to the countries at large. I hope that my thirty years experience of construction marvelous buildings will fulfill a dream of my ancestors, my father Late Sri Ramji Lal Agarwal and grandfather, Late Sri Roop Chand Agarwal, to provide grand building and world class infrastructure which enhances the moral and confidence of our students to face the challenges in corporate and professional world. I hope that will also create the landscape of my campus which is lush green, sprawling and eco friendly. In the end I would like t say that excellence is never an accident, it is the result of commitment, meticulous planning, firm determination an ceaseless effort. I hope that we nurture sense of excellence in all our students and staffs.

Director's MESSAGE

Dr. Rishi Asthana
Director

Goel Institute of Technology and Management is on a fascinating path of growth and development. As it has completed 13 years of its establishment, it has evolved itself as one of the top technological institutes of the state.

Starting with, B.Tech. courses only, it has expanded in post graduate program in MBA, Mechanical Electronics and Computer science and Engineering also. It has also facilitated the students to enter at diploma level in Mechanical, Civil and Electrical engineering disciplines.

The faculty at the institute is a good blend of young and experienced academicians and dedicated supporting staffs who work hard to develop students not only technically but also develop their intrinsic skills for overall personality development.

Institute has excellent infrastructure, latest technology labs and - 50 Mbps internet facility round the clock helps the students to excel in their chosen field.

Institute is also having a Training and Placement cell which is continuously working hard to fill the gap between industry and institute by arranging various seminars and workshops and thus enhancing their scope not only in campus placement but also in jobs of their choice at large.

I welcome all the students entering in 2020-21. We look forward to build a long lasting and mutually beneficial relationship with you.

Head of department (HOD)
MESSAGE

Prof. Dr. Devendra Agarwal
Head of Department (CSE)

Dear Students,

Since 2008 (inception year), we are providing quality education. Our sole mission is helping students to become "competent technocrats and business managers who are also principled value-based leaders". We have succeeded in our mission by embracing a 100% interactive educational philosophy, which is practiced, organization students and faculty. GITM is a center of learning where young talent is nurtured in different fields of engineering and management. The major emphasis is on imparting technical training to encourage curiosity and innovativeness among the students and the foundation from where they can acquire quick learning ability and adaptively with the fast-changing needs of the industry. I am sure you will enjoy your time here and it will be a great learning experience for you. We will work, learn, and grow together and take the institute the new heights in the academic field and maintain the highest standards with diverse cultural heritage. Our faculty members are excellent in teaching and research, with frequent publications in top journals. They bring innovation and diversity to the classroom, which helps us deliver memorable learning experiences to students. In addition to that, students also get a chance to interact with industry specialists and alumni, who help broaden their understanding of various concepts through their own experiences, Tam confident that our students would be an asset to any organization through their technical and managerial capabilities.

Deputy Head of department (Dy. HOD) MESSAGE

Er. Brijesh Pandey
Deputy Head of Department (CSE)

Learning is a continuous process and does not end with the acquisition of a degree specially because steady and rapid advances in computing technologies shorten the life of tools and techniques prevalent today.

Therefore we do not aim to make our students walking manuals of any language or package. Instead they are given a strong foundation in computer science and problem solving techniques, and are made adaptable to changes. We believe that this approach to teaching-learning, coupled which practical experience gain during industrial training in reputed organizations, equips. our students to handle the challenges posed by the software industry.

I am confident that you will find yourself worthy to show your talent in any organization globally.

EDITORIAL BOARD

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Chief Editor

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Editor

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CSE- 3rd Year

Nishant Pandey
CSE- 3rd Year

**Anudeep Verma**
CSE- 3rd Year

MESSAGE FROM EDITORIAL DESK

It is our greatest pleasure to present this edition of "G-Byte" to you. It showcases the literary talent, innovative ideas, creative work of our students and teachers, and proud accomplishments of the Department of Computer science and engineering. The magazine started its journey as a mere thought, fighting all the obstacles coming in its way and, has finally reached our readers' hands. We express our gratitude to all those who contributed to this dream to come true, especially to our authors. The generous efforts from the contributors to this magazine are the reasons for its possible existence. We hope you enjoy reading it.

Thank you all!

FACULTY OF DEPARTMENT COMPUTER SCIENCE AND ENGINEERING

Dr. Devendra Agarwal
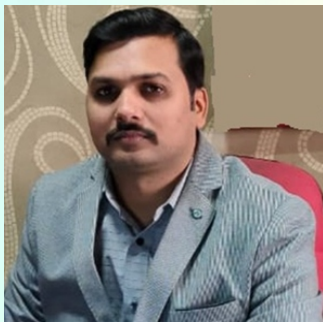
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Dr. Ganesh Chandra

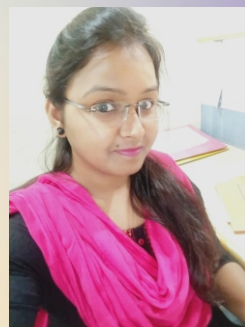Dr. Satya Bhushan

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Mr. Shailendra Kumar Rawat

Mrs. Arunima Mishra

Ms. Dipshikha

Mr. Nishel Chandra

Mrs. Deepa Tiwari

TABLE OF CONTENT

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Nishant Pandey
CS-3ʳᵈ Year
GITM, CSE

ARTIFICIAL NEURAL NETWORK

Introduction

The term "Artificial neural network" refers to a biologically inspired sub-field of artificial intelligence modeled after the brain. An Artificial neural network is usually a computational network based on biological neural networks that construct the structure of the human brain. Similar to a human brain has neurons interconnected to each other, artificial neural networks also have neurons that are linked to each other in various layers of the networks. These neurons are known as nodes.

Artificial neural network tutorial covers all the aspects related to the artificial neural network. In this tutorial, we will discuss ANNs, Adaptive resonance theory, Kohonen self-organizing map, Building blocks, unsupervised learning, Genetic algorithm, etc.
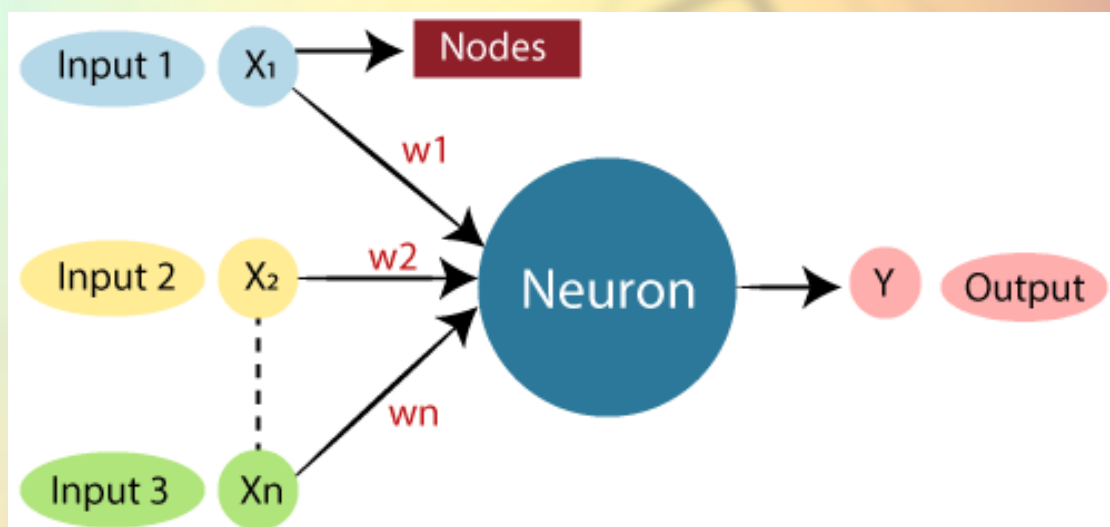
What is Artificial Neural Network?

The term "Artificial Neural Network" is derived from Biological neural networks that develop the structure of a human brain. Similar to the human brain that has neurons interconnected to one another, artificial neural networks also have neurons that are interconnected to one another in various layers of the networks. These neurons are known as nodes.
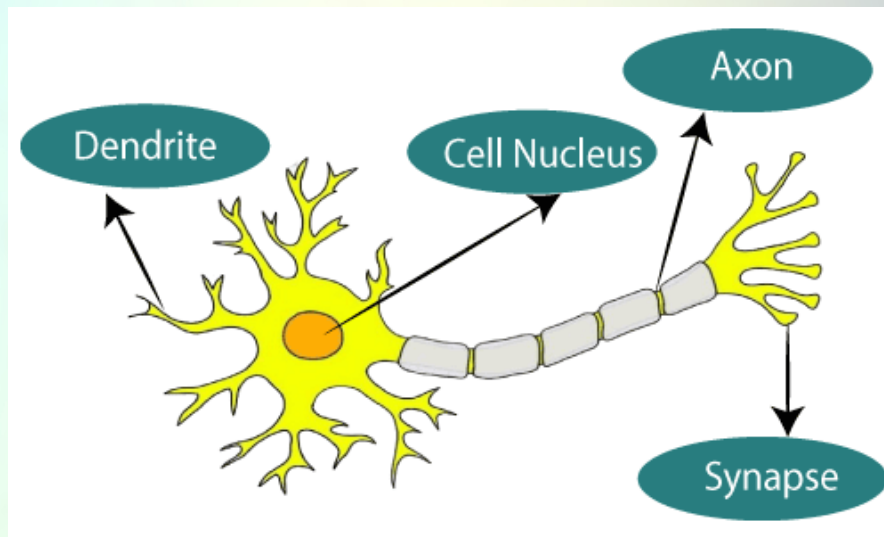
The given figure illustrates the typical diagram of Biological Neural Network.

The typical Artificial Neural Network looks something like the given figure.

Dendrites from Biological Neural Network represent inputs in Artificial Neural Networks, cell nucleus represents Nodes, synapse represents Weights, and Axon represents Output.

Relationship between Biological neural network and artificial neural network:

Biological Neural Network	Artificial Neural Network
Dendrites	Inputs
Cell nucleus	Nodes
Synapse	Weights
Axon	Output

An Artificial Neural Network in the field of Artificial intelligence where it attempts to mimic the network of neurons makes up a human brain so that computers will have an option to understand things and make decisions in a human-like manner. The artificial neural network is designed by programming computers to behave simply like interconnected brain cells.

There are around 1000 billion neurons in the human brain. Each neuron has an association point somewhere in the range of 1,000 and 100,000. In the human brain, data is stored in such a manner as to be distributed, and we can extract more than one piece of this data when necessary from our memory parallelly. We can say that the human brain is made up of incredibly amazing parallel processors.

We can understand the artificial neural network with an example, consider an example of a digital logic gate that takes an input and gives an output. "OR" gate, which takes two inputs. If one or both the inputs are "On," then we get "On" in output. If both the inputs are "Off," then we get "Off" in output. Here the output depends upon input. Our brain does not perform the same task. The outputs to inputs relationship keep changing because of the neurons in our brain, which are "learning."

The architecture of an artificial neural network

To understand the concept of the architecture of an artificial neural network, we have to understand what a neural network consists of. In order to define a neural network that consists of a large number of artificial neurons, which are termed units arranged in a sequence of layers. Lets us look at various types of layers available in an artificial neural network.

Artificial Neural Network primarily consists of three layers:
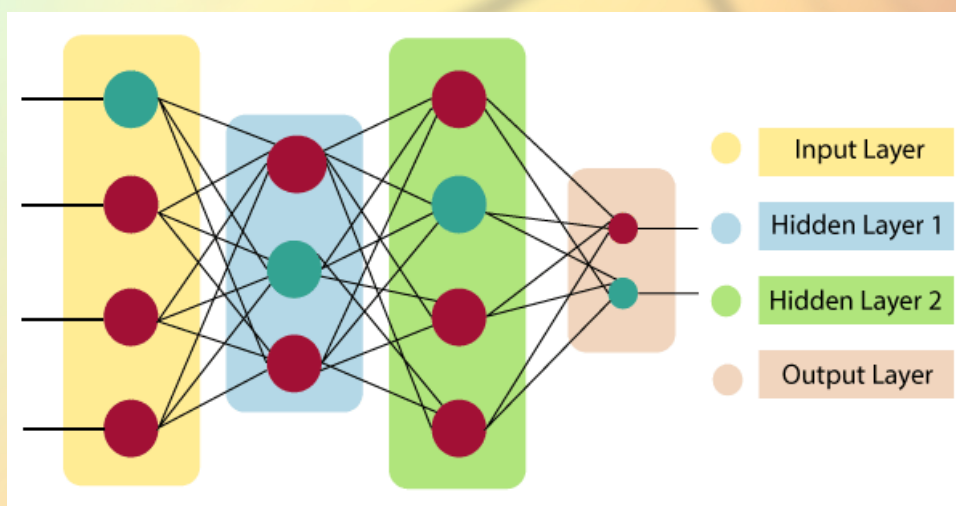
Input Layer:

As the name suggests, it accepts inputs in several different formats provided by the programmer.

Hidden Layer:

The hidden layer presents in-between input and output layers. It performs all the calculations to find hidden features and patterns.

Output Layer:

The input goes through a series of transformations using the hidden layer, which finally results in output that is conveyed using this layer.

The artificial neural network takes input and computes the weighted sum of the inputs and includes a bias. This computation is represented in the form of a transfer function.

$$\sum_{i=1}^{n} Wi * Xi + b$$

It determines weighted total is passed as an input to an activation function to produce the output. Activation functions choose whether a node should fire or not. Only those who are fired make it to the output layer. There are distinctive activation functions available that can be applied upon the sort of task we are performing.

How do artificial neural networks work?

Artificial Neural Network can be best represented as a weighted directed graph, where the artificial neurons form the nodes. The association between the neurons outputs and neuron inputs can be viewed as the directed edges with weights. The Artificial Neural Network receives the input signal from the external source in the form of a

pattern and image in the form of a vector. These inputs are then mathematically assigned by the notations $x(n)$ for every n number of inputs.
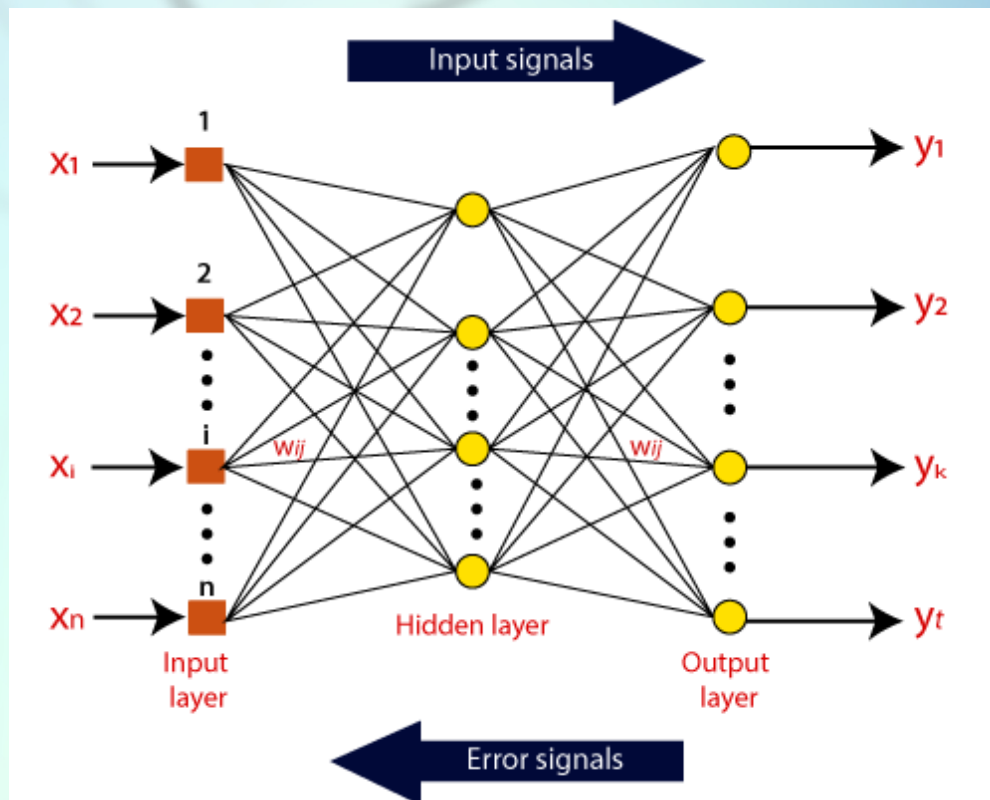
Afterward, each of the input is multiplied by its corresponding weights (these weights are the details utilized by the artificial neural networks to solve a specific problem). In general terms, these weights normally represent the strength of the interconnection between neurons inside the artificial neural network. All the weighted inputs are summarized inside the computing unit.

If the weighted sum is equal to zero, then bias is added to make the output non-zero or something else to scale up to the system's response. Bias has the same input, and weight equals to 1. Here the total of weighted inputs can be in the range of 0 to positive infinity. Here, to keep the response in the limits of the desired value, a certain maximum value is benchmarked, and the total of weighted inputs is passed through the activation function.

The activation function refers to the set of transfer functions used to achieve the desired output. There is a different kind of the activation function, but primarily either linear or non-linear sets of functions. Some of the commonly used sets of activation functions are the Binary, linear, and Tan hyperbolic sigmoidal activation functions. Let us take a look at each of them in details:

Binary:

In binary activation function, the output is either a one or a 0. Here, to accomplish this, there is a threshold value set up. If the net weighted input of neurons is more than 1, then the final output of the activation function is returned as one or else the output is returned as 0.

Sigmoidal Hyperbolic:

The Sigmoidal Hyperbola function is generally seen as an "S" shaped curve. Here the tan hyperbolic function is used to approximate output from the actual net input. The function is defined as:

$F(x) = (1/1 + \exp(-????x))$

Where ???? is considered the Steepness parameter.

Types of Artificial Neural Network:

There are various types of Artificial Neural Networks (ANN) depending upon the human brain neuron and network functions, an artificial neural network similarly performs tasks. The majority of the artificial neural networks will have some similarities with a more complex biological partner and are very effective at their expected tasks. For example, segmentation or classification.

Feedback ANN:

In this type of ANN, the output returns into the network to accomplish the best-evolved results internally. As per the University of Massachusetts, Lowell Centre for Atmospheric Research. The feedback networks feed information back into itself and are well suited to solve optimization issues. The Internal system error corrections utilize feedback ANNs.

Feed-Forward ANN:

A feed-forward network is a basic neural network comprising of an input layer, an output layer, and at least one layer of a neuron. Through assessment of its output by reviewing its input, the intensity of the network can be noticed based on group behavior of the associated neurons, and the output is decided. The primary advantage of this network is that it figures out how to evaluate and recognize input patterns.
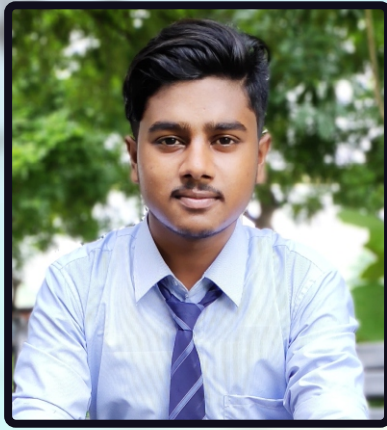
Sandeep Prajapati
CS-3rd Year
GITM, CSE

What is AWS Machine Learning?

The goal of machine learning, a subset of AI, is to train machines on how to properly respond to their surroundings (via data inputs) and "learn" without direct programming. Amazon's AWS ML offerings include tools and services to help organizations across the entire ML spectrum. Among other capabilities, they help developers:

- Build, train, and deploy machine learning models.

- Apply reinforcement learning to the training of complex sequences of behaviours in a dynamic environment.

- Create recommendation engines to serve their customers better.

- Fine-tune forecasting models to help businesses make better, data-backed decisions.

- Enhance computer vision, which allows machines to quickly and accurately identify people and objects in images.

Some of the more well-known businesses using AWS Machine Learning include Netflix, CapitalOne, BMW, and the National Football League. Amazon's offerings include pre-trained AI models, which are useful for forecasting, recommendations, computer vision, and language, and Amazon SageMaker to help organizations build and train their models. In addition to the AWS DeepRacer project mentioned above, developers are using AWS Machine Learning to efficiently test thousands of potential product designs, make quick and accurate property damage assessments following natural disasters, improve health care outcomes, enhance customer service responses, and much more.

The machine learning market is predicted to increase at a compound annual growth rate (CAGR) of 42.8 percent from 2018 to 2024 (becoming a $30.6 billion market), according to a roundup of machine learning market predictions published by Forbes. This phenomenal growth in machine learning (and AI in general) will do doubt encourage more professionals to embark on a path toward becoming an AI or ML engineer. At the same time, organizations may struggle to fill those roles as this technology provides competitive advantages. Learning how to leverage AWS Machine Learning tools and services is smart business for both professionals and organizations.

Overview of Amazon Web Services

Amazon Web Services, or only AWS, is Amazon's cloud services platform, which provides flexibility and scalability for organizations of all sizes to deploy services and manage data. Instead of deploying physical servers, AWS allows companies to use (and pay for) only the database storage, compute power, content delivery, and on-demand AWS services (such as AWS Machine Learning) they need. Competitors include Microsoft Azure and Google Cloud.

AWS allows organizations to tap into a growing set of services and capabilities without having to build it in house, which saves money and speeds up deployment times. Some of the reasons companies prefer AWS to other cloud services include the following:

- Security - Data is encrypted to provide end-to-end security

- Experience - Amazon was an early pioneer of cloud computing and can draw from its years of experience to provide best-in-class solutions.

- Flexibility - AWS offers exceptional flexibility and, for instance, allows developers to select the operating system language and database.

- Usability - Developers consider AWS to be relatively easy to use, as they can quickly deploy applications, build new apps, or migrate existing ones.

- Scalability - Depending on user requirements, developers can scale up or down as needed.

This technology is constantly evolving and we are confident it will get even more advanced in the upcoming years.

Amazon Machine Learning

AWS Machine Learning Tools and Services

Amazon offers several services and tools under the AWS Machine Learning umbrella. These solutions enable developers and organizations to more quickly deploy their ML systems as compared to a code-based approach. Keep in mind that the terms "tools" and "services" are often interchanged when discussing AWS Machine Learning solutions. The following is a brief explanation of each.

1. SageMaker

This managed service is designed to help you quickly and efficiently transition your conceptual machine learning models into production. SageMaker includes several tools that enable you to design, build, and deploy your ML model and has an "autopilot" feature that will automatically run your model through multiple algorithms to determine which is the most effective.

2. Comprehend

This natural language processing (NLP) service uses machine learning to extract useful information from textual data, including unstructured data such as customer reviews and customer service emails. Since Comprehend is a fully managed service, you can use pre-trained models.

3. Fraud Detector

As its name implies, Amazon Fraud Detector is designed to flag potentially fraudulent accounts. Organizations must enter existing data of known fraudulent transactions to train it for future use.

4. Lex

Lex allows you to build conversational chatbots for use in customer service, sales, and other such applications. Lex offers a natural language understanding (NLU) component that can make sense of conversational language and offer the correct feedback.

5. Translate

Similar to Google Translate, Amazon Translate is a neural machine translation service that allows you to localize sites for different regions and translate large volumes of text. This service also allows you to customize to take brand names and unique jargon into account.

6. Rekognition

This is a computer vision service that streamlines the development process for applications that can recognize specific people and objects from images (including video). Rekognition allows organizations to customize per business needs.

7. CodeGuru

This service helps developers spot potential problems with their code before it's too late. For example, CodeGuru can recognize leaks or inefficiencies with CPU cycles and then suggest solutions based on the context of the code itself.

8. Forecast

This service uses existing datasets to provide time-series predictions for organizations. For instance, Forecast can be used to predict business expenses, customer support, even future stock prices.

9. DeepRacer

As discussed above, DeepRacer is a 3D virtualization of an automobile with a corresponding 1/18-scale model car that allows driverless automobile developers to test their AI algorithms. Developers can even compete against other developers on virtual racetracks.

10. Kendra

This hosted service is an enterprise search engine optimized to help customers with product queries. Kendra also understands natural language questions, which can help organizations save money in customer support.

Advantages of AWS Machine Learning

Amazon's AWS Machine Learning suite of services can help cut down the time and expense it typically takes to develop, test, and deploy ML models. For instance, adding specifics to pre-trained models can help a company quickly deploy a chatbot to help with customer service tasks. AWS also supports all of the major machine learning frameworks, such as TensorFlow and Caffe2.

What can you use Amazon Machine Learning for?

To get started with AWS ML services, you need a model - it can be either custom or predefined. The latter ones offer various possibilities, including:

Support for data-driven decision-making

Fraud detection services

Giving your customers comprehensive answers

Gathering useful information

It's also secure, with end-to-end encryption, and provides a "pay-as-you-go" model that allows organizations of all sizes to scale as needed. Also, AWS provides numerous data analysis services to help make the best business decisions possible. A known leader in cloud computing, Amazon offers a fantastic end-to-end solution for companies implementing machine learning into their products, services, and operations.
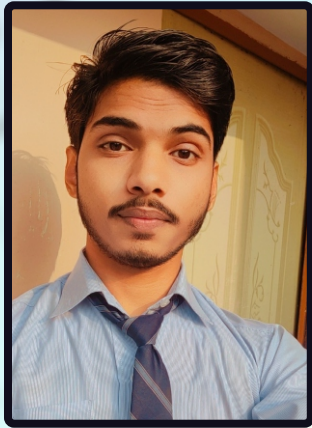
Anudeep Verma
CS-3ʳᵈ Year
GITM, CSE

MACHINE LEARNING

What is K-Means Clustering?

We can group similar items, products, and users together. This grouping, or segmenting, works across industries. And that's what makes the concept of clustering such an important one in Machine Learning and Data Science.

Clustering helps us understand our data in a unique way – by grouping things together into – you guessed it – clusters.

In this article, we will cover k-means clustering and its components comprehensively. We'll look at clustering, why it matters, its applications and then deep dive into k-means clustering (including how to perform it in Python on a real-world dataset).

What is Clustering?

Let's kick things off with a simple example. A bank wants to give credit card offers to its customers. Currently, they look at the details of each customer and based on this information, decide which offer should be given to which customer.

Now, the bank can potentially have millions of customers. Does it make sense to look at the details of each customer separately and then make a decision? Certainly not! It is a manual process and will take a huge amount of time.

So what can the bank do? One option is to segment its customers into different groups. For instance, the bank can group the customers based on their income:

Can you see where I'm going with this? The bank can now make three different strategies or offers, one for each group. Here, instead of creating different strategies for individual customers, they only have to make 3 strategies. This will reduce the effort as well as the time.

The groups I have shown above are known as clusters and the process of creating these groups is known as clustering. Formally, we can say that:

Clustering is the process of dividing the entire data into groups (also known as clusters) based on the patterns in the data.

Can you guess which type of learning problem clustering is? Is it a supervised or unsupervised learning problem?

Think about it for a moment and make use of the example we just saw. Got it? Clustering is an unsupervised learning problem!

Introduction to K-Means Clustering

We have finally arrived at the meat of this article!

The first property of clusters – it states that the points within a cluster should be similar to each other. So, our aim here is to minimize the distance between the points within a cluster.

There is an algorithm that tries to minimize the distance of the points in a cluster with their centroid – the k-means clustering technique.

K-means is a centroid-based algorithm, or a distance-based algorithm, where we calculate the distances to assign a point to a cluster. In K-Means, each cluster is associated with a centroid.

The main objective of the K-Means algorithm is to minimize the sum of distances between the points and their respective cluster centroid.

Let's now take an example to understand how K-Means actually works:

We have these 8 points and we want to apply k-means to create clusters for these points. Here's how we can do it.

Step 1: Choose the number of clusters *k*

The first step in k-means is to pick the number of clusters, k.

## Step 2: Select k random points from the data as centroids

Next, we randomly select the centroid for each cluster. Let's say we want to have 2 clusters, so k is equal to 2 here. We then randomly select the centroid:
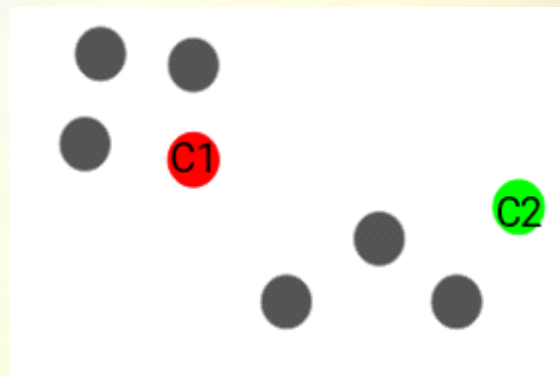
Here, the red and green circles represent the centroid for these clusters.

Step 3: Assign all the points to the closest cluster centroid

Once we have initialized the centroids, we assign each point to the closest cluster centroid:
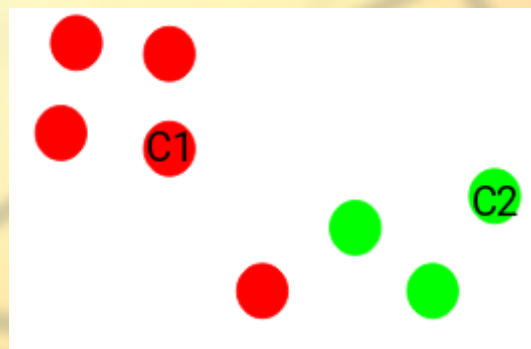
Here you can see that the points which are closer to the red point are assigned to the red cluster whereas the points which are closer to the green point are assigned to the green cluster.

Step 4: Recompute the centroids of newly formed clusters

Now, once we have assigned all of the points to either cluster, the next step is to compute the centroids of newly formed clusters:
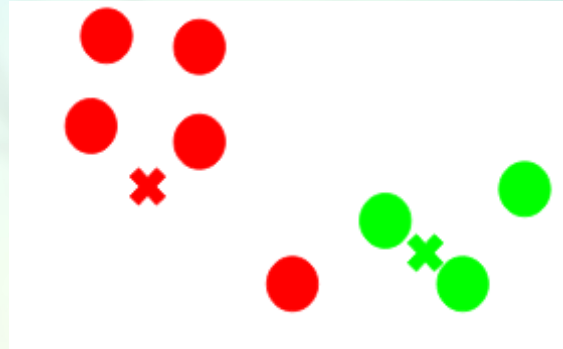
Here, the red and green crosses are the new centroids.

Step 5: Repeat steps 3 and 4

We then repeat steps 3 and 4:
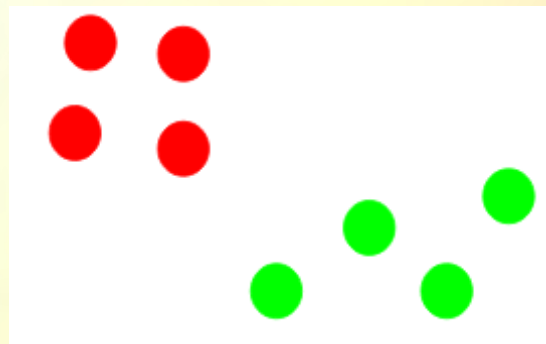
The step of computing the centroid and assigning all the points to the cluster based on their distance from the centroid is a single iteration. But wait – when should we stop this process? It can't run till eternity, right?

Stopping Criteria for K-Means Clustering

There are essentially three stopping criteria that can be adopted to stop the K-means algorithm:

1. Centroids of newly formed clusters do not change.
2. Points remain in the same cluster.
3. Maximum number of iterations are reached

We can stop the algorithm if the centroids of newly formed clusters are not changing. Even after multiple iterations, if we are getting the same centroids for all the clusters, we can say that the algorithm is not learning any new pattern and it is a sign to stop the training.

Another clear sign that we should stop the training process if the points remain in the same cluster even after training the algorithm for multiple iterations.

Finally, we can stop the training if the maximum number of iterations is reached. Suppose if we have set the number of iterations as 100. The process will repeat for 100 iterations before stopping.

Grad's Talk

AWANTIKA SHUKLA

COMPANY

SOFTWARE ENGINEER
IBM INDIA PVT. LTD BANGLORE

PASSOUT YEAR :- 2014

Studying in this college is a very valuable and a memorable experience. Like any other student, I too had many apprehensions regarding the faculty, facilities, environment, etc. But all these fines vanished with a few days of kick-starting this journey. The friendly and approachable lecturers, well-equipped library and an organized administration made the learning process exiting, convenient & wholesome. The college also encourages students to participate in various activities such as Coding Competitions, Quiz competitions, Sports etc. has provided us with all the conveniences required for the same. My seniors have always supported and helped us with various aspects of course and keep updating the students the various facts of Engineering.

Throughout these four years, one thing I've surely learnt is that achievement is, what you attain in life. It is this institution which encourages me every day to think beyond my abilities. I am so grateful to be part of this institution.

ISHITA PATEL

COMPANY

**SENIO TEST ENGINEER
PEOPLE STRONG GURGAON**

PASSOUT YEAR :- 2014

It would be difficult to sum up four years of GITM in just few lines. I must say that the learning and exposure which GITM gives is just commendable. The faculty is just amazing and they stand by you from the first day to the end of placement days. Apart from the curriculum, there are a lot of activities for students. The best part of college is that they give you internships and placements in best reputed organisations. During the most crucial time of placements, the faculty and placement team provides students with lot of preparatory sessions so that they come up with their best. I feel GITM is the wholesome basket for one who is looking to pursue Bachelors in Technology and I'll definitely cherish these moments forever.

My experience at GITM has taught me one fundamental thing - life is unpredictable. It might be good, it might be bad, it might be weird, and it might not interest you, but expect anything to happen. College life prepares you for all of this. It is a perfect blend of joy and hardship.

DAMINI GAUR

COMPANY

CYBER SECURITY ENGINEER
HERBALIFI , BANGLORE

PASSOUT YEAR :- 2014

My engineering journey at GITM is indeed building of dynamic personality. The computer department has given lots of opportunities to explore in different fields. It was never been stick to academics only. I got motivated to participate in various national level competitions like ROBOCON, Smart India Hackathon, Texas Instruments, etc. I got the opportunity to do an internship in android application development at TEC. With curricular practical, College organized various industry lectures related to subjects like CISCO networking, Web security, etc. The college organized the GATE practice tests for students. Also, College provided certification in different technologies like android, iOS, R-programming including hands-on coding with industry experts. As part of placement training college organized aptitude, basic programming, HR guidance, alumni experience sharing sessions. I really feel great and proud to be studied at GITM!!!

Definitely, stronger the foundation, higher the levels you reach , and I am so proud to acknowledge that my foundation was laid out by GITM and I will forever grateful for that.

Poet's Corner

HELP ME!

Help me!
I am the child of your innovation,
And not want to be the reason for your destruction.
Ages to ages my generation have been passed down,
To kill some of you for saving your town.

Help me!
I have no desire to make you feel fear,
All I want is to make your life easier.
Choose me for your life betterment,
Not for dispute settlement.

By– Rupali Singh
B. Tech CSE - 3rd Year

<u>तुम मुझको कब तक रोकोगे</u>

मुट्ठी में कुछ सपने लेकर, भरकर जेबों में आशाएं ।दिल में है अरमान यही, कुछ कर जाएं... कुछ कर जाएं... ।सूरज-सा तेज़ नहीं मुझमें, दीपक-सा जलता देखोगे..सूरज-सा तेज़ नहीं मुझमें, दीपक-सा जलता देखोगे...अपनी हद रौशन करने से,तुम मुझको कब तक रोकोगे...तुम मुझको कब तक रोकोगे... । ।

मैं उस माटी का वृक्ष नहीं जिसको नदियों ने सींचा है...बंजर माटी में पलकर मैंने...मृत्यु से जीवन खींचा है... ।मैं पत्थर पर लिखी इबारत हूँ... शीशे से कब तक तोड़ोगे..मैं पत्थर पर लिखी इबारत हूँ ..शीशे से कब तक तोड़ोगे..मिटने वाला मैं नाम नहीं...तुम मुझको कब तक रोकोगे...तुम मुझको कब तक रोकोगे...।।

इस जग में जितने जुल्म नहीं, उतने सहने की ताकत है ....तानों के भी शोर में रहकर सच कहने की आदत है ।।मैं सागर से भी गहरा हूँ...तुम कितने कंकड़ फेंकोगे..मैं सागर से भी गहरा हूँ...तुम कितने कंकड़ फेंकोगे..चुन-चुन कर आगे बढूँगा मैं...तुम मुझको कब तक रोकोगे...तुम मुझको कब तक रोकोगे..।।

झुक-झुककर सीधा खड़ा हुआ, अब फिर झुकने का शौक नहीं..अपने ही हाथों रचा स्वयं.. तुमसे मिटने का खौफ़ नहीं...तुम हालातों की भट्टी में... जब-जब भी मुझको झोंकोगे...तुम हालातों की भट्टी में... जब-जब भी मुझको झोंकोगे...तब तपकर सोना बनूंगा मैं...तुम मुझको कब तक रोकोगे...तुम मुझको कब तक रोक़ोगे...।।

By– *Sandeep Prajapati*
B. Tech CSE - 3rd Year

BUZZWORTHY

GOVERNMENT WARNING: NEW DIAVOL VIRUS SPREADS VIA EMAIL TO ROB YOUR MONEY

The Government of India has issued a "Virus Alert" through the Computer Emergency Response Team of India (CERT-In) after a new kind of ransomware was discovered to be spreading via email. CERT-In, in its latest notice, warned about the ransomware called Diavol.


EXPLAINED: CAN VPN BE TRACKED OR HACKED? KNOW ALL ABOUT VPN

Digital privacy and protection are some of the biggest concerns for most people when they are online. VPNs are used all over the world, why is VPN used, can VPN be tracked and hacked? How does a VPN help protect you or prevent you from getting into these situations? Find in detail.

HOW TO RECOVER DELETED PHOTOS WITH STELLAR PHOTO RECOVERY?

Despite whether you have deleted/lost your photos permanently, you can still recover it. Photo recovery in 3 simple steps: Select ->Scan -> Recover. Here, we will tell you how you can recover deleted photos using Stellar photo recovery software despite the photo loss situation.
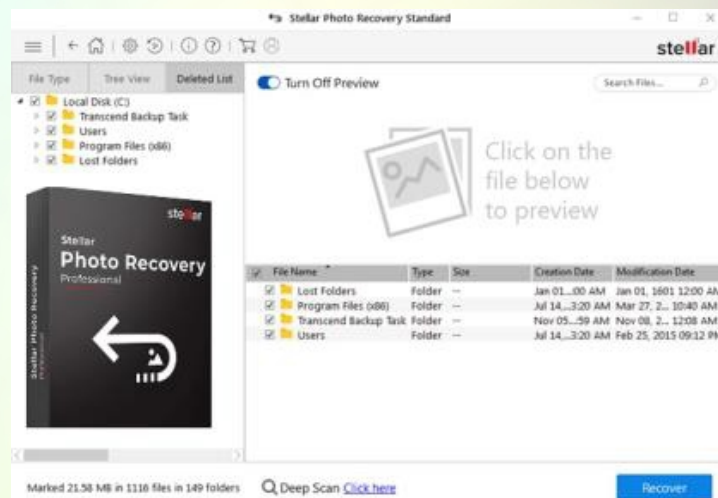
GOOGLE MEET GETS LIVE TRANSLATED CAPTIONS FEATURE HOW TO ACTIVATE IT

Google Meet, Google's video conferencing software is getting a live translated captions feature after a few months of testing. The feature works on mobile and web clients of Google Meet, but is still a bit limited, meaning it will only translate four languages into English: French, German, Portuguese and Spanish. "Translated captions help make Google Meet video calls more inclusive and collaborative by removing language proficiency barriers," Google shared in a Workspace blog post announcing the new feature.

TECHNOLOGY-ORIENTED CURRICULUM IS THE NEW PEDAGOGY

We must incorporate Technology-Oriented Curriculum Delivery, which is based on technique and pedagogy aligned with the demands of 21st Century Skills, into our education delivery for K-12 students and schools, says Rajeev Tiwari, Co-founder, STEMROBO Technologies.
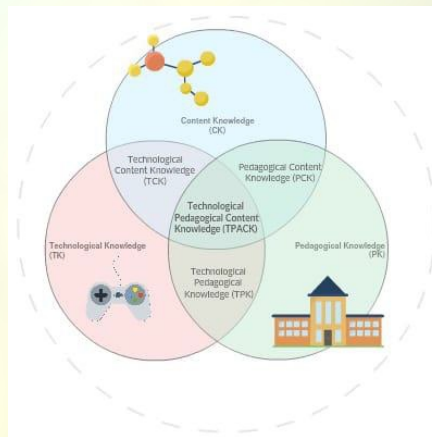

'TWITTER FLOCK' ALLOWS SHARING TWEETS WITH UP TO 150 SELECT USERS

Twitter is said to be working on a feature that allows you to share tweets with a specific group of people (via Post). Only people in your 'Flock' can see and reply to your tweets.
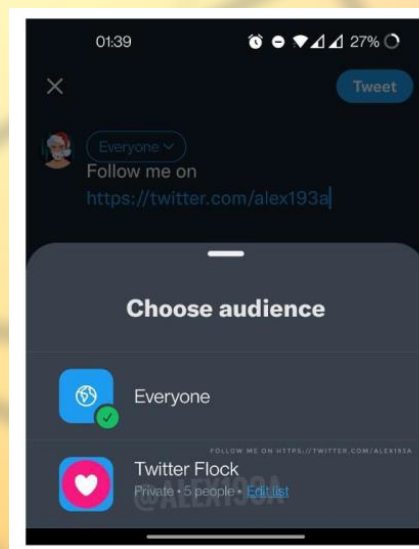
HOW TONGA'S BROKEN INTERNET CABLE WILL BE FIXED?

An undersea fibre optic cable connecting Tonga to the rest of the world was broken during a volcano eruption. The underwater eruption, followed by a tsunami, caused the 110,000 inhabitants of Tonga to be isolated.
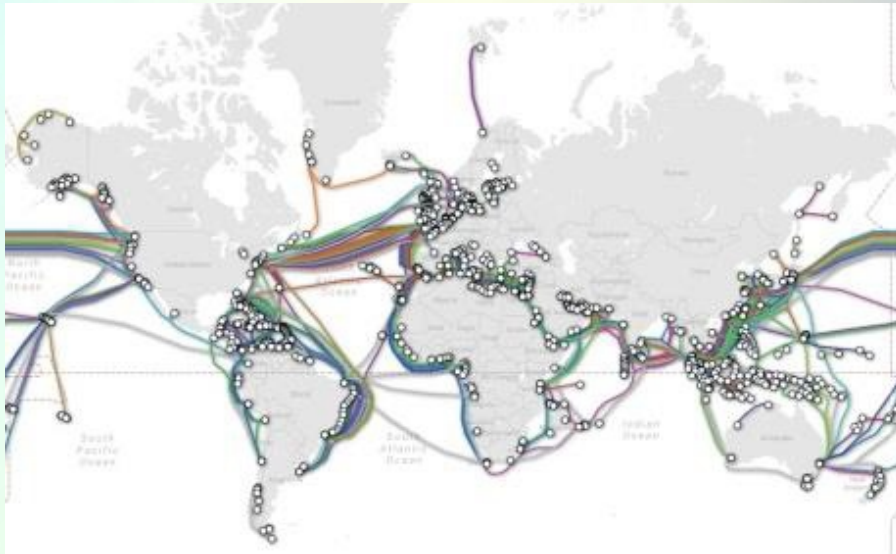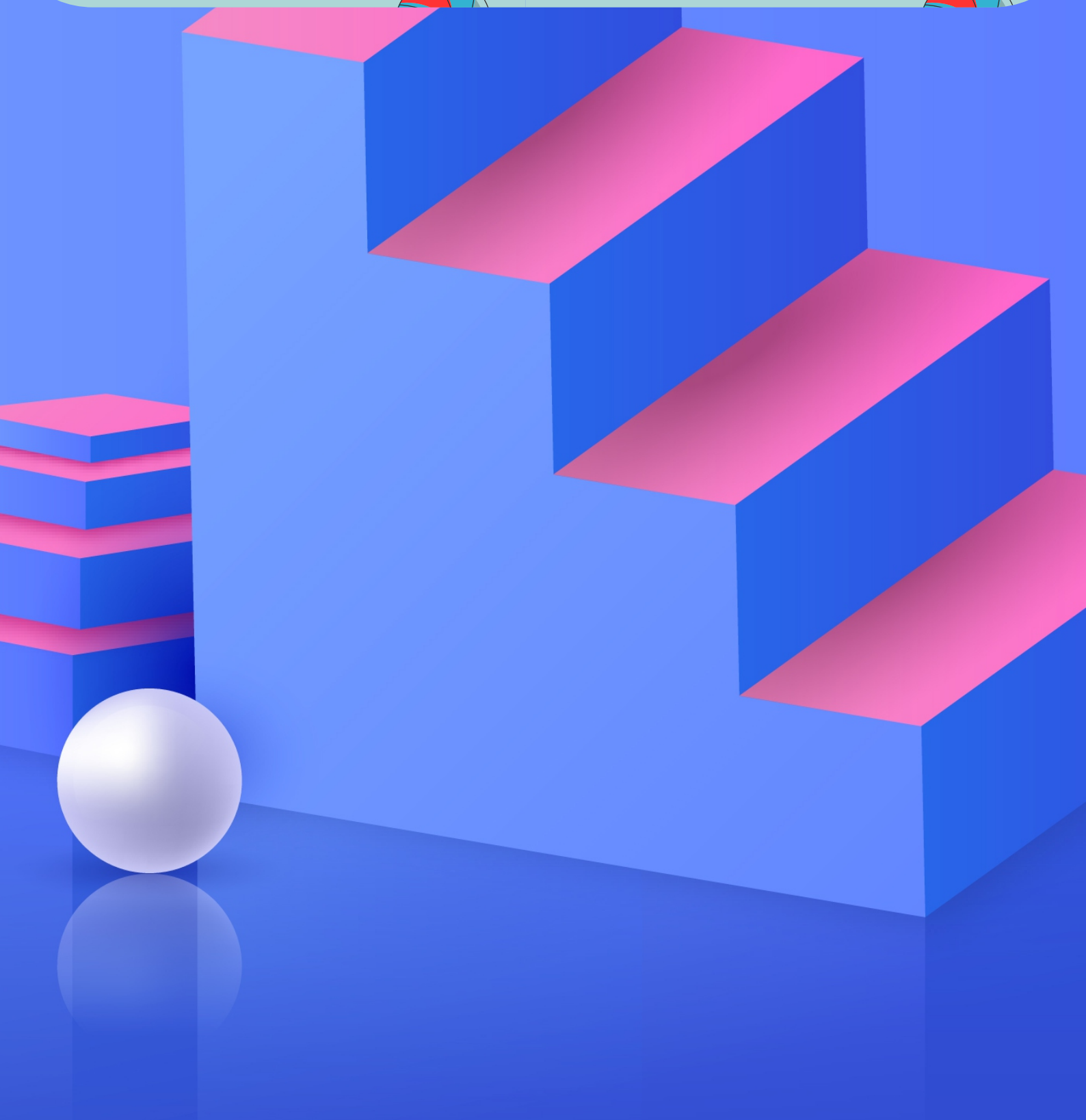

By: -

Vijay Kumar Sharma

B.Tech IT 3rd year
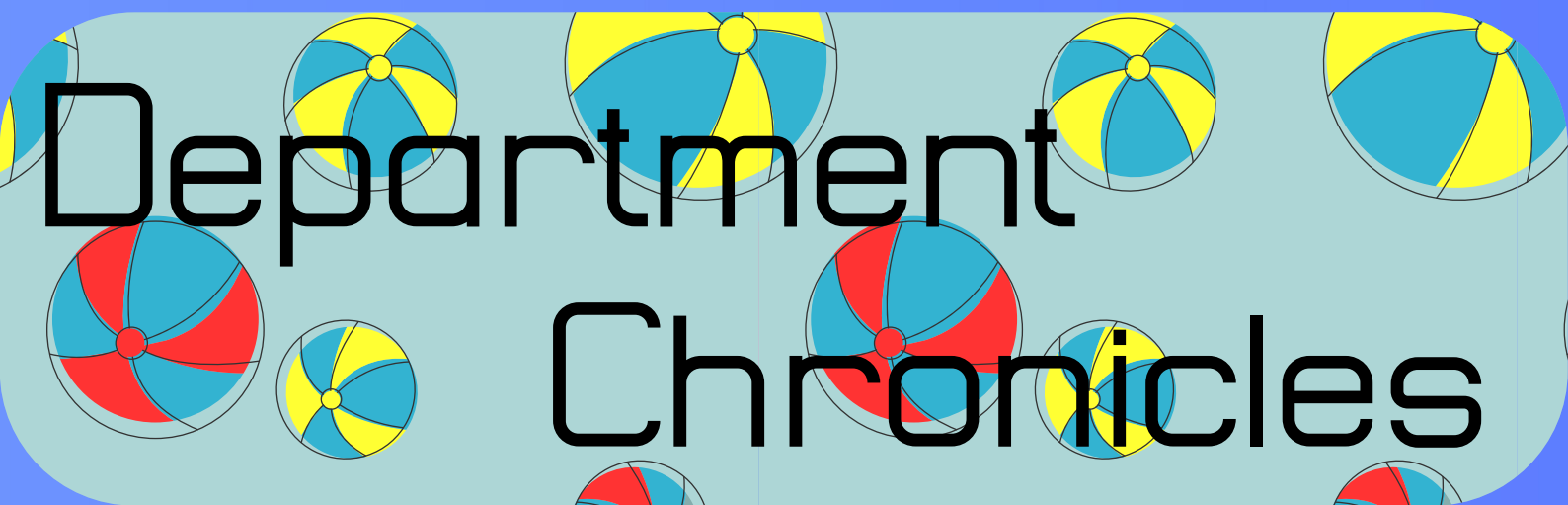
CHRONICLES OF DEPARTMENT

WORKSHOP

Department of Computer science and Engineering and Training & Placement organized a Workshop on Android on 30 December 2021. The guest speaker was Mr. Sarfraz Ahmad, Live IT Solutions, Lucknow .This session was exclusively for B.Tech students of Goel Institute of Technology and Management.

Around 93 students and Faculty members attended the session They learnt about innovative tools and technologies provided by, Live IT Solutions. The main objective of this session was that students got to know about Android, To explore the power and simplicity of Android. This Workshop was appreciated by all the students as they were able to add another programming language in their technical skill set. The Trainer Mr. Sarfraz Ahmad is the team member of organization, has given the Design and Created Android App using Kotlin Programming Language.

App Name: Random Meme Generator.
Tool Used: Android Studio, Kotlin Programming language, Volley for API calling, Server Calling.

Seminar started with the Introduction of the basics of Application Development using Android Studio. They also demonstrated how to install Android Studio for Windows and gave a tour of the Interface. Android Studio consists of a manifest file, java file, resources file and the Grade. Manifest file describes essential information about the app like

app's package name, id etc. Grade is the dependency manager and compiler builds your app. The participants were also familiarized with concepts of Activities and Life cycle of Activities.

Workshop was ended with a vote of thanks to Mr. Sarfraz Ahmad from Miss Samiksha Singh.

DATE: 30 December 2021
MODE: Offline
VENUE: Computer Lab

IMAGES & Poster

WORKSHOP

Department of Computer science and Engineering in Association with GITM Innovation Cell is organized a Webinar on "PYTHON USING FLASK FRAMEWORK for B. Tech 2nd year on 19 January , 2022

The session was conducted by
Mr. Animesh Mishra as Senior Technical Expert from TEKNAVIGATORS (Direction.Leadership.Result)
Around 98 students and Faculty members attended the session

They learnt about innovative tools and technologies provided by TEKNAVIGATORS (Direction.Leadership.Result). The main objective of this session was that students got to know about Flask framework, to explore the power and simplicity of python. All the students were able to add another programming language in their technical skill set that enhance their Industrial knowledge. The resource person Mr. Animesh Mishra, who is the team member of organization, had taken the session on practical knowledge regarding Web Framework, Web Server Gateway Interface, and tinplating engine etc, using Flask Framework and Also discuss the layout of the Python Flask Framework:

· Module Init

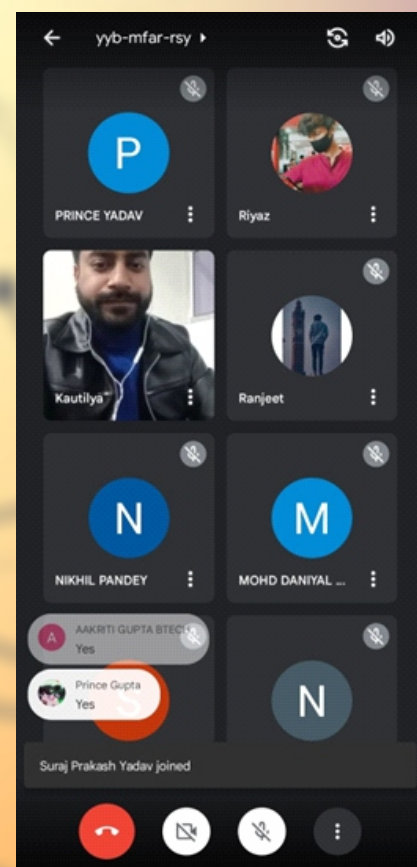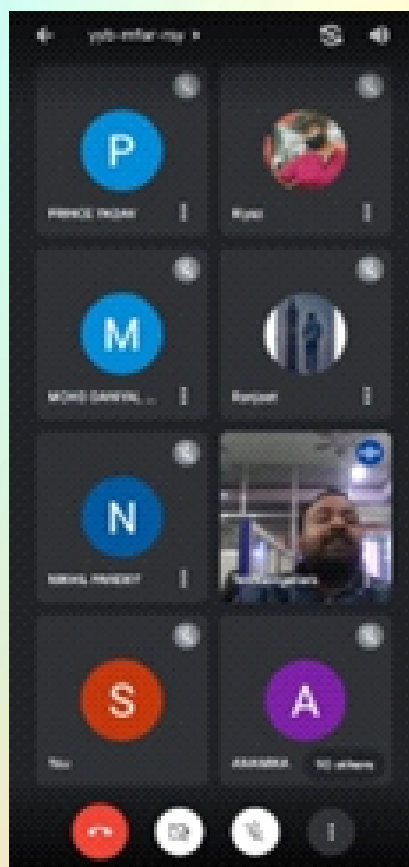· Module URL

· App root Init

· Module Templates

· Module Views

Students also got their certificates regarding this learning webinar.

DATE: 19 January , 2022
MODE: Online
VENUE: Google Meet

IMAGES & Poster

Seminar

The session was conducted by Capt. Abhay Singh Founder Director Mind Mantra Knowledge Pvt. Ltd., Sr. Consultant NIIT, Member Leadership Excellence Harvard Square, Ex Army officer and Ex Banker

Department of Computer Science & Engineering, T & P as well as innovation cell is organized an expert talk on topic "Entrepreneurship and Innovation as Career Opportunity" on 22/2/2022.

The entire session was extremely interactive session. He initially started off by defining the words entrepreneurship and gave a clear idea of the same. "Entrepreneurship is not a career" he quoted and explained in detail how an individual can launch his/her start-up. The main objective of this seminar are :-

1   Promote the importance of Entrepreneurship and innovation as career opportunity and inculcate skill set required for a young graduate,

2   To stimulate the overall architecture of the Entrepreneurship life cycle and how student can create innovative product by undertaking relevant methods.

The Program targeted to provide opportunities to Undergraduate students, Postgraduate students and Faculty members to expand their dexterities in various significant facets involved in building Career Opportunities in Entrepreneurship and Innovation. The Seminar ended with a question and answer session. Around 496 students and Faculty members attended the session.

DATE: 22 Feb, 2022
MODE: Offline
VENUE: Goelplex

IMAGES & Poster

Seminar

Goel Institute of Technology & Management, Lucknow, GITM Innovation Cell Along with Department of Computer science and Engineering and Training & Placement organized a Seminar on SAP: The next generation startup Innovation on Monday, 28 March, 2021-22. This session was exclusively for B.Tech students of Goel Institute of Technology and Management.

The session was conducted by

1. Ms. Swati Srivastava (Co-Founder Papillion Synergy Tech Pvt.Ltd)
2. Ms. Priya Singh (Co-Founder Papillion Synergy Tech Pvt.Ltd)

Seminar started with Introduction of Enterprises and areas have set up such startup support projects to prevalently Seek after essential objectives. The main objective of this session was that students got to know about to reveal insight into the advantages of corporate gas pedals according to a corporate point of view and that of the taking an interest new companies.

The benefits for new companies partaking in corporate gas pedal projects can be connected to Functional Go-to-Market speed increase concerning item improvement, deals speed increase, as well as ability and information advancement. Additionally, the new companies get benefits connected to key business advancement speed increase in the space of methodology.

The Program targeted to provide opportunities to Undergraduate students, Postgraduate students and Faculty members to expand their dexterities in various significant facets involved in building Career

Opportunities in Entrepreneurship and Innovation. This Seminar was appreciated by all the students as they were able to add another programming language in their technical skill set The Seminar ended with a question and answer session. Around 256 students and Faculty members attended the session.
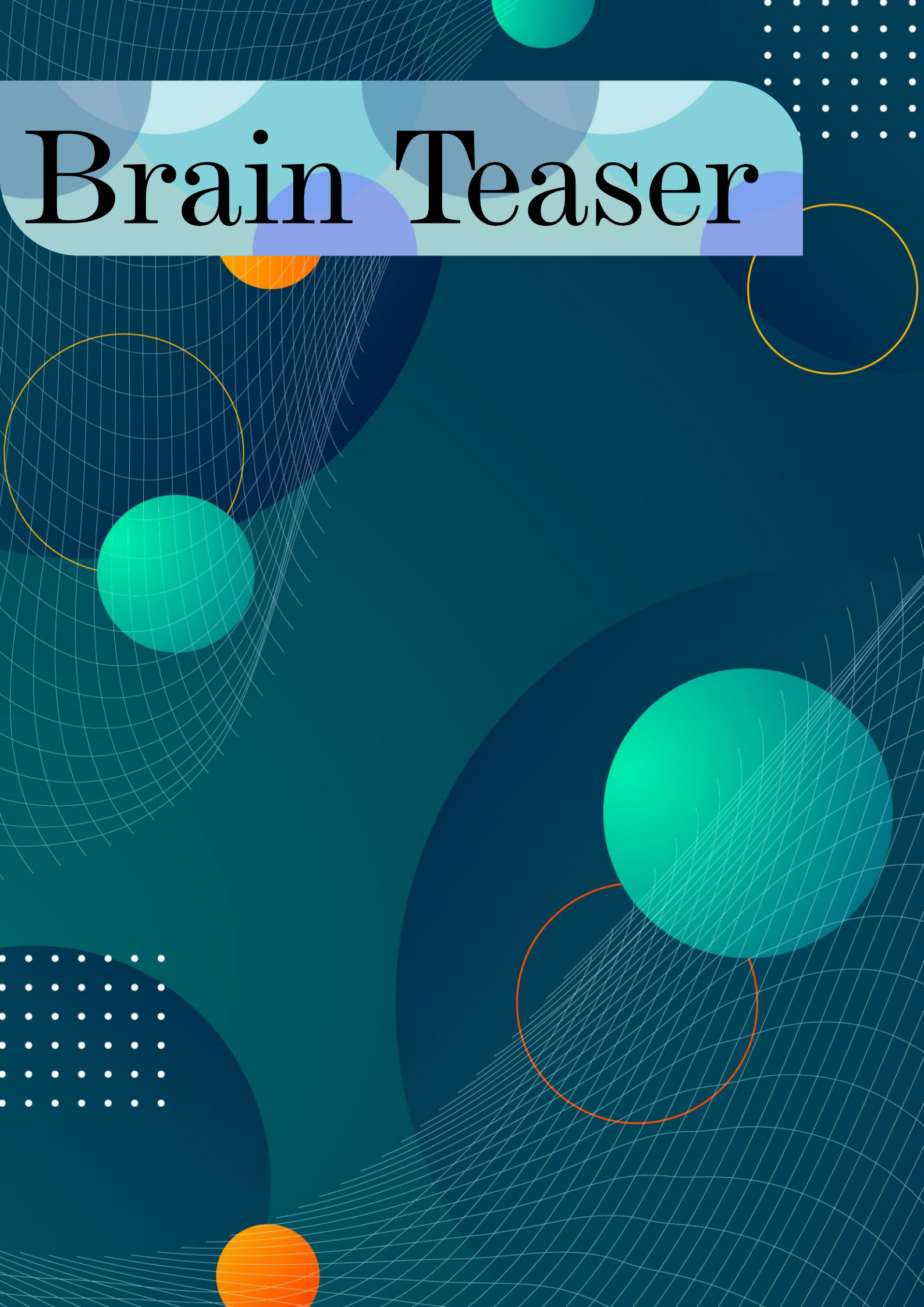
DATE: 28 March, 2021-22
MODE: Offline
VENUE: GITM Auditorium

IMAGES & Poster

Brain Teaser

QUIZ ON MACHINE LEARNING

Q1. Name the type of learning in which labeled training data is used.

Q2. Who is known as father of machine learning?

Q3. What is full form of PAC?

Q4. Instance Based Learning is also known as?

Q5. Machine Learning is a subset of ?

Q6. Which algorithm is widely used and effective machine learning algorithm based on the idea of bagging?

Q7. Data used to build a data mining model is called?

Q8. You are given sesimic data and you want to predict next earthquake , this is an example of which type of learning?

Q9. What is full form of SVM?

Q10. Perceptron Classifier is based on which type of learning algorithm?

ANSWER

ANS-10. Supervised learning algorithm

ANS-9. Support Vector Machine

ANS-8. Supervised learning

ANS-7. Training data

ANS-6. Random Forest

ANS-5. Artificial Intelligence

ANS-4. Lazy learning

ANS-3. Probably Approximate Correct

ANS-2. Geoffery Everest Hinton

ANS -1. Supervised learning

Placement

PLACEMENT
CAMPUS PLACEMENT 2021-22

Student Name	Working Status	Details	Designation
Ankush Kumar Verma	Placed	Svayam Infoware Pvt Ltd	Software Engineer
Aryan Somvanshi	Placed	Wipro	Project Engineer
Asiya Sayed	Placed	TCS / Mind Tree	Assistant Software Engineer Trainee
Atendra Verma	Placed	TCS / Svayam Infoware Pvt Ltd	Assistant Software Engineer Trainee / Software Engineer
Puneet Kumar Pandey	Placed	TCS	Assistant Software Engineer Trainee
Samarjeet Singh Gautam	Placed	Svayam Infoware Pvt Ltd	Software Engineer
Vikas Yadav	Placed	TCS	Assistant Software Engineer Trainee
Nitin Tiwari	Placed	Mentor Infotech (MIS)	Android Developer

![GITM - Goel Institute of Technology & Management logo]

THANK YOU

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