RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

NANDYAL

(ESTD-1995)

About RGMCET

Rajeev Gandhi Memorial College of Engineering and Technology was founded in the year 1995. It is located in a 32.04 acre sprawling campus on NH-40 (old NH-18) at Nandyal, Kurnool (Dist), Andhra Pradesh.

It is the dedicated commitment and efforts of our Chairman, the man with vision "Vidyarathna" Dr. M. Santhiramudu, who started the institution with a motto "EDUCATION FOR PEACE". RGMCET is a road of elegant educational journey, yet path breaking in different dimensions.

Rajeev Gandhi Memorial College of Engineering & Technology (Autonomous) is Ranked in the band of 251-300 in Engineering category as per National Institutional Ranking Framework (NIRF) - 2020, Ministry of Human Resource Development (MHRD), Govt. of India.

RGMCET Vision

- To develop this rural based engineering college into an institute of technical education with global standards.
- To become an institute of excellence which contributes to the needs of society.
- To inculcate value based education with noble goal of " Education for peace and progress".

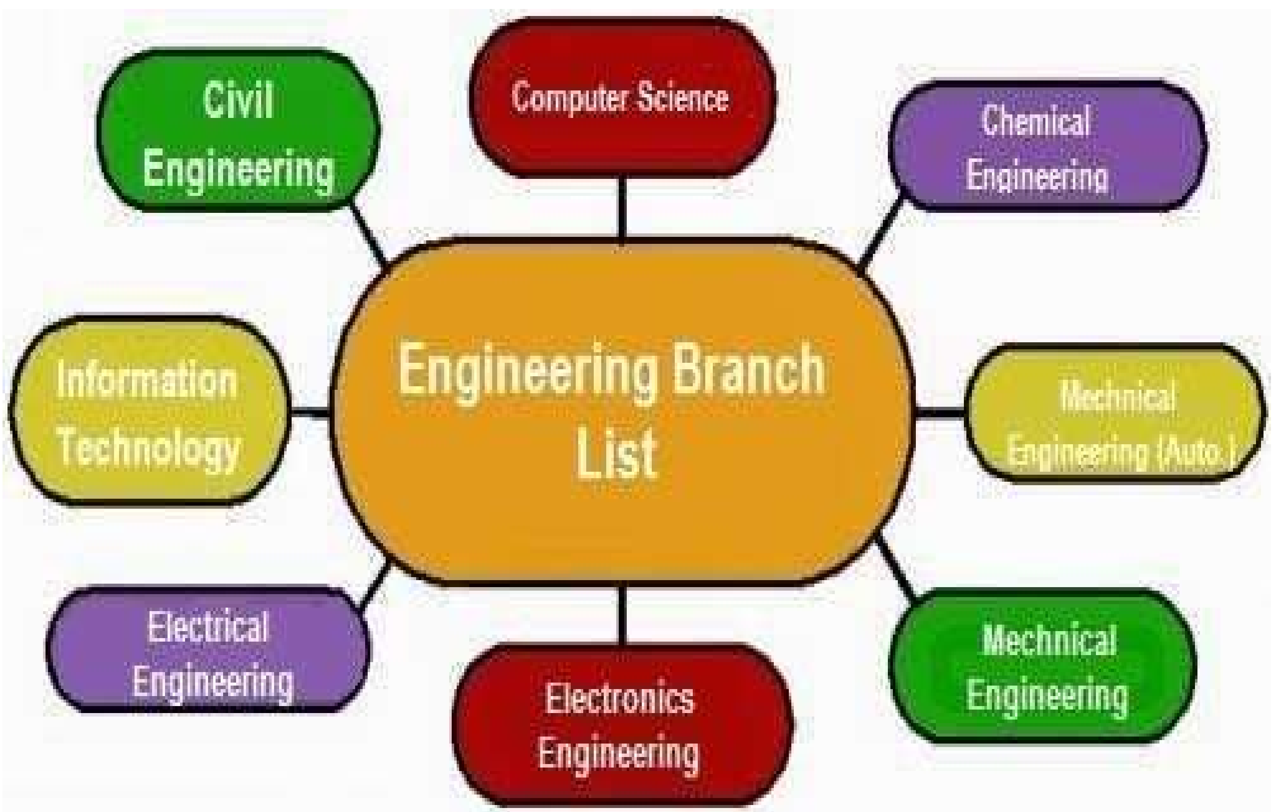
RGMCET Mission

- To build a world class undergraduate program with all required infrastructure that provides strong theoretical knowledge supplemented by the state of art skills.
- To establish postgraduate programs in basic and cutting edge technologies.
- To create conductive ambiance to induce and nurture research.
- To turn young graduates to success oriented entrepreneurs.
- To develop linkage with industries to have strong industry institute interaction.
- To offer demand driven courses to meet the needs of the industry and society.

- *To inculcate human values and ethos into the education system for an all-round development of students.*

RGMCET Quality Policy

- *To improve the teaching and learning.*
- *To evaluate the performance of students at regular intervals and take necessary steps for betterment.*
- *To establish and develop centers of excellence for research and consultancy.*
- *To prepare students to face the competition in the market globally and realize the responsibilities as true citizen to serve the nation and uplift the country's pride.*



About COMPUTER SCIENCE AND ENGINEERING

CSE Department Vision

- To empower students with cutting edge technologies in computer science and engineering.
- To train the students as entrepreneurs in computer science and engineering to address the needs of the society.
- To develop smart applications to disseminate information to rural people.

CSE Department Mission

- To become the best computer science and engineering department in the region offering undergraduate, post graduate and research programs in collaboration with industry.
- To incubate, apply and spread innovative ideas by collaborating with relevant industries and R & D labs through focused research groups.
- To provide exposure to the students in the latest tools and technologies to develop smart applications for the society.

Program Specific Outcomes (PSO's)

1. Students will have the ability to understand the principles and working of computer systems to assess the hardware and software aspects of computer systems.

2. Students will have the ability to understand the structure and development methodologies of software system, that possess professional skills and knowledge of software design process.
3. Students will have the ability to use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.

Program Educational Outcomes (PEO's):

1. To Pursue a successful career in the field of Computer Science & Engineering or a related field utilizing his/her education and contribute to the profession as an excellent employee, or as an entrepreneur.
2. To be aware of the developments in the field of Computer Science & Engineering; continuously enhance their knowledge informally or by pursuing graduate studies.
3. To Engage in research and inquiry leading to new innovations and products.
4. To be able to work effectively in multidisciplinary and multicultural environments.
5. To be responsible members and leaders of their communities, understand the human, social and environmental context of their profession and contribute positively to the needs of individuals and society at large.

Program Outcomes (PO's) - Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the

professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological chang

Incipience:

A short note for readers... We want to thank all of those who supported us in Compass Magazine. We will always be gratified to the faculty who supported us through this journey.

The essential purpose of Compass Magazine is to inform, engage, inspire and entertain a diverse readership including faculty, staff, students and other friends ofRGMCET.

Our magazine glides you through a series of queries you get during the phase of B.Tech and we tried to possibly find answers and solutions for your queries and problems.

You will get to know how the scope of Computer Science and Engineering has in present society and what are the important guidelines you need to follow in order to embellish your success in stream of your choice. So we wish you a happy experience and good luck with your future.

A Quick Glimpse:

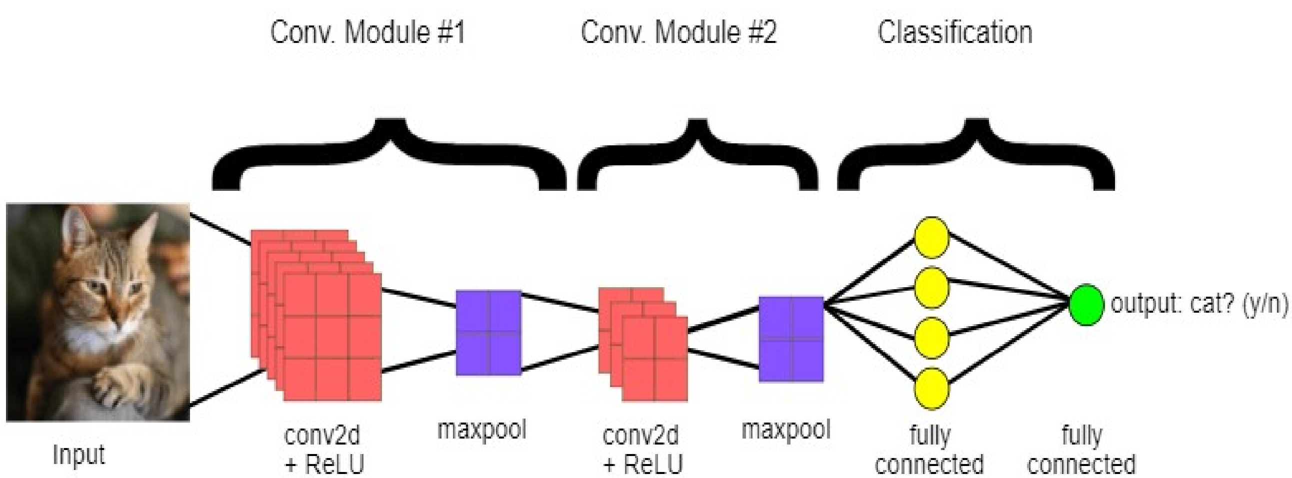
Deep Learning Algorithms

The Deep Learning Algorithms are as follows:

1. Convolutional Neural Networks (CNNs)

CNN's popularly known as **ConvNets** majorly consists of several layers and are specifically used for image processing and detection of objects. It was developed in **1998** by **Yann LeCun** and was first called **LeNet.** Back then, it was developed to recognize digits and zip code characters. CNNs have wide usage in identifying the image of the satellites, medical image processing, series forecasting, and anomaly detection.

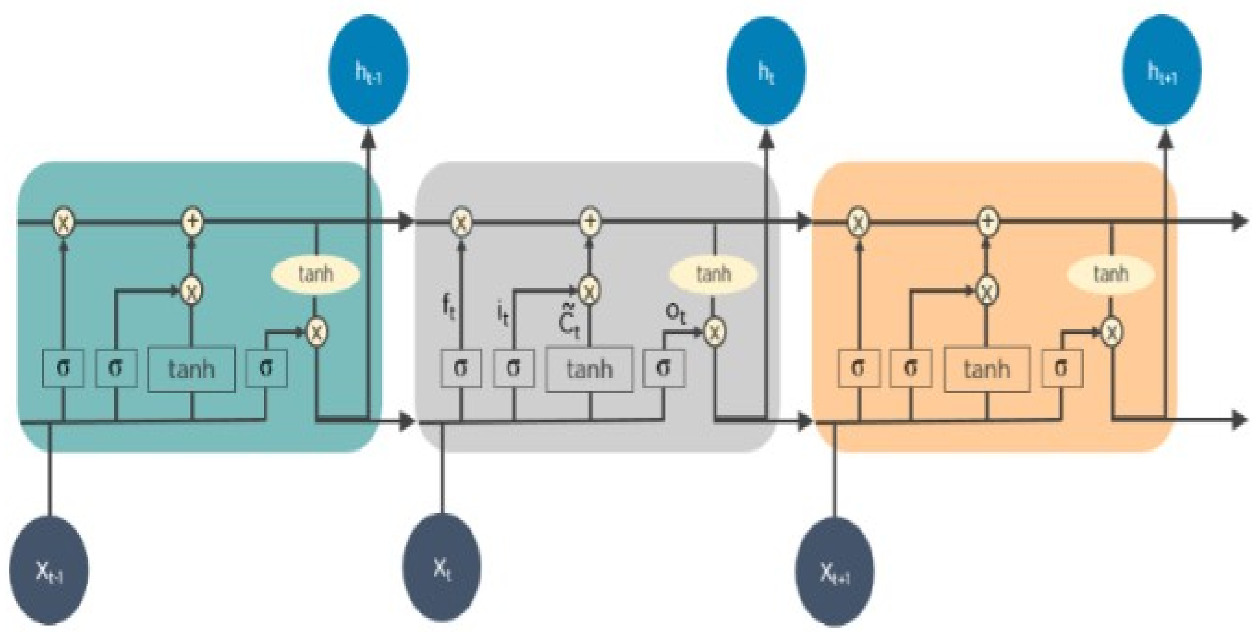
CNNs process the data by passing it through multiple layers and extracting features to exhibit convolutional operations. The **Convolutional Layer** consists of **Rectified Linear Unit** (ReLU) that outlasts to rectify the feature map. **The Pooling layer** is used to rectify these feature maps into the next feed. Pooling is generally a sampling algorithm that is down-sampled and it reduces the dimensions of the feature map. Later, the result generated consists of **2-D arrays** consisting of **single, long, continuous,** and **linear vector** flattened in the map. The next layer i.e., called **Fully Connected Layer** which forms the flattened **matrix** or **2-D** array fetched from the Pooling Layer as input and identifies the image by classifying it.



2. Long Short Term Memory Networks (LSTMs)

LSTMs can be defined as **Recurrent Neural Networks** (RNN) that are programmed to learn and adapt for dependencies for the long term. It can memorize and recall past data for a greater period and by default, it is its sole behavior. LSTMs are designed to retain over time and henceforth they are majorly used in time series predictions because they can restrain memory or previous inputs. This analogy comes from their **chain-like** structure consisting of **four** interacting layers that communicate with each other differently. Besides applications of time series prediction, they can be used to construct **speech recognizers, development in pharmaceuticals,** and composition of **music loops** as well.

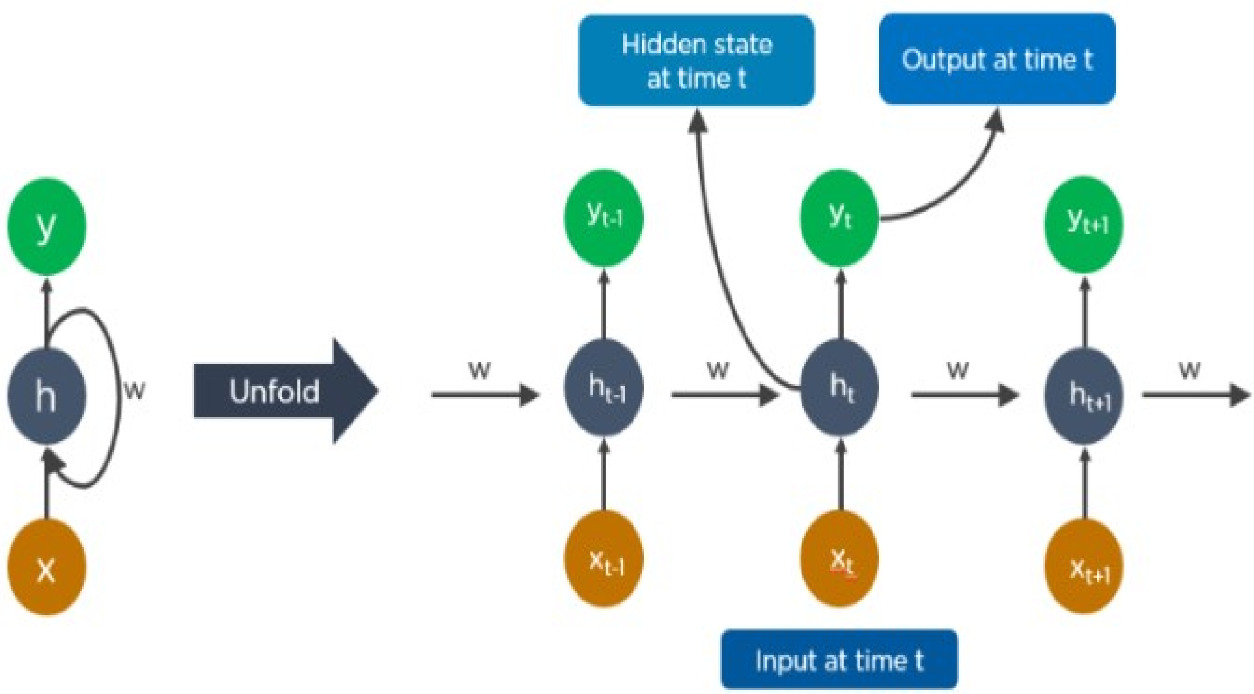
LSTM work in a sequence of events. First, they don't tend to remember irrelevant details attained in the previous state. Next, they update certain cell-state values selectively and finally generate certain parts of the cell-state as output. Below is the diagram of their operation.



3. Recurrent Neural Networks (RNNs)

Recurrent Neural Networks or RNNs consist of some directed connections that form a cycle that allow the input provided from the LSTMs to be used as input in the current phase of RNNs. These inputs are deeply embedded as inputs and enforce the memorization ability of LSTMs lets these inputs get absorbed for a period in the internal memory. RNNs are therefore dependent on the inputs that are preserved by LSTMs and work under the synchronization phenomenon of LSTMs. RNNs are mostly used in captioning the image, time series analysis, recognizing handwritten data, and translating data to machines.

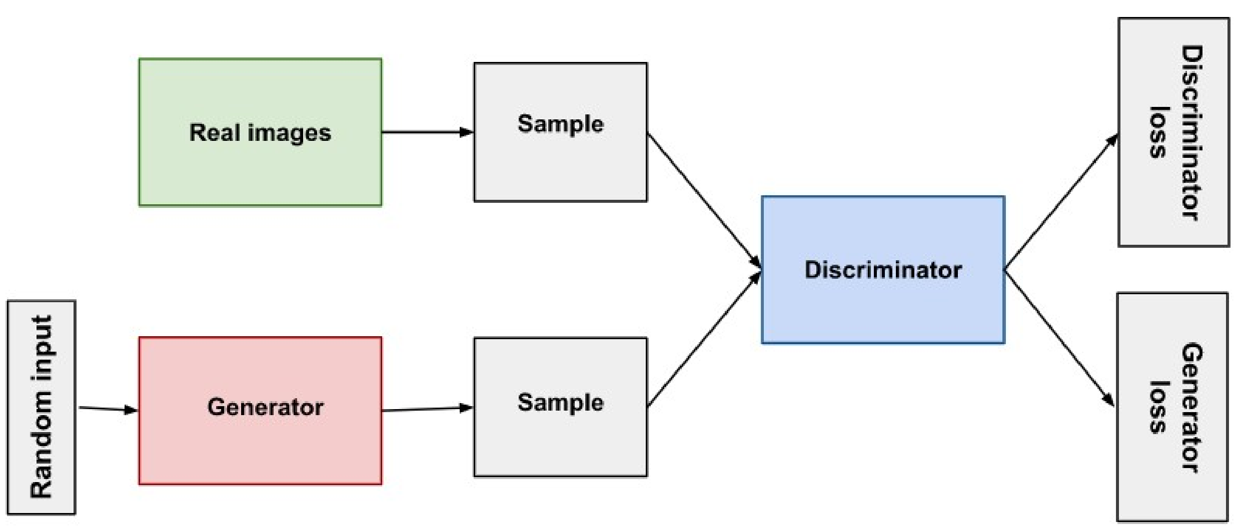
RNNs follow the work approach by putting output feeds **(t-1)** time if the time is defined as **t.** Next, the output determined by t is feed at input time **t+1.** Similarly, these processes are repeated for all the input consisting of any length. There's also a fact about RNNs is that they store historical information and there's no increase in the input size even if the model size is increased. RNNs look something like this when unfolded.



4. Generative Adversarial Networks (GANs)

GANs are defined as deep learning algorithms that are used to generate new instances of data that match the training data. GAN usually consists of two components namely a **generator** that learns to generate false data and a **discriminator** that adapts itself by learning from this false data. Over some time, GANs have gained immense usage since they are frequently being used to clarify **astronomical images** and simulate **lensing** the gravitational dark matter. It is also used in **video games** to increase graphics for **2D** textures by recreating them in higher resolution like **4K**. They are also used in creating **realistic cartoons character** and also rendering human faces and **3D object rendering.**

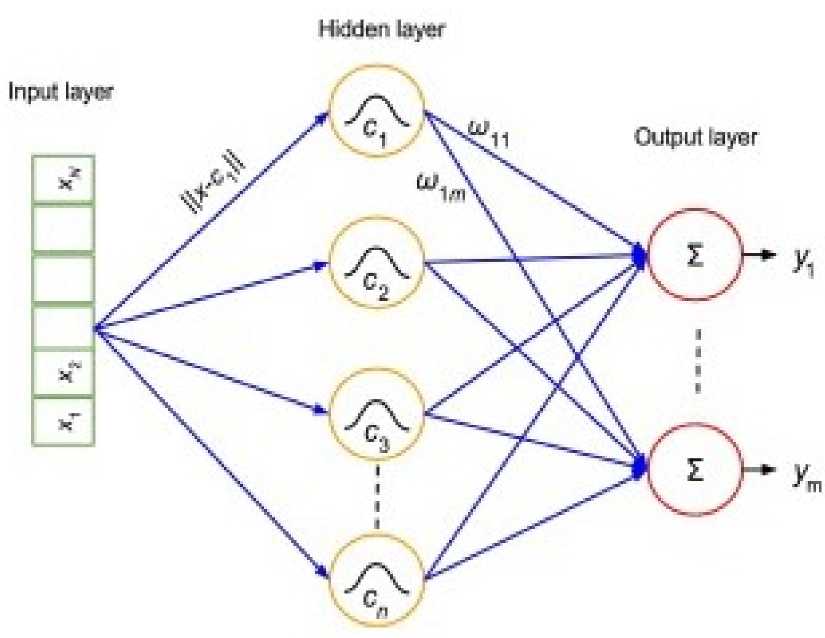
GANs work in simulation by generating and understanding the fake data and the real data. During the training to understand these data, the generator produces different kinds of fake data where the discriminator quickly learns to adapt and respond to it as false data. GANs then send these recognized results for updating. Consider the below image to visualize the functioning.



5. Radial Basis Function Networks (RBFNs)

RBFNs are specific types of neural networks that follow a feed-forward approach and make use of radial functions as activation functions. They consist of **three** layers namely the **input layer, hidden layer,** and **output layer** which are mostly used for **time-series prediction, regression testing,** and **classification.**

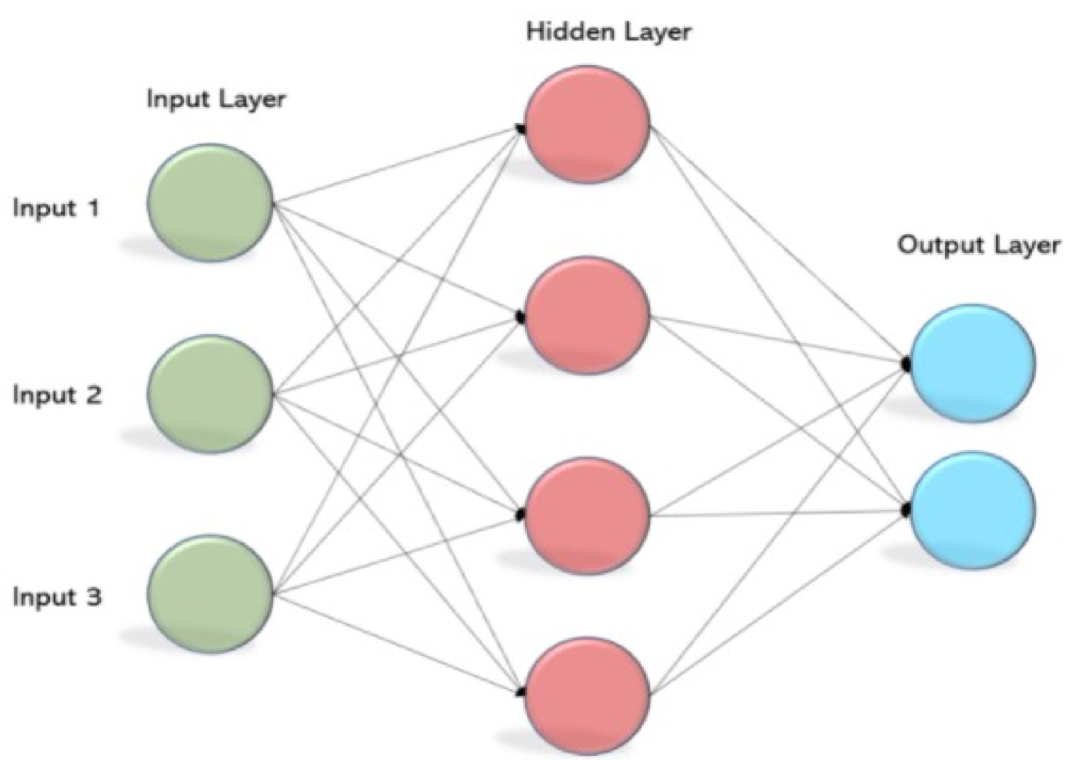
RBFNs do these tasks by measuring the similarities present in the training data set. They usually have an input vector that feeds these data into the input layer thereby confirming the identification and rolling out results by comparing previous data sets. Precisely, the input layer has **neurons** that are sensitive to these data and the nodes in the layer are efficient in classifying the class of data. Neurons are originally present in the hidden layer though they work in close integration with the input layer. The hidden layer contains **Gaussian transfer** functions that are inversely proportional to the distance of the output from the neuron's center. The output layer has linear combinations of the **radial-based** data where the Gaussian functions are passed in the neuron as parameter and output is generated. Consider the given image below to understand the process thoroughly.



6. Multilayer Perceptrons (MLPs)

MLPs are the base of deep learning technology. It belongs to a class of feed-forward neural networks having various layers of **perceptrons.** These perceptrons have various activation functions in them. MLPs also have connected input and output layers and their number is the same. Also, there's a layer that remains hidden amidst these two layers. MLPs are mostly used to build **image and speech recognition** systems or some other types of the **translation software.**

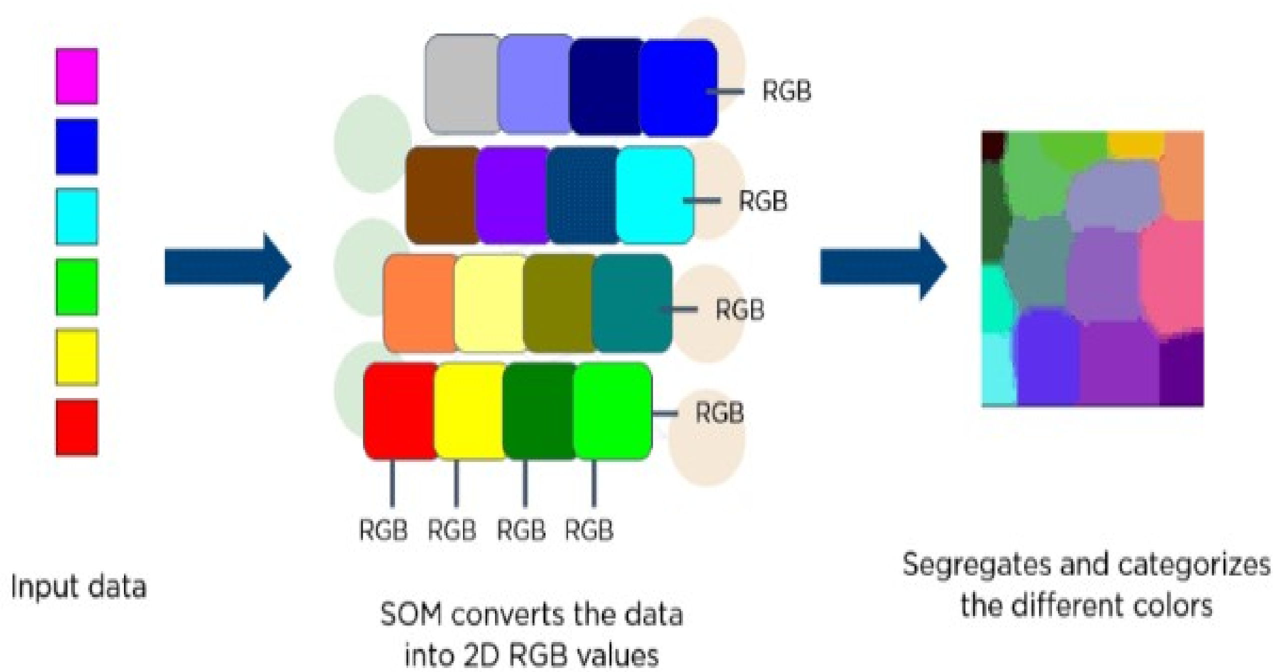
The working of MLPs starts by feeding the data in the input layer. The neurons present in the layer form a graph to establish a connection that passes in one direction. The weight of this input data is found to exist between the hidden layer and the input layer. MLPs use activation functions to determine which nodes are ready to fire. These activation functions include **tanh** function, **sigmoid** and **ReLUs.** MLPs are mainly used to train the models to understand what kind of co-relation the layers are serving to achieve the desired output from the given data set. See the below image



7. Self Organizing Maps (SOMs)

SOMs were invented by **Teuvo Kohenen** for achieving data visualization to understand the dimensions of data through artificial and self-organizing neural networks. The attempts to achieve data visualization to solve problems are mainly done by what humans cannot visualize. These data are generally high-dimensional so there are lesser chances of human involvement and of course less error.

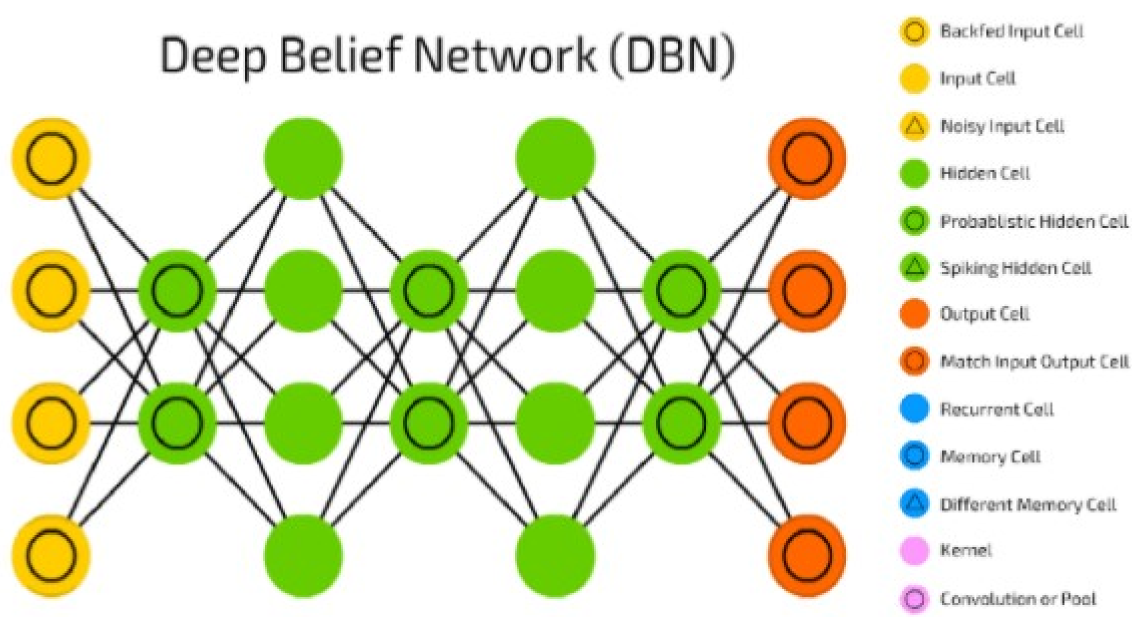
SOMs help in visualizing the data by initializing weights of different nodes and then choose random vectors from the given training data. They examine each node to find the relative weights so that dependencies can be understood. The winning node is decided and that is called **Best Matching Unit** (BMU). Later, SOMs discover these winning nodes but the nodes reduce over time from the sample vector. So, the closer the node to BMU more is the more chance to recognize the weight and carry out further activities. There are also multiple iterations done to ensure that no node closer to BMU is missed. One example of such is the **RGB color combinations** that we use in our daily tasks. Consider the below image to understand how they function.



8. Deep Belief Networks (DBNs)

DBNs are called generative models because they have various layers of latent as well as stochastic variables. The latent variable is called a **hidden unit** because they have binary values. DBNs are also called **Boltzmann Machines** because the **RGM** layers are stacked over each other to establish communication with previous and consecutive layers. DBNs are used in applications like video and image recognition as well as capturing motional objects.

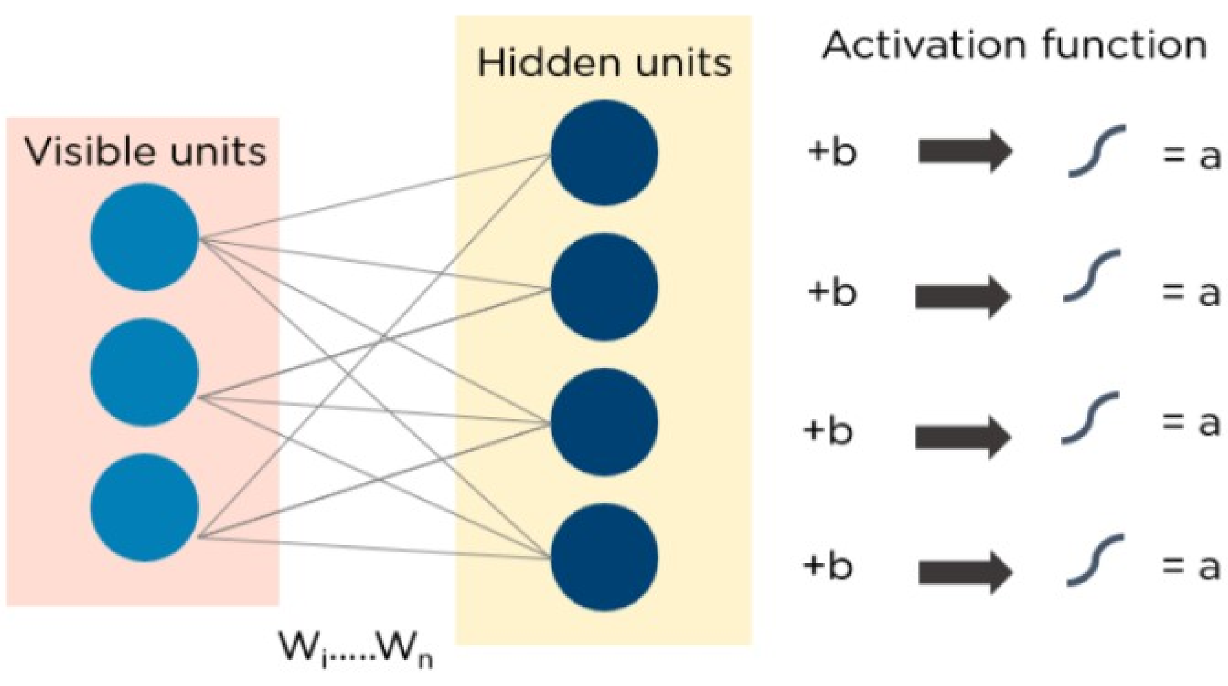
DBNs are powered by **Greedy algorithms.** The layer to layer approach by leaning through a **top-down** approach to generate weights is the most common way DBNs function. DBNs use step by step approach of **Gibbs** sampling on the hidden **two-layer** at the top. Then, these stages draw a sample from the visible units using a model that follows the ancestral sampling method. DBNs learn from the values present in the latent value from every layer following the **bottom-up** pass approach.



9. Restricted Boltzmann Machines (RBMs)

RBMs were developed by **Geoffrey Hinton** and resemble stochastic neural networks that learn from the probability distribution in the given input set. This algorithm is mainly used in the field of dimension **reduction, regression** and **classification, topic modeling** and are considered the building blocks of DBNs. RBIs consist of two layers namely the **visible layer** and the **hidden layer**. Both of these layers are connected through hidden units and have bias units connected to nodes that generate the output. Usually, RBMs have two phases namely **forward pass** and **backward pass**.

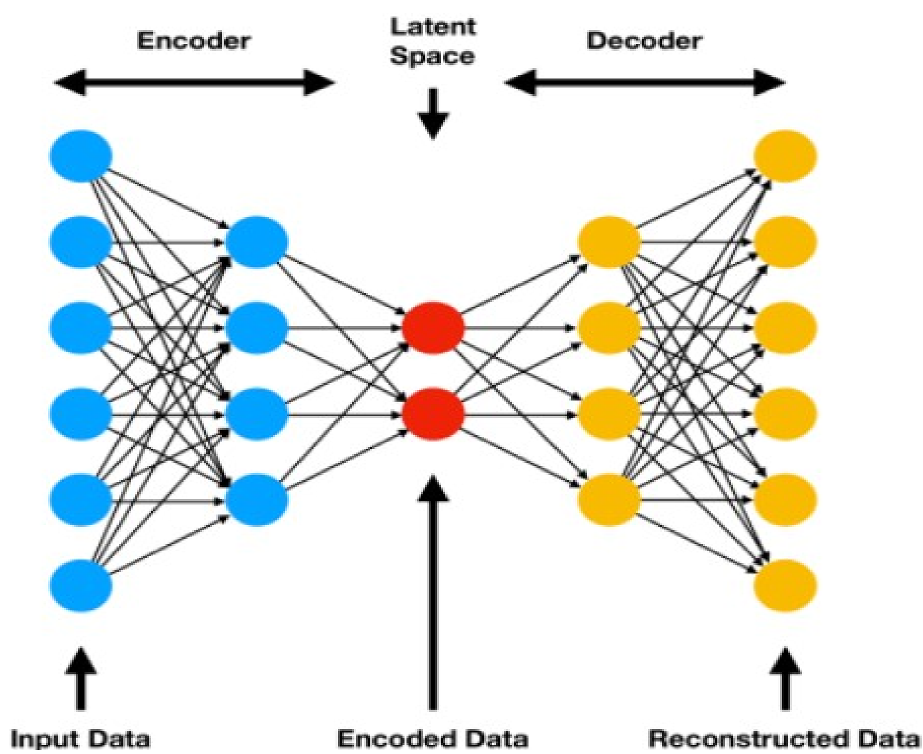
The functioning of RBMs is carried out by accepting inputs and translating them to numbers so that inputs are encoded in the forward pass. RBMs take into account the weight of every input, and the backward pass takes these input weights and translates them further into reconstructed inputs. Later, both of these translated inputs, along with individual weights, are combined. These inputs are then pushed to the visible layer where the activation is carried out, and output is generated that can be easily reconstructed. To understand this process, consider the below image.



Autoencoders

Autoencoders are a special type of neural network where inputs are outputs are found usually identical. It was designed to primarily solve the problems related to unsupervised learning. Autoencoders are highly trained neural networks that **replicate** the data. It is the reason why the input and output are generally the same. They are used to achieve tasks like **pharma discovery, image processing,** and **population prediction.**

Autoencoders constitute three components namely the **encoder**, the **code**, and the **decoder.** Autoencoders are built in such a structure that they can receive inputs and transform them into various representations. The attempts to copy the original input by reconstructing them is more accurate. They do this by encoding the image or input, reduce the size. If the image is not visible properly they are passed to the neural network for clarification. Then, the clarified image is termed a reconstructed image and this resembles as accurate as of the previous image. To understand this complex process, see the below-provided image.



Building a Hybrid Deep Learning Model

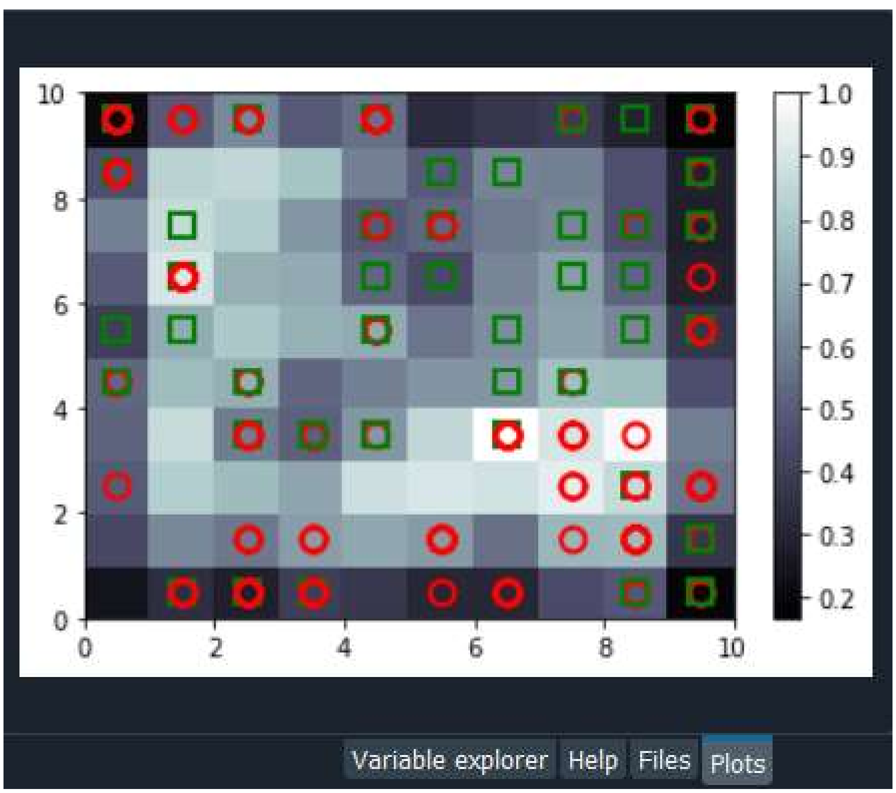
We will start with Part1 that includes making an unsupervised deep learning branch of the hybrid deep learning model, i.e., the **self-organizing map**, which we will use to identify the frauds exactly as we did earlier.

So, we will run the following code to get our self-organizing map that will contain the outlying neurons.

```
# Part 1 - Identify the Frauds with the Self-Organizing Map
# Importing the libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

# Importing the dataset

dataset = pd. read_csv('Credit_Card_Applications.csv')
X = dataset. iloc[:, :-1].values
y = dataset. iloc[:, -1].values

# Feature Scaling

from sklearn. preprocessing import MinMaxScaler
sc = MinMaxScaler (feature_range = (0,1))
X = sc.fit_transform(X)

#Training the SOM

from minisom import MiniSom
som = MiniSom (x=10, y=10, input_len= 15, sigma= 1.0, learning_rate = 0.5)
som. random_weights_init(X)
som. train_random(data = X, num_iteration = 100)
 #Statement
#Visualizing the results
```

```
from pylab import bone, pcolor, colorbar, plot, show
bone ()
pcolor (som. distance_map (). T)
colorbar()
markers = ['o', 's']
colors = ['r', 'g']
for i, x in enumerate(X):
    w = som. winner(x)
    plot (w [0] + 0.5,
          w [1] + 0.5,
          markers[y[i]],
          markeredgecolor = colors[y[i]],
          markerfacecolor = 'None',
          markersize = 10,
          markeredgewidth = 2)
show()
```

Output:

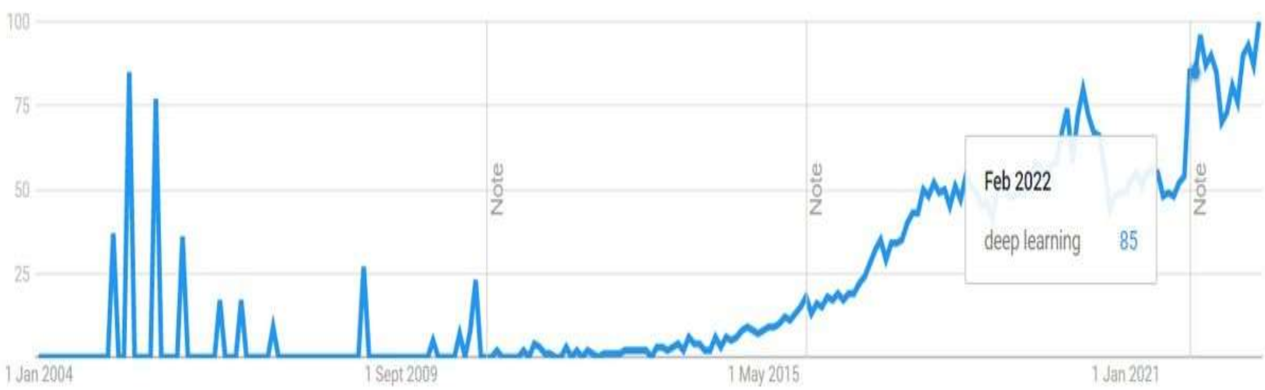


From the above image, we can see that we got an outline neuron because it is characterized by a large MID, i.e., the Mean Interneuron Distance and besides that, it contains both the categories of customers; customers that got their application approved and the customers that didn't get their application approved.

How popular is deep learning?

In this section, we will look at the popularity of deep learning among the public, research, and developer community.

The popularity of deep learning has boomed in the last five years. It’s used for many AI-related tasks like object recognition, text processing, image processing, etc. The figure below illustrates the trend of deep learning searched by people on Google.



The major reasons for its popularity are the highly accurate results produced by deep learning models, the ability to make predictions on unstructured datasets, and provide useful insights about the same. According to reports by AI Index, there’s been a significant increase (almost six times) in the number of citations among the research community.

Understanding the future of deep learning opportunities

A McKinsey survey showed that while AI adoption has been adding value to organizations, the use of deep learning in business is still at an early stage. However, the advancements of this approach to AI are very promising. It is already transforming several industries, including healthcare, finance, and automotive.

Companies have massive amounts of data, known as big data, that need to be analyzed and understood. Deep learning is capable of handling it and analyzing it very accurately. Classic machine learning algorithms like Naïve Bayes, decision trees, and support vector machines can't directly be applied to raw data. Typically, a preprocessing step called feature extraction is necessary to convert the data into a format that algorithms can understand so as to classify it. The process is complex and time-consuming.

In contrast, deep learning eliminates the need for manual feature extraction, with neural networks capable of drawing features out of raw data automatically. Multiple processing layers produce increasingly complex representations of data, culminating in the best possible input data.

Transfer learning

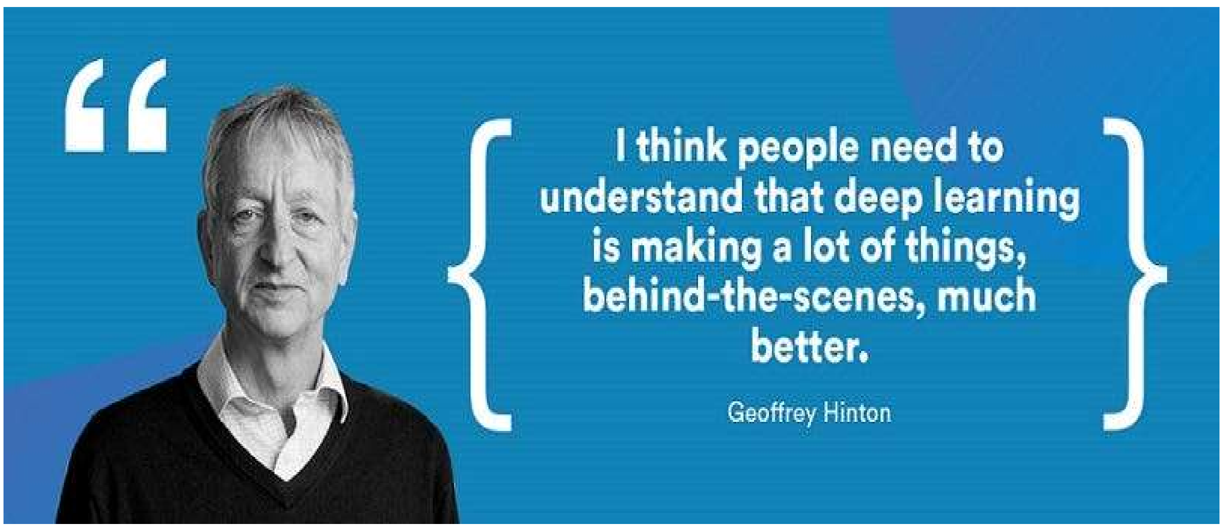
Deep learning enables transfer learning, a technique where a pre-trained neural network can be reused for a new but related problem. The input and middle layers of the pre-trained model, which detect generic features, are transferred to another network. Only the later layers need to be retrained to recognize more specific features.

Several public and third-party models and toolkits are available for fine-tuning for different use cases.

These advantages of deep learning techniques make them useful and increase the scope of being used for implementing new models for new use cases. In the future of deep learning, there will be more advancements in terms of algorithms. For instance, FAIR has developed state-of-the-art deep learning models like Detectron2 for object detection problems which outperform many other previously released algorithms like VGG16 and ResNet models.

Conclusion

Deep learning continues to gain popularity owing to its highly accurate results, ability to make predictions on unstructured datasets, and provide useful insights about the datasets. While often confused with machine learning and artificial intelligence, it is specifically based on artificial neural networks. And although its use in business is still at a nascent stage, it holds much promise as it is already transforming several industries. It’s likely that deep learning will continue to evolve and have a significant impact on our society in the future.



Internet of Things (IOT)

IoT devices are becoming increasingly used across various industries. A large part of this expansion derives from the increasing bandwidths we are seeing with 5G. Running parallel to that expansion is the need for increased cybersecurity, particularly with respect to IoT. The open interconnectivity capabilities of IoT have made it a prime candidate for cyberattacks in the past. Providers will refocus their efforts to help ensure IoT is becoming more secure.

What is Internet of Things?

The Internet of Things, or IoT, is a network of physical devices. These devices can transfer data to one another without human intervention. IoT devices are not limited to computers or machinery. The Internet of Things can include anything with a sensor that is assigned a unique identifier (UID). The primary goal of the IoT is to create self-reporting devices that can communicate with each other (and users) in real time.

Types of IOT Applications:

Billions of devices are connected to the internet, collecting and sharing information with one another. They range from smart home setups like cooking appliances and smoke detectors to military-grade surveillance equipment. The list below outlines a few of the most common types of IoT applications.

1. Consumer IoT

Consumer IoT refers to personal and wearable devices that connect to the internet. These devices are often referred to as smart devices.

2. Industrial Internet of Things (IIOT)

The industrial Internet of Things is the system of interconnected devices in the industrial sector. Manufacturing machinery and devices used for energy management are a part of the industrial Internet of Things.

3. Commercial IoT

Commercial IoT refers to the tools and systems used outside of the home. For example, businesses and health care organizations leverage commercial IoT for auditable data trails and consumer management.

Benefits of the Internet of Things

Before the introduction of the IoT, devices could only collect and share information with human interaction. Today, the IoT enables lower operational costs, increased safety and productivity, and overall improved customer experience. Here are a few notable pros of the Internet of Things:

Automation. Removing the need to perform mundane tasks like turning the thermostat on and off or locking doors increases efficiency and quality of life.

Conservation. Automation makes it easier to manage energy consumption and water usage without human oversight or error.

Big data analytics. Information that was previously difficult to collect and analyze can be tracked effortlessly with the Internet of Things.

The Internet of Things in health care

The IoT helps decrease the need for traditional record-keeping and protects patients with real-time alerts. For example, glucose monitors can alert the patient or caretaker when glucose levels become problematic and prompt the appropriate action.

The Internet of Things in business

The IoT is essential to business. It makes it possible to collect and analyze massive amounts of data in real time. IoT devices also enable automation. They allow people to gain more control over their environments, health, and even safety. For example, smart home security systems can automatically assess threats like burglary or carbon monoxide poisoning and call for help.

Components of Internet of Things:

Internet of Things platform

An IoT platform manages device connectivity. It can be a software suite or a cloud service. The purpose of an IoT platform is to manage and monitor hardware, software, processing abilities, and application layers.

Sensor technologies

IoT sensors, sometimes called smart sensors, convert real-world variables into data that devices can interpret and share. Many different types of sensors exist. For example, temperature sensors detect heat and convert temperature changes into data. Motion sensors detect movement by monitoring ultrasonic waves and triggering a desired action when those waves are interrupted.

Internet connectivity

Sensors can connect to cloud platforms and other devices through a host of network protocols for the internet. This enables communication between devices.

Artificial intelligence (AI) and machine learning

Natural language processing (NLP) in IoT devices makes it easier for users to input information and interact with devices. One common example of an IoT device that utilizes NLP technology is the Amazon Alexa. Machine learning also enhances the analytical capabilities of IoT devices.

Edge computing

Edge computing is a computing framework. It aims to conserve resources and speed up response time by moving computational resources like data storage closer to the data source. The IoT accomplishes this by utilizing edge devices like IoT gateways.

Potential drawbacks of IoT

Managing large amounts of data poses certain risks and disadvantages. For example, more IoT devices mean more human intervention through network and device monitoring. Some security researchers believe that cybersecurity professionals may face an increased workload as the IoT grows. Here are a few more potential drawbacks of the Internet of Things:

Privacy concerns: It can be challenging to protect the data mined by IoT devices. Increased tracking threatens the confidentiality of the information we share over the internet.

Security issues: Individual device security is left up to the manufacturers. Wireless network security could become compromised if manufacturers do not prioritize security measures.

Bandwidth: Too many connected devices on a shared network results in slow internet speeds.

Acres of Diamond

Hafiz was a farmer in Africa who was happy and content. He was happy because he was content. He was content because he was happy. One day a wise man came and told him about the glory of diamonds and the power that goes along with them. The wise man said, “If you had a diamond the size of your thumb, you could buy your own city. If you had a diamond the size of your fist, you could probably buy your own country.” And then the wise man left. That night, Hafiz couldn’t sleep. He was unhappy and he was discontented. He was unhappy because he was discontented and discontented because he was unhappy.

The next morning Hafiz made arrangements to sell his farm, took care of his family and went off in search of diamonds. He looked all over Africa and couldn’t find any. He looked all through Europe and couldn’t find any. By the time he got to Spain, he was emotionally, physically and financially broke. He was so disheartened that he threw himself into the Barcelona river and committed suicide. Back home, the person who had bought his farm was watering the camels at the stream that ran through the farm. Across the stream, the rays of the morning sun hit a stone and made it sparkle like a rainbow. He thought the stone would look good in his living room. He picked up the stone and put it on his mantle piece. That afternoon, the wise man came and saw the stone sparkling. He asked, “Is Hafiz back?” The new owner said, “No, why do you ask?” The wise man said, “Because that is a diamond. I recognise one when I see one.” The man said, “No, that’s just a stone I picked up from the stream. Come I’ll show you. There are many more.” They went and picked some samples and sent them for analysis. Sure enough, the stones were diamonds. They found that the farm was indeed covered with acres and acres of diamonds.

Moral:

1) When our attitude is right, we realise that we are all walking on acres of diamonds. Opportunities are always under our feet. We don’t have to go anywhere.

2) People, who don’t know how to recognise opportunities, complain of noise when they knock.

Artificial Intelligence

Artificial Intelligence is concerned with the design of intelligence in an artificial device. The term was coined by John McCarthy in 1956. AI is the study of the mental faculties through the use of computational models AI is the study of intellectual/mental processes as computational processes. AI program will demonstrate a high level of intelligence to a degree that equals or exceeds the intelligence required of a human in performing some task. AI is unique, sharing borders with Mathematics, Computer Science, Philosophy, Psychology, Biology, Cognitive Science and many others Although there is no clear definition of AI or even Intelligence, it can be described as an attempt to build machines that like humans can think and act, able to learn and use knowledge to solve problems on their own.

What is AI?

Acting humanly: The Turing Test approach The Turing Test, proposed by Alan Turing TURING TEST (1950), was designed to provide a satisfactory operational definition of intelligence. A computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses come from a person or from a computer. The computer would need to possess the following capabilities:

natural language processing to enable it to communicate successfully in English; knowledge representation to store what it knows or hears; automated reasoning to use the stored information to answer questions and to draw new conclusions; machine learning to adapt to new circumstances and to detect and extrapolate patterns. computer vision to perceive objects, and robotics to manipulate objects and move about

Thinking humanly: The cognitive modeling approach If we are going to say that a given program thinks like a human, we must have some way of determining how humans think. We need to get inside the actual workings of human minds.

Thinking rationally: The “laws of thought” approach The Greek philosopher Aristotle was one of the first to attempt to codify “right thinking,” that is, irrefutable reasoning processes. His syllogisms provided patterns for argument structures that always yielded correct conclusions when given correct premises—for example, “Socrates is a man; all men are mortal; therefore, Socrates is mortal.” These laws of thought were LOGIC supposed to govern the operation of the mind; their study initiated the field called logic.

Acting rationally: The rational agent approach An agent is just something that acts (agent comes from the Latin agere, to do). Of course, all computer programs do something, but computer agents are expected to do more: operate autonomously, perceive their environment, persist over a prolonged time period, adapt to change, and create and pursue goals. A rational agent is one that acts so as to achieve the best outcome or, when there is uncertainty, the best expected outcome.

History of AI:

Important research that laid the groundwork for AI:

In 1931, Goedel layed the foundation of Theoretical Computer Science1920-30s: He published the first universal formal language and showed that math itself is either flawed or allows for unprovable but true statements. In 1936, Turing reformulated Goedel's result and church's extension thereof. In 1956, John McCarthy coined the term "Artificial Intelligence" as the topic of the Dartmouth Conference, the first conference devoted to the subject. In 1957, The General Problem Solver (GPS) demonstrated by Newell, Shaw & Simon In 1958, John McCarthy (MIT) invented the Lisp language. In 1959, Arthur Samuel (IBM) wrote the first game-playing program, for checkers, to achieve sufficient skill to challenge a world champion. In 1963, Ivan Sutherland's MIT dissertation on Sketchpad introduced the idea of interactive graphics into computing. In 1966, Ross Quillian (PhD dissertation, Carnegie Inst. of Technology; now CMU) demonstrated semantic nets In 1967, Dendral program (Edward Feigenbaum, Joshua Lederberg, Bruce Buchanan, Georgia Sutherland at Stanford) demonstrated to interpret mass spectra on organic chemical compounds. First successful knowledge-based program for scientific reasoning. In 1967, Doug Engelbart invented the mouse at SRI In 1968, Marvin Minsky & Seymour Papert publish Perceptrons, demonstrating limits of simple neural nets. In 1972, Prolog developed by Alain Colmerauer. In Mid 80's, Neural Networks become widely used with the Backpropagation algorithm (first described by Werbos in 1974). 1990, Major advances in all areas of AI, with significant demonstrations in machine learning, intelligent tutoring, case-based reasoning, multi-agent planning, scheduling, uncertain reasoning, data mining, natural language understanding and translation, vision, virtual reality, games, and other topics. In 1997, Deep Blue beats the World Chess Champion Kasparov In 2002,iRobot, founded by researchers at the MIT Artificial Intelligence Lab, introduced Roomba, a vacuum cleaning robot. By 2006, two million had been sold.

Cyber Security

Cyber Security is the body of technologies, processes, and practices designed to protect networks, devices, programs, and data from attack, theft, damage, modification or unauthorized access. Cyber Security is the set of principles and practices designed to protect our computing resources and online information against threats.

What is Cyber Security?

The technique of protecting internet-connected systems such as computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks is known as cyber security.Cyber Security into two parts one is cyber, and the other is security.Cyber refers to the technology that includes systems, networks, programs, and data. And security is concerned with the protection of systems, networks, applications, and information. In some cases, it is also called electronic information security or information technology security.

Importance of Cyber Security

Protecting Sensitive Data: With the increase in digitalization, data is becoming more and more valuable. Cybersecurity helps protect sensitive data such as personal information, financial data, and intellectual property from unauthorized access and theft.

Prevention of Cyber Attacks: Cyber attacks, such as Malware infections, Ransomware, Phishing, and Distributed Denial of Service (DDoS) attacks, can cause significant disruptions to businesses and individuals. Effective cybersecurity measures help prevent these attacks, reducing the risk of data breaches, financial losses, and operational disruptions.

Safeguarding Critical Infrastructure: Critical infrastructure, including power grids, transportation systems, healthcare systems, and communication networks, heavily relies on interconnected computer systems. Protecting these systems from cyber threats is crucial to ensure the smooth functioning of essential services and prevent potential disruptions that could impact public safety and national security.

Maintaining Business Continuity: Cyber attacks can cause significant disruption to businesses, resulting in lost revenue, damage to reputation, and in some cases, even shutting down the business. Cybersecurity helps ensure business continuity by preventing or minimizing the impact of cyber attacks.

Protecting National Security: Cyber attacks can be used to compromise national security by targeting critical infrastructure, government systems, and military installations. Cybersecurity is critical for protecting national security and preventing cyber warfare.

Preserving Privacy: In an era where personal information is increasingly collected, stored, and shared digitally, cybersecurity is crucial for preserving privacy. Protecting personal data from unauthorized access, surveillance, and misuse helps maintain individuals' privacy rights and fosters trust in digital services.

History of Cyber Security :

1940s: For nearly two decades after the creation of the world's first digital computer in 1943, carrying out cyberattacks was tricky.Access to the giant electronic machines was limited to small numbers of people and they weren't networked.Only a few people knew how to work them so the threat was almost non-existent.

1950s: The phone phreaks

Fraudulent manipulation of telephone signaling in order to make free phone calls.

1960s: All quiet on the Western Front

1970s: Computer security is born

Cybersecurity proper began in 1972 with a research project on ARPANET (The Advanced Research Projects Agency Network), a precursor to the internet. Researcher Bob Thomas created a computer program called Creeper that could move across ARPANET's network, leaving a breadcrumb trail wherever it went. 'I'm the creeper, catch me if you can'. Ray Tomlinson – the inventor of email – wrote the program Reaper, which chased and deleted Creeper.Reaper was not only the very first example of antivirus software, but it was also the first self-replicating program, making it the first-ever computer worm.

1980s: From ARPANET to internet

The 1980s brought an increase in high-profile attacks, including those at National CSS, AT&T, and Los Alamos National Laboratory Despite this, in 1986, German hacker Marcus Hess used an internet gateway in Berkeley, CA, to piggyback onto the ARPANET. He hacked 400 military computers, including mainframes at the Pentagon, intending to sell information to the KGB.

1987: The birth of cybersecurity

1987 was the birth year of commercial antivirus, although there are competing claims for the innovator of the first antivirus product.Andreas Luning and Kai Figge released their first antivirus product for the Atari ST – which also saw the release of Ultimate Virus Killer (UVK) Three Czechoslovakians created the first version of NOD antivirus In the U.S., John McAfee founded McAfee (then part of Intel Security), and released VirusScan.

1990s: The world goes online

The first polymorphic viruses were created (code that mutates while keeping the original algorithm intact to avoid detection) British computer magazine PC Today released an edition with a free disc that 'accidentally' contained the Disk Killer virus, infecting tens of thousands of computers EICAR (European Institute for Computer Antivirus Research) was established towards the end of the 1990s, email was proliferating and while it promised to revolutionize communication, it also opened up a new entry point for viruses.

2000s: Threats diversify and multiply

2010s: The next generation

2012: Saudi hacker 0XOMAR publishes the details of more than 400,000 credit cards online 2013: Former CIA employee for the US Government Edward Snowden copied and leaked classified information from the National Security Agency (NSA) 6 • 2013-2014: Malicious hackers broke into Yahoo, compromising the accounts and personal information of its 3 billion users. Yahoo was subsequently fined $35 million for failing to disclose the news • 2017: WannaCry ransomware infects 230,000 computers in one day • 2019: Multiple DDoS attacks forced New Zealand's stock market to temporarily shut down • According to a security research firm, 81 global firms from 81 countries reported data breaches in the first half of 2020 alone. • 80% of firms have seen an increase in cyber-attacks this year. Coronavirus is alone blamed for a 238% rise in cyber-attacks on banks. Phishing attacks have seen a dramatic increase of 600% since the end of February. • Due to pandemic, ransomware attacks rose 148% in March and the average ransomware payment rose by 33% to $111,605 as compared to Q4 2019

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