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Virtual Reality

What is Virtual Reality?

Simply put, VR is a computerized simulation of natural or imaginary reality. Often the user of VR is fully or partially immersed in the environment. Full immersion refers to someone using a machine to shield herself from the real world. Partial immersion happens when a person can manipulate a VR environment but isn't tucked or locked away in a machine. However, virtual reality doesn't necessarily have to be "full immersion" to be considered a true VR simulation. Games like Second Life on the PC and control devices like the Nintendo Wii remote are VRbased products. These items let users interact with a VR environment that is a computer simulation. These VR environments can be anything from a typical game, such as Super Mario Brothers, to a fully detailed city reconstitution or a fictional fantasy land. The only limit to a VR environment is the imagination and the resources that the creator has available.

Types of Virtual Reality

There are many types of Virtual Reality, including the following:

- Enhanced Reality
- Desktop Virtual Reality
- Telepresence
- Immersive Virtual Reality
- QTVR

Virtual reality applications can be divided into:

1. The simulation of real environments such as the interior of a building or a spaceship often with the purpose of training or education
2. The development of an imagined environment, typically for a game or educational adventure Areas in which Virtual Reality applications are commonly used are:

- Design Evaluation (Virtual Prototyping)
- Architectural Walk-through
- Planning and Maintenance
- Concept and Data Visualisation
- Operations in hazardous or remote environments
- Training and simulation
- Sales and Marketing
- Entertainment and Leisure
- Enhanced Realities There are a number of popular products available for creating virtual reality effects on personal computers. QuickTime Virtual Reality (QTVR) allows the creation of applications without coding. It is a photography-based VR, an "immersive" technology with easy to use software.

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LoRa & LoRaWAN Technology

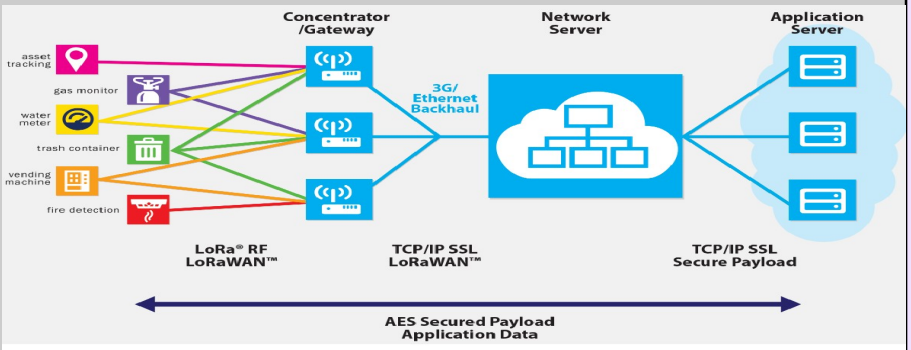
LoRa

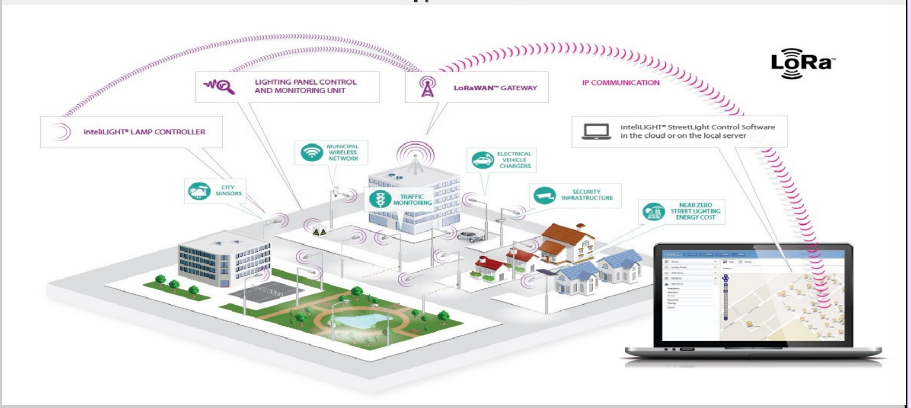
LoRa (short for long range) is a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology. Semtech's LoRa devices and wireless radio frequency technology (LoRa Technology) is a long range, low power wireless platform that has become the de facto technology for Internet of Things (IoT) networks worldwide. LoRa Technology enables smart IoT applications that solve some of the biggest challenges facing our planet: energy management, natural resource reduction, pollution control, infrastructure efficiency, disaster prevention, and more.

LoRaWAN

The LoRaWAN open specification is a low power, wide area networking (LPWAN) protocol based on LoRa Technology. Designed to wirelessly connect battery operated things to the Internet in regional, national or global networks, the LoRaWAN protocol leverages the unlicensed radio spectrum in the Industrial, Scientific and Medical (ISM) band. The specification defines the device-to-infrastructure of LoRa physical layer parameters and the LoRaWAN protocol, and provides seamless interoperability between devices. While Semtech provides the radio chips featuring LoRa Technology, the LoRa Alliance, a non-profit association and the fastest growing technology alliance, drives the standardization and global harmonization of the LoRaWAN protocol

Key Features of LoRa Technology:





• **Long Range:** A single base station using LoRa Technology enables deep penetration capability for dense urban environments and indoor coverage while also providing the ability to connect to sensors more than 15-30 miles away in rural areas.

• **Low Power:** The LoRaWAN protocol was developed specifically for low-power and enables unprecedented battery lifetime of up to 20 years depending on the application.

• **Geolocation:** This feature enables tracking applications without GPS or additional power consumption.

• **Low Cost:** LoRa Technology reduces up front infrastructure investments and operating costs, as well as end-node sensor costs.

• **Open Standard:** LoRaWAN, a Low-Power Wide Area Networks (LPWAN) specification, ensures interoperability among applications, IoT solution providers and telecom operators to speed adoption.

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Clayodor

clayodor (\klei-o-dor\) is a clay-like malleable material that changes smell based on user manipulation of its shape. This work explores the tangibility of shape changing materials to capture smell, an ephemeral and intangible sensory input. We present the design of a proof-of-concept prototype, and discussions on the challenges of navigating smell though form. Recent HCI research has moved beyond static and rigid physical i nterfaces to d ynamicall y controlled materials. For example, research has explored materials with dynamically changing qualities such as shape, stiffness, weight, and optical properties. For the last decade, researchers from CMU and Intel have worked towards the realization of Claytronics, a future material composed by nanoscale computers in the form of atoms. This will potentially enable direct and dynamic user manipulations with programmable materials. Building on top of the possibilities of shape changing interfaces, we envision clayodor, a clay-like malleable material that changes smell based on user manipulation of its shape.We explore the tangibility of shaping a malleable material to capture an ephemeral and intangible sensor input: smell. By allowing users to take this material into their hands and physically shape it into various meaningful forms, we are aiming to explore the potential mental model of coupling these forms with smells. Similarly, Obrist et al also indicated the evocative quality of scent to connect people to memories and past experiences. However, there is no focus on the power for objects to be used as a symbol in the production or recall of smell. Further, we posit that because smell is a distinctively difficult sense to describe, shaping and molding objects has potential to forgo the necessity for users to attempt at providing descriptions of smells for recall. On a poetic note, our work explores how shaping materials into symbolic forms serves as triggers to scents that connect people to past experiences. One main challenge is the complexity to produce arbitrary smells on demand. Humans have a thousand different olfactory receptors in our nose, each sensing a different chemical bond Reproducing arbitrary smell would therefore require a thousand-dimension space, which presents significant challenges compared to the 3- dimensional space of vision (RGB). Another challenge is the difficulty of creating as systemic and reproducible classification scheme for smell. As humans refer to smells through ambiguous descriptions, it is difficult to create rigorous categorization for universal reference. Recent HCI research efforts focus on user interaction with smell-based technology, rather than the chemical engineering challenge of reproducing specific scents. To the best of our knowledge, most systems use off the shelf aromas in their prototypes, focusing research effort on interaction design. Brewster et al. developed a smell-based photo-tagging tool (Olfoto) to elicit memories though smell. Commercial product Scentee lets you associate particular smells with smartphone notifications. The Smelling Screen is a display system that can generate smell distribution on a 2D screen. Ranasinghe et al. explored using smell for digital communication, enabling the sharing of smell over the Internet. By recreating smell though form, clayodor explores the possibility of form as a user-designated navigator for smell.

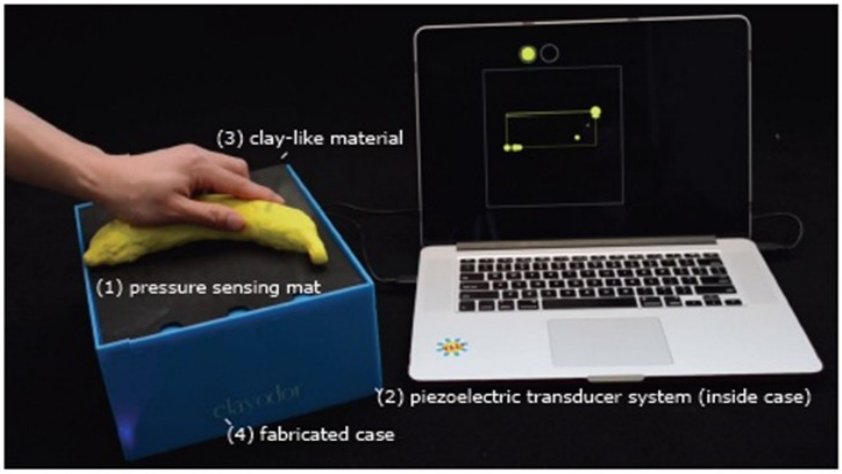

Figure 1. *clayodor* prototype

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Educational robotics

Educational robotics teaches the design, analysis, application and operation of robots. Robots include articulated robots, mobile robots or autonomous vehicles. Educational robotics can be taught from elementary school to graduate programs. Robotics may also be used to motivate and facilitate the instruction other, often foundational, topics such as computer programming, artificial intelligence or engineering design.

Summer robotics camp

Several summer camp programs include robotics as part of their core curriculum. In addition, youth summer robotics programs are frequently offered by celebrated museums such as the American Museum of Natural History[7] and The Tech Museum of Innovation in Silicon Valley, CA, just to name a few. There are of benefits that come from attending robotics camps. It teaches students how to use teamwork, resilience and motivation, and decision making. Students learn teamwork because most camps involve exciting activities that involve lots of teamwork. Resilience and motivation is expected because by completing the challenging programs, students feel talented and accomplished after they complete the program.

Post-secondary degree programs

From approximately 1960 though 2005, robotics education at post-secondary institutions took place through elective courses, thesis experiences and design projects offered as part of degree programs in traditional academic disciplines, such as mechanical engineering,.

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Sophia

Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics. Sophia was activated on February 14, 2016, [1] and made her first public appearance at South by Southwest Festival (SXSW) in mid-March 2016 in Austin, Texas, United States. She is able to display more than 60 facial expressions.

Sophia has been covered by media around the globe and has participated in many high-profile interviews. In October 2017, Sophia became a Saudi Arabian citizen, the first robot to receive citizenship of any country. In November 2017, Sophia

was named the United Nations Development Programme's first ever Innovation Champion, and is the first non-human to be given any United Nation title.

Features

Cameras within Sophia's eyes combined with computer algorithms allow her to see. She can follow faces, sustain eye contact, and recognize individuals. She is able to process speech and have conversations using a natural language subsystem. Around January 2018 Sophia was upgraded with functional legs and the ability to walk.

Submitted by
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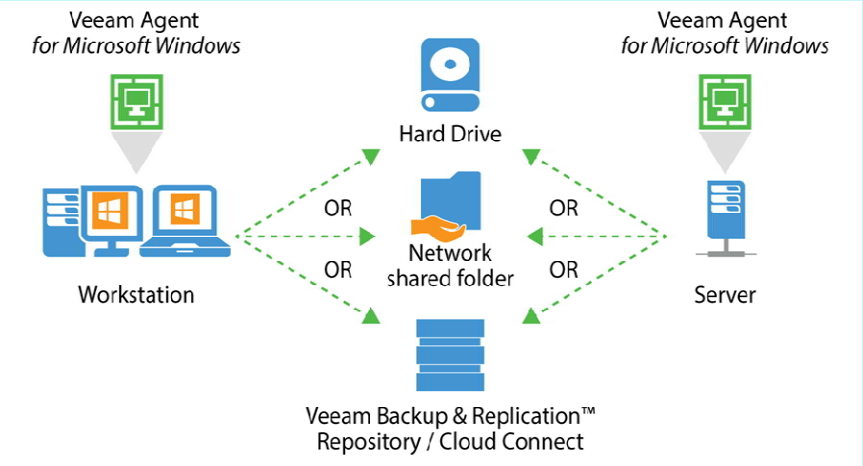
New Veeam Agent for Microsoft Windows

Due to various factors, including complex hardware configurations and regulatory compliance requirements, some physical servers and workstations cannot be virtualized. And everyday occurrences such as lapses in connectivity, hardware failures, file corruption-even ransomware or thefcan leave an organization's data at risk.

NEW Veeam® Agent *for Microsoft Windows* — a key component of the Veeam Availability Platform — solves these issues by closing the gap that some enterprises face with large, heterogeneous or multi-cloud environments environments and further enables workload mobility by delivering Availability for Windows-based workstations, physical servers and cloud instances.

Veeam Agent *for Microsoft Windows* is built on the extremely successful Veeam Endpoint Backup™ FREE and includes three editions.Workstation, Physical Server and Cloud Instance — with additional features designed to ensure the Availability of your Windows workloads by providing backup and recovery for physical and cloud-based workloads, as well as endpoint devices that belong to remote users.With Veeam Agent *for Microsoft Windows*, you get:



Enterprise-level backup and recovery: Get complete protection for both workstations and Windows-based servers those running in the cloud including full application awareness**Physical backups off site:** Back up Windows-based workloads off site to a cloud service provider through Veeam Cloud Connect and more

Protection of roaming endpoints: Meet RPOs for laptops and tablets outside the corporate network

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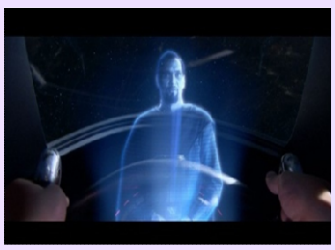
Holograms

Holograms were used mostly in telecommunications as an alternative to screens. Holograms could be transmitted directly, or they could be stored in various storage devices (such as holodiscs) the storage device can be hooked up with a holo projector in order for the stored image to be accessed [1]. Fig.2. Example of visual Image Debatably, virtual reality goggles (which consist of two small screens but are nonetheless sufficiently different from traditional computer screens to be considered screen less) and heads-up display in jet fighters (which display images on the clear cockpit window) also are included in Visual Image category. In all of these cases, light is reflected off some intermediate object (hologram, LCD panel, or cockpit window) before it reaches the retina. In the case of LCD panels the light is refracted from the back of the panel, but is nonetheless a reflected source[3]. The new software and hardware will enable the user to, in effect; make design adjustments in the system to fit his or her particular needs, capabilities, and preferences. They will enable the system to do such things as adjusting to users behaviors in dealing with interactive movable type.



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Aneka: A Software Platform for .NET-based Cloud Computing

Aneka is a platform for deploying Clouds developing applications on top of it. It provides a runtime environment and a set of APIs that allow developers to build .NET applications that leverage their computation on either public or private clouds. One of the key features of Aneka is the ability of supporting multiple programming models that are ways of expressing the execution logic of applications by using specific abstractions. This is accomplished by creating a customizable and extensible service oriented runtime environment represented by a collection of software containersconnected togetherCloud Computing [1] is a recent technology trend whose aim is to deliver on demand IT resources on a pay per use basis. Previous trends were limited to a specific class of users, or focused on making available on demand a specific IT resource, mostly computing. Cloud Computing aims to be global and to provide such services to the masses, ranging from the end user that hosts its personal documents on the Internet, to enterprises outsourcing their entire IT infrastructure to external data centers. Neverbefore an approach to make IT a real utility has been so global and complete: not only computing and storage resources are delivered on demand but the entire stack of computing can be leveraged on the Cloud. Figure 1 provides an overall view of the scenario envisioned by Cloud Computing. It encompasses so many aspects of computing that very hardly a single solution is able to provide everything that is needed. More likely, specific solutions can address the user needs and be successful in delivering IT resources as a real utility. Figure 1 also identifies the three pillars on top of which Cloud Computing solutions are delivered to end users. These are: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure/Hardware as a Service (IaaS/HaaS). These new concepts are also useful to classify the available options for leveraging on the Cloud the IT needs of everyone. Examples of Software as a Service are Salesforce.com 2 and Clarizen.com3, which respectively provide on line CRM and project management services.

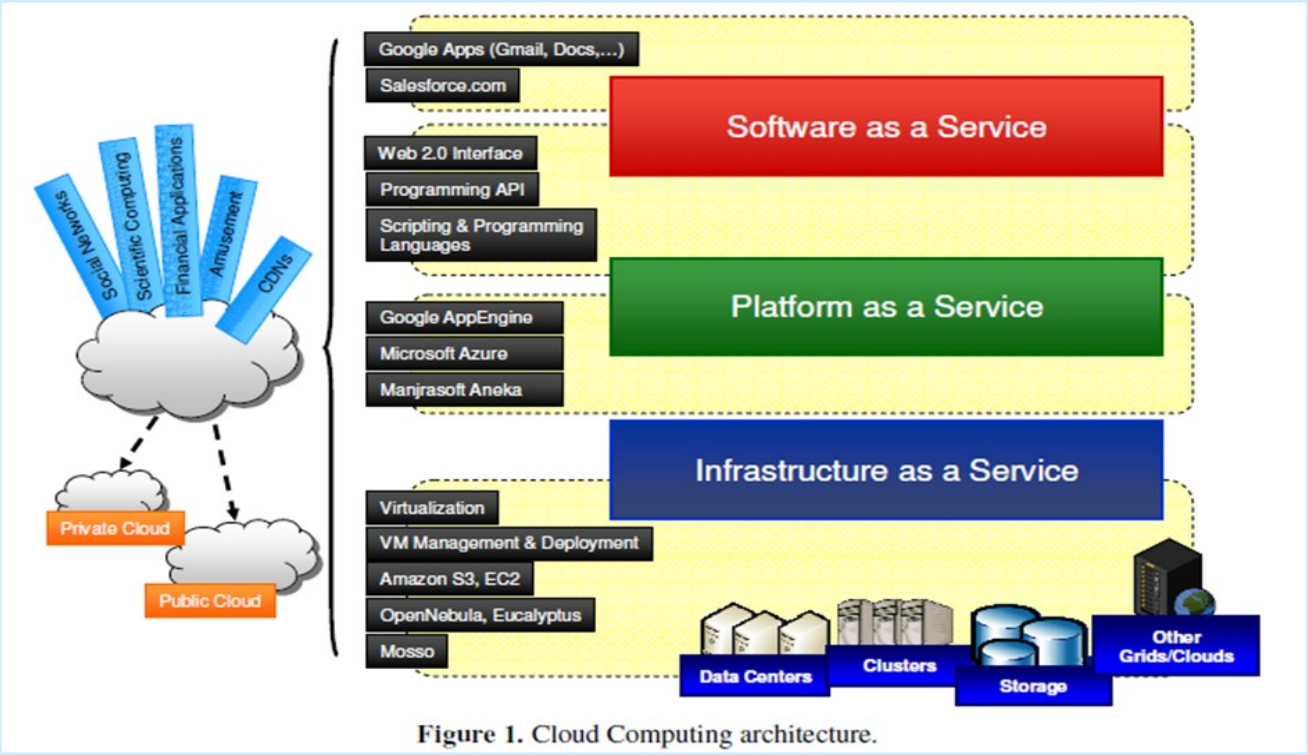

Figure 1. Cloud Computing architecture.

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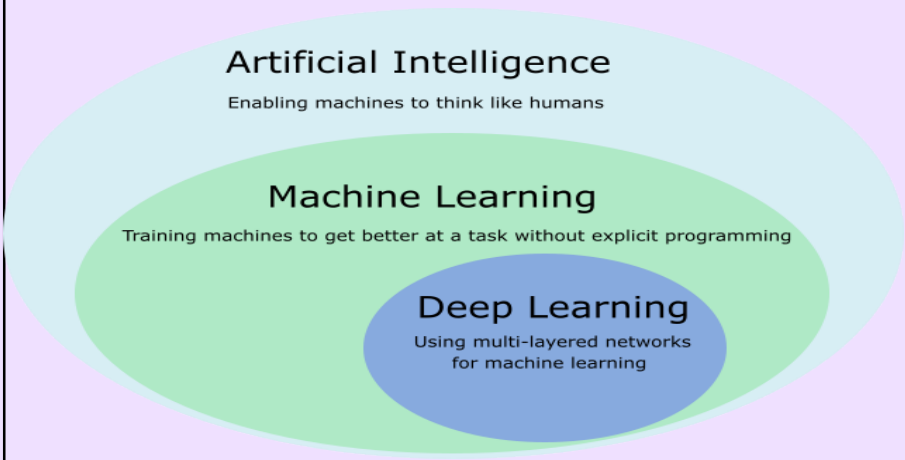
Machine Learning VS Artificial Intelligence

Machine Learning is a new trending field these days and is an application of artificial intelligence. Machine learning uses certain statistical algorithms to make computers work in a certain way without being explicitly programmed. The algorithms receive an input value and predict an output for this by



the use of certain statistical methods. The main aim of machine learning isto create intelligent machines which can think and work like human beings. Machine Learning is a branch of **artificial intelligence** that gives systems the ability to learn automatically and improve themselves from the experience without being explicitly programmed or without the intervention of human. Its main aim is to make computers learn automatically from the experience.

Requirements of creating good machine learning systems

So what is required for creating such machine learning systems? Following are the things required in creating such machine learning systems:

Data – Input data is required for predicting the output.

Algorithms – Machine Learning is dependent on certain statistical algorithms to determine data patterns.

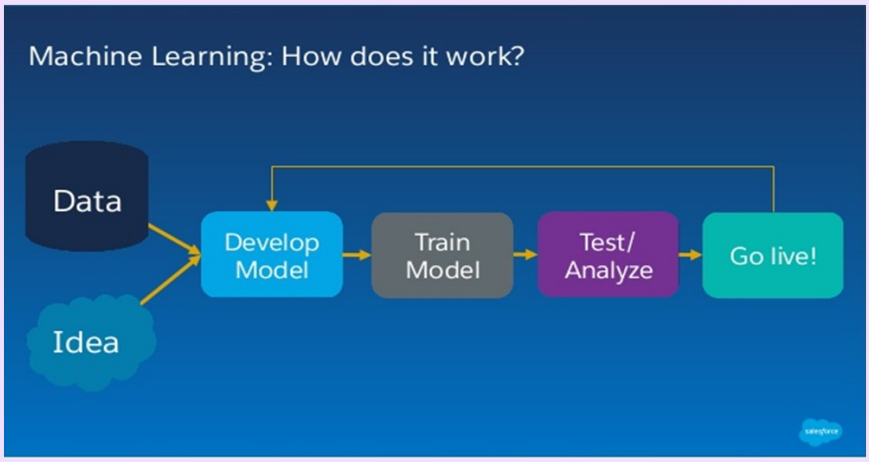
Automation – It is the ability to make systems operate automatically.

Iteration – The complete process is iterative i.e. repetition of process.

Scalability – The capacity of the machine can be increased or decreased in size and scale.

Modeling – The models are created according to the demand by the process of modeling.

Methods of Machine Learning Machine Learning methods are classified into certain categories. These are:



Supervised Learning – In this method, input and output is provided to the computer along with feedback during the training. The accuracy of predictions by the computer during training is also analyzed. The main goal of this training is to make computers learn how to map input to the output.

Unsupervised Learning – In this case, no such training is provided leaving computers to find the output on its own. Unsupervised learning is mostly applied on transactional data. It is used in more complex tasks. It uses another approach of iteration known as deep learning to arrive at some conclusions.

Reinforcement Learning – This type of learning uses three components namely – agent, environment, action. An agent is the one that perceives its surroundings, an environment is the one with which an agent interacts and acts in that environment. The main goal in reinforcement learning is to find the best possible policy.

How does machine learning work?Machine learning makes use of processes similar to that of data mining. Machine learning algorithms are described in terms of target function(f) that maps input variable (x) to an output variable (y). This can be represented as:y=f(x)There is also an error e which is the independent of the input variable x. Thus the more generalized form of the equation is:y=f(x) + e

In machine the mapping from x to y is done for predictions.

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Deep Neural Network

Deep learning: One of the machine learning technique that learns features directly from data.

Why deep learning: When the amounth of data is increased, machine learning techniques are insufficient in terms of performance and deep learning gives better performance like accuracy.

What is amounth of big: It is hard to answer but intuitively 1 million sample is enough to say "big amounth of data"

Usage fields of deep learning: Speech recognition, image classification, natural language procession (nlp) or recommendation systems

What is difference of deep learning from machine learning:

Machine learning covers deep learning.

Features are given machine learning manually.

On the other hand, deep learning learns features directly from data.

Deep Learning is a part of the broader field machine learning and is based on data representation learning. It is based on the interpretation of artificial neural network. Deep Learning algorithm uses many layers of processing. Each layer uses the output of previous layer as an input to itself. The algorithm used can be supervised algorithm or unsupervised algorithm. Deep Learning is mainly developed to handle complex mappings of input and output. It is another hot topic for M.Tech thesis and project along with machine learning.

Deep Neural Network

Deep Neural Network is a type of Artificial Neural Network with multiple layers which are hidden between the input layer and the output layer. This concept is known as feature hierarchy and it tends to increase the complexity and abstraction of data. This gives network the ability to handle very large, high-dimensional data sets having millions of parameters. The procedure of deep neural networks is as follows:

Consider some examples from a sample dataset.

Calculate error for this network.

Improve weight of the network to reduce the error.

Repeat the procedure.

Applications of Deep Learning

Here are some of the applications of Deep Learning:

1. Automatic Speech Recognition
2. Image Recognition
3. Natural Language Processing
4. Toxicology
5. Customer Relationship Management
6. Bioinformatics
7. Mobile Advertising

Advantages of Deep Learning

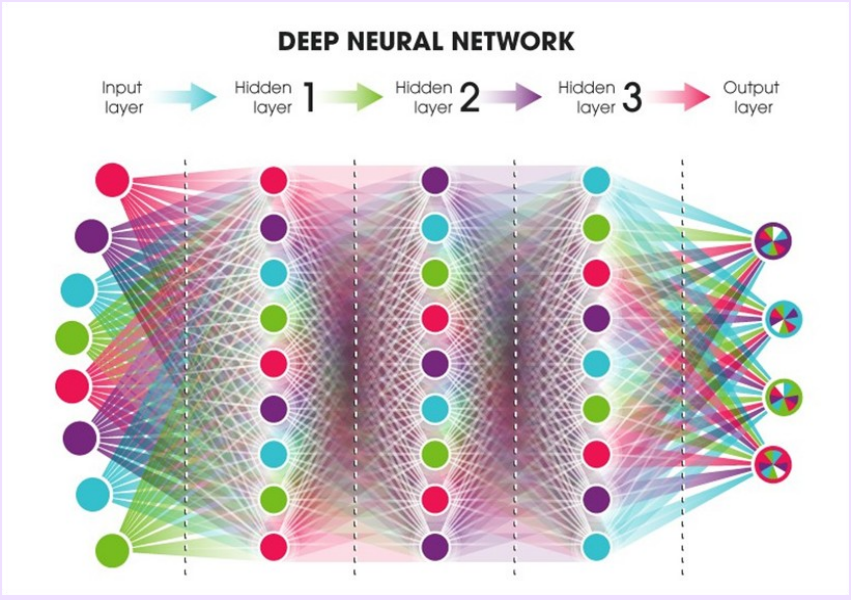
Deep Learning helps in solving certain complex problems with high speed which were earlier left unsolved. Deep Learning is very useful in real world applications. Following are some of the main advantages of deep learning:

Eliminates unnecessary costs – Deep Learning helps to eliminate unnecessary costs by detecting defects and errors in the system.

Identifies defects which otherwise are difficult to detect – Deep Learning helps in identifying defects which left untraceable in the system.

Can inspect irregular shapes and patterns – Deep Learning can inspect irregular shapes and patterns which is difficult for machine learning to detect.

From this introduction, you must have known that why this topic is called as hot for your M.Tech thesis and projects. This was just the basic introduction to machine learning and deep learning. There is more to explore in these fields. It is a part of the family of machine learning and deals with the functioning of the artificial neural network. Neural Networks are used to study the functioning of the human brain. It is one of the growing and exciting field. Deep learning has made it possible for the practical implementation of various machine learning applications.



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