Assignment 1

Internet of Things (IOT)

The internet of things, or IOT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

Working Process

An IOT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IOT devices share the sensor data they collect by connecting to an IOT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

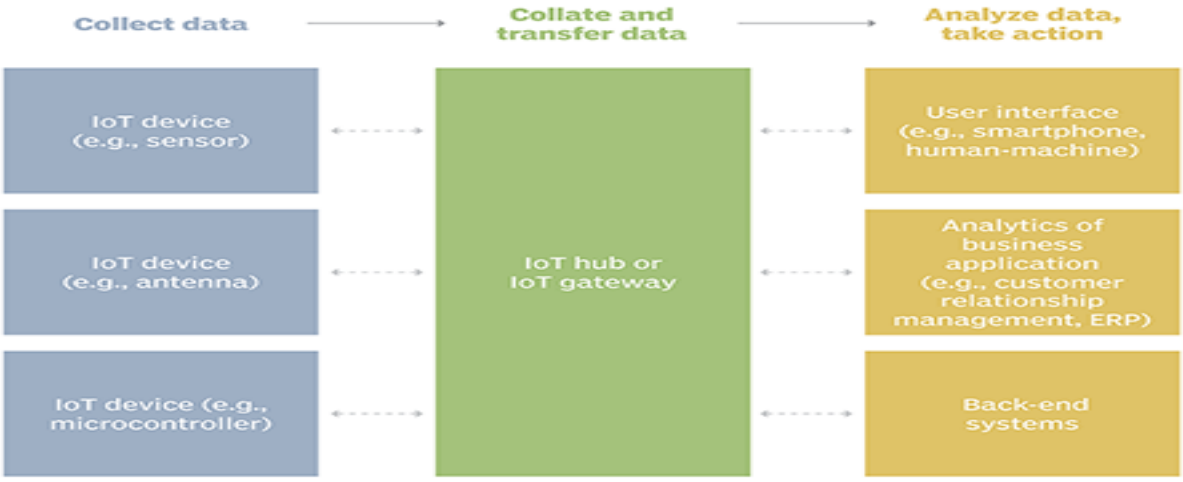

FIG: BLOCK DIAGRAM OF IOT

BLOCK CHAIN

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system. A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is known as Distributed Ledger Technology (DLT). Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature called a hash.

Blockchain example

Asgaror, lead singer of the Norwegian black metal band Heimskringla, has seen his income dwindle ever since the band's label increased their cut. Asgaror realizes he can increase his revenue by selling to fans directly. He decides to use the blockchain not only to register his band's grim riffs and nefarious lyrics, but also to set up a smart contract that allows users to purchase Heimskringla's records and merch by paying a set amount of a certain cryptocurrency. Both the registration of Heimskringla's intellectual property and every transaction to purchase goods from the band are securely and permanently recorded.

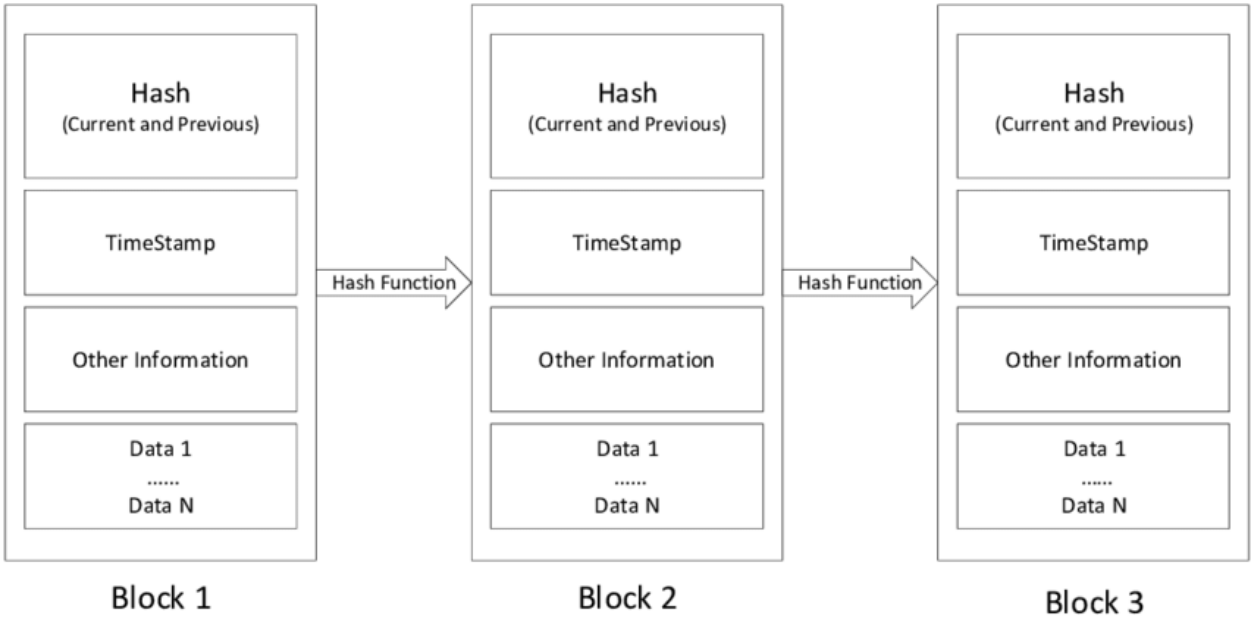

FIG: BLOCK DIAGRAM OF BLOCK CHAIN

DEEP LEARNING

Deep learning (also known as **deep structured learning**) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised. Deep-learning architectures such as deep neural networks, deep belief networks, graph neural networks, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, machine vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics, drug design, medical image analysis, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance

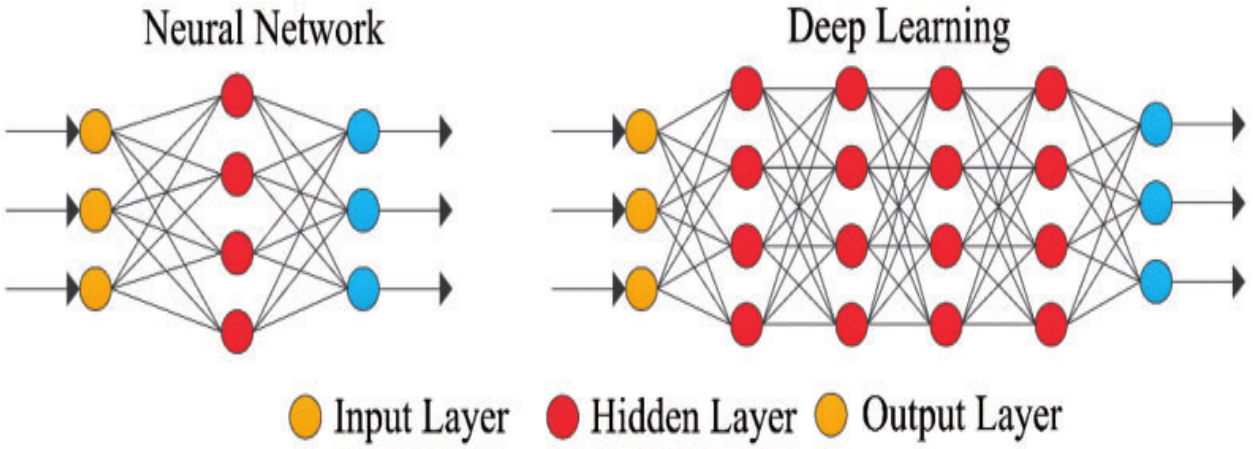

FIG: DEEP LEARNING

MACHINE LEARNING

Machine learning (**ML**) is the study of computer algorithms that improve automatically through experience and by the use of data. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of applications, such as in medicine, email filtering, and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks. A subset of machine learning is closely related to computational statistics, which focuses on making predictions using computers; but not all machine learning is statistical learning. The study of mathematical optimization delivers methods, theory and application domains to the field of machine learning. Data mining is a related field of study, focusing on exploratory data analysis through unsupervised learning. In its application across business problems, machine learning is also referred to as predictive analytics.

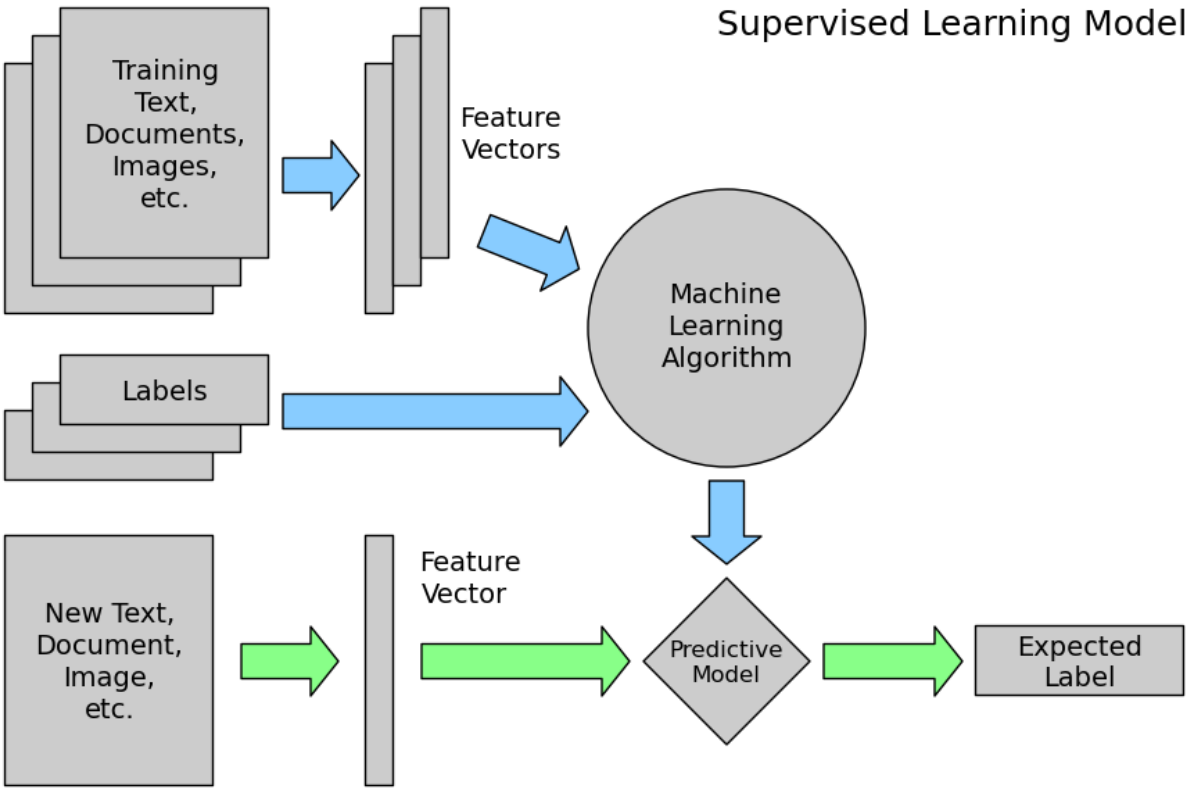

FIG: Machine Learning

Neural Networks

Artificial neural networks (**ANNs**), usually simply called **neural networks** (**NNs**), are computing systems vaguely inspired by the biological neural networks that constitute animal brains. An NN is based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal to other neurons. An artificial neuron that receives a signal then processes it and can signal neurons connected to it. The "signal" at a connection is a real number, and the output of each neuron is computed by some non-linear function of the sum of its inputs. The connections are called *edges*. Neurons and edges typically have a weight that adjusts as learning proceeds. The weight increases or decreases the strength of the signal at a connection. Neurons may have a threshold such that a signal is sent only if the aggregate signal crosses that threshold. Typically, neurons are aggregated into layers. Different layers may perform different transformations on their inputs. Signals travel from the first layer (the input layer), to the last layer (the output layer), possibly after traversing the layers multiple times.

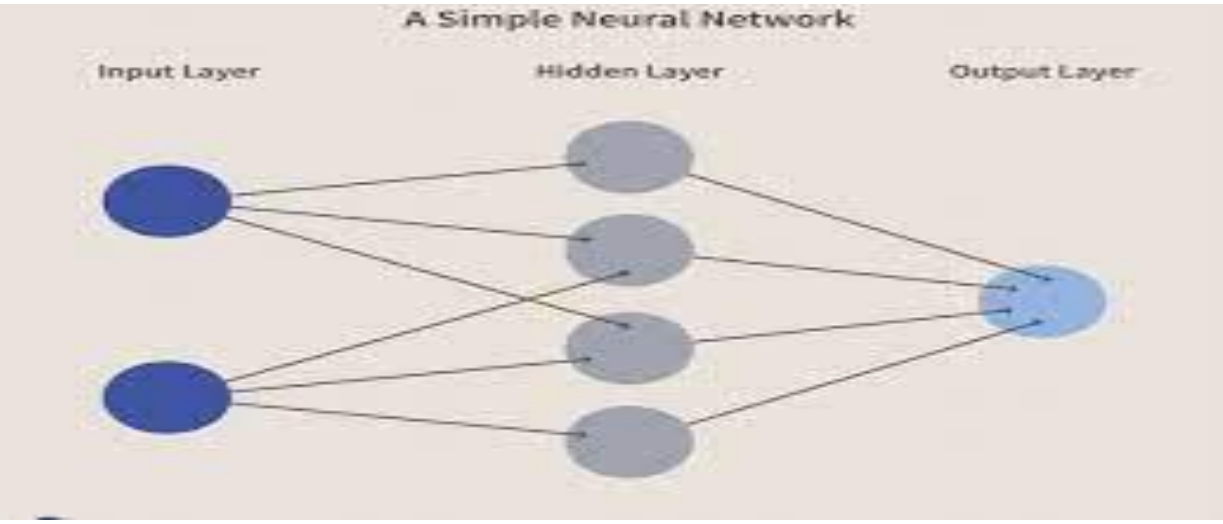

FIG: Neural Network

Problem Oriented Programming

Problem-Oriented Development is an emerging paradigm of computing that emphasizes problems (as opposed to requirements) as the primary subject of scrutiny by software engineers. As such, Problem-Oriented Development is concerned with:

- Investigating the structure of organizational problems as addressed by Software Engineering;
- Providing formalisms for modelling and representing problems;
- Providing guidance and frameworks for problem analysis and decomposition;
- Defining techniques for formally justifying solutions (e.g. by associating problem components with solution components);
- Supporting knowledge reuse during problem analysis (e.g. through problem patterns).

Specific Approaches

- Problem-Oriented Software Engineering provides a formal definition of problems, and a framework for associating problems with solutions through formal, logical arguments.
- Problem Frames provide a framework for defining empirical models of software engineering problems which are grounded in the physical world. The Problem Frames approach also provides a set of elementary problem patterns;
- The Domain Theory hypothesizes a set of cognitive "deep structures" corresponding to components of domain knowledge and draws on these to provide a framework for modelling software problems.

Difference between Compiler and Interpreter

COMPILER	INTERPRETER
It takes entire program as input.	It takes single instruction as input.
Intermediate Object code is generated.	No intermediate Object code is generated.
Conditional control statements are execute faster.	Conditional control statements are execute slower.
Memory requirement is more.	Memory requirement is less.
Program need not to be compiled every time.	Every time high level program is converted to low level program.
Error are displayed after entire program is checked.	Error are displayed for every instruction interpreted.

Algorithm and Flowchart to find the greatest number among three.

Algorithm to find the greatest number among three.

Step 1: Read A, B, C
Step 2: If (A > B) && (A > C):
Print "A is the largest number"
Step 3: else if (B > A) && (B > C):
Print "B is the largest "
Step 4: else:
Print "C is the largest"
Step 5: End.

Flowchart to find the greatest number among three.