

# DEEP LEARNING APPLICATIONS AND FRAMEWORKS – A REVIEW

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**ABSTRACT-** Deep learning technologies are suitable methods for usual indication and evidence processing, like image classification and speech recognition. A subclass of Machine Learning Algorithms that is actual good at identifying outlines but typically requires a large number of data is called deep learning. Deep learning is equipment stimulated by the operative of human brain. In deep learning, networks of artificial neurons analyze large dataset to automatically discover underlying patterns, without human intervention, deep learning identify patterns in unstructured data such as, images, sound, video and text. DNN has been indicating as the best decision for the training procedure because it manufactured a high percentage of accurateness. We are going to get the detailed information about deep learning, applications of deep learning, types of deep learning and the frameworks of deep learning in this paper.

**Key Words:** Deep learning, machine learning, applications of deep learning, neural networks, deep learning framework.

## 1. INTRODUCTION

Deep learning is an expertise stimulated by the operational of human brain. In deep learning, networks of artificial neurons study large dataset to robotically determine fundamental patterns, without human interference [3]. In deep learning, a computer absorbs to classify metaphors, typescript and sound. The computer is trained with large image datasets and then it changes the pixel price of the picture to an interior demonstration, where the classifier can identify patterns on the input image. [1] Deep learning for image classification suits critical use of machine learning method. Deep learning is part of a wider family of machine learning methods established on learning data representation, as contrasting to hard code machine algorithms. [2]

Critically, Deep Learning receipts a lot of data, which can make results about new data. This data is accepted through Neural Networks, known as Deep Neural Networks (DNN). A proportion of deep learning procedures are routine neural networks, because of which, the deep learning models are general as deep neural

networks. In Deep learning, CNN [4, 5] is popular type of DNN.

Deep learning decreases under the group of Artificial Intelligence where it can perform or think like a human. Normally, the system itself will be set with hundreds or maybe thousands of input data in order to make the 'training' session to be more efficient and fast. It starts by giving some sort of 'training' with all the input data. The experiment contains an extensive intra-class variety of images caused by color, size, environmental conditions and shape. It is vital big data of categorized drill images and to formulate this big data, it ingests a lot of time and cost as for the drill drive only.

## 2. APPLICATIONS OF DEEP LEARNING

In deep learning, there are numerous applications which are used in day today life. They are

- Self-driving cars
- News Aggregation and Fraud News Detection
- Natural Language Processing
- Virtual Assistant
- Visual Recognition

### 2.1 Self-Driving Cars

Deep Learning is the power that is fetching independent driving to life. A billion sets of data are served to a system to physique a model, to train the apparatuses to acquire, and then test the outcomes in a safe situation. The major anxiety for independent car designers is handling exceptional situations. A consistent cycle of testing and implementation characteristic to deep learning algorithms is safeguarding safe driving with more and more experience to millions of situations. Data from cameras, sensors, geo-mapping is serving generate concise and stylish models to traverse through traffic, identify paths, signage, pedestrian-only routes, and real-time elements like traffic volume and road obstructions[13].

## 2.2 News Aggregation and Fraud News Detection

There is a technique to strainer out all the immoral and unpleasant news from your news fodder. Extensive use of deep learning in news aggregation is strengthening exertions to convert news as per readers. It develops tremendously hard to separate false news as bots duplicate it across networks spontaneously. Deep Learning benefits progress classifiers that can distinguish false or influenced news and eliminate it from your nourish and advise you of potential confidentiality preambles. Training and authenticating a deep learning neural network for news detection is actually tough as the data is overwhelmed with attitudes and no one party can ever adopt if the news is neutral or biased.

## 2.3 Natural Language Processing

Accepting the complications connected with language whether it is syntax, semantics, tonal nuances, expressions, or even sarcasm, is one of the firmest responsibilities for humans to learn. Continuous training since birth and experience to altered social settings support human's mature suitable responses and a modified form of manifestation to every situation. Natural Language Processing through Deep Learning is frustrating to realize the same thing by training machines to hook philological distinctions and edging suitable reactions. Dispersed illustrations are chiefly operative in manufacturing linear semantic associations used to build idioms and sentences.

## 2.4 Virtual Assistant

The best application of deep learning is virtual assistants. Each interface with these assistants affords them with an occasion to learn extra about the voice and inflection, thereby providing a subordinate to human interface involvement. Virtual assistants use deep learning to recognize more about their focuses reaching from people dine-out favorites. Virtual assistants are accurately at beck-and-call as they can do entirety from consecutively spending to auto-responding. With deep learning applications such as text generation and document summarizations, virtual assistants can assist in generating or distribution suitable email copy as well.

## 2.5 Visual Recognition

Visualize yourself going through a embarrassment of ancient images attractive down the longing lane. Images can be arranged founded on positions spotted in photographs, faces, a grouping of people, or rendering to events, dates, etc. Large-scale image Visual recognition through deep neural networks is enhancing development in this division of digital media administration by using

convolution neural networks, Tensor flow, and Python extensively.

## 3. NEURAL NETWORKS

Neural networks, a stunning biologically-inspired encoding standard which allows a computer to learn from observational data. There are two types of neural network. They are

- Artificial neural network
- Deep neural network

### 3.1 Artificial neural network

Artificial Neural Network (ANN) are used for computing organisms which are simulated by the natal neural networks. An ANN is associated with gathering of components or nodes called artificial neurons, which insecurely characteristic the neurons in a biological brain [8]. Each connection, like the synapses in a biological brain, can convey a signal to other neurons. An artificial neuron that admits a indication then travels it and can indication neurons linked to it. The unique goal of the ANN method was to resolution complications in the same way that a human brain would.[Fig 1] [7]

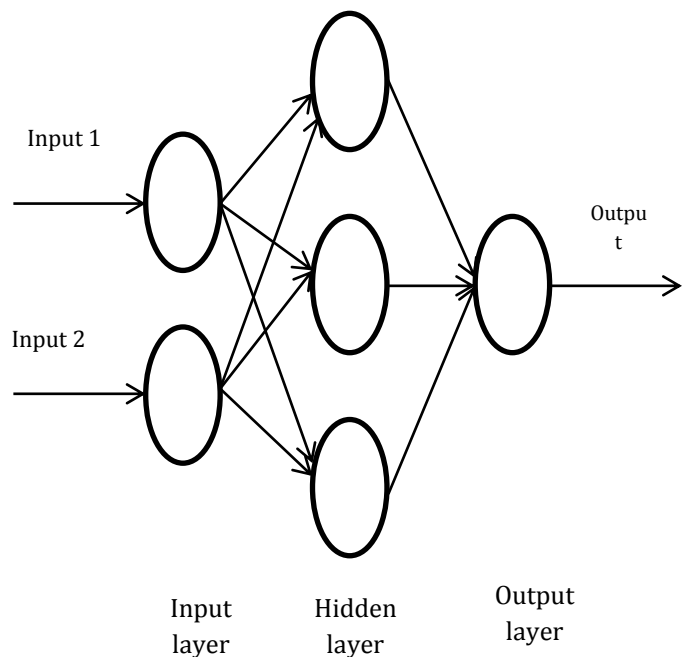


Fig-1:Artificial neural network

- Input layer: Numeral of neurons in this layer resembles to the number of inputs to the neuronal network. This layer contains of inactive nodes, i.e., which do not take portion in the definite signal alteration, but only conveys the signal to the resulting layer.
- Hidden layer: This layer has random amount of layers with random amount of neurons. The nodes in this layer revenue fragment in the signal alteration, hence, they are dynamic.
- Output layer: The amount of neurons in the output layer resembles to the amount of the output standards of the neural network. The nodes in this layer are dynamic ones.[6]

### 3.2 Deep Neural Network

Deep Neural Network (DNN) is an Artificial Neural Network (ANN) with numerous layers among the input and output layers [9]. The DNN inventions is the accurate mathematical operation to turn the input into the output, whether it is a direct association or a non-linear association. The network transfers through the layers manipulative the possibility of each output. DNNs can model composite non-linear associations. DNN constructions produce compositional models where the entity is articulated as a layered arrangement of primitives [10]. The additional layers permit composition of structures from subordinate layers, hypothetically demonstrating multipart data with fewer units than a equally execution narrow network [9].DNNs are characteristically feed advancing networks in which data movements from the input layer to the output layer without twisting back.[Fig 2]

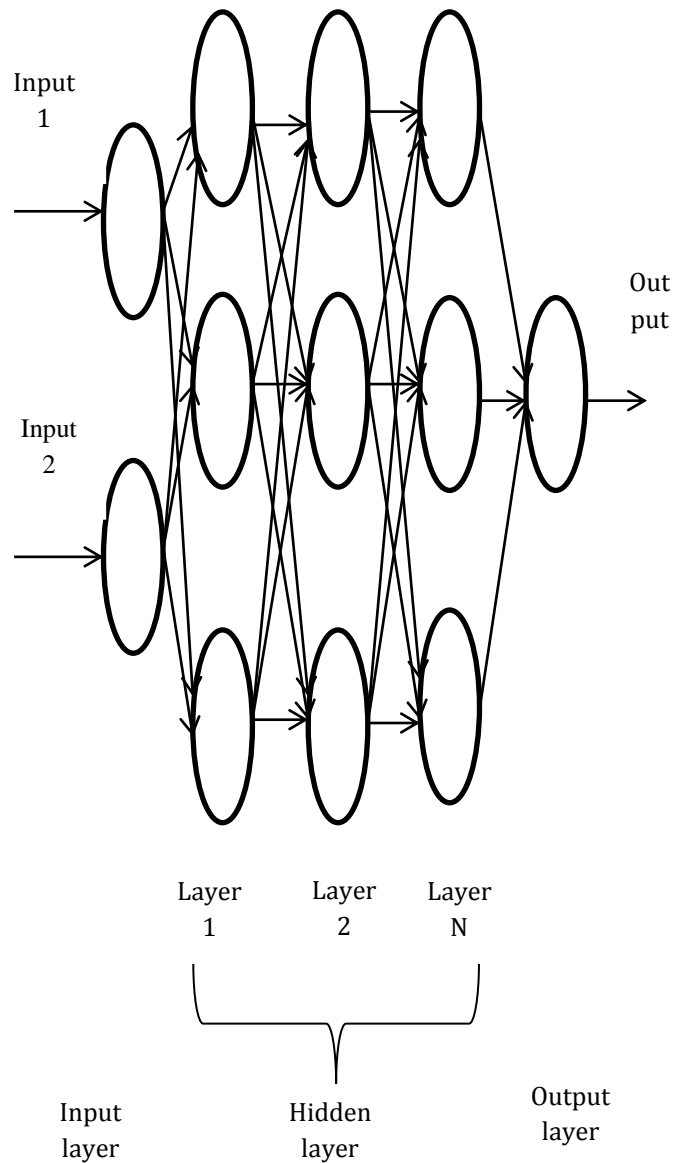


Fig-2: Deep Neural Network

## 4. FRAMEWORKS OF DEEP LEARNING

Deep learning framework is an interface, which allows us to build the deep learning models more easily and quickly, without getting the detailed algorithm. They provide clear and efficient way for defining models using collection of optimized components.

### 4.1 TensorFlow

One of the best deep learning framework is TensorFlow. It has been adopted by several giants at scale such as Twitter and IMB essentially due to its highly flexible system architecture. TensorFlow is obtainable on both desktop

and mobile and also provisions languages such as Python, C++ and R to generate deep learning models beside with packaging libraries. TensorFlow has two main tools. They are

1. TensorBoard for effective data conception of network modeling and presentation.
2. TensorFlow Serving for express disposition of new algorithms/tests while retentive the same server architecture and APIs. It also delivers combination with other TensorFlow models which is altered from the unadventurous performs and can be prolonged to serve other model and data types.

#### 4.2 PyTorch

PyTorch has seen a great level of approval within the deep learning framework communal. PyTorch is essentially a port to Torch deep learning framework used for creating deep neural networks and performing tensor computations that are high in terms of complication. PyTorch is a port to the Torch deep learning framework which can be recycled for building deep neural networks and implementing tensor computations. PyTorch is a Python package which delivers Tensor calculations. PyTorch uses vigorous computation graphs[12].

#### 4.3 Keras

Keras is written in Python and can run on top of TensorFlow. Keras, on the other pointer, is a high-level API, established with a attention to enable firm investigation. So rapid results are needed, Keras will spontaneously take care of the core tasks and produce the output. Both Convolutional Neural Networks and Recurrent Neural Networks are maintained by Keras. It runs faultlessly on CPUs as well as GPUs.

#### 4.4 Caffe

Caffe is a deep learning framework that is sustained with interfaces like C, C++, Python, MATLAB as well as the Command Line Interface. It is well recognized for its speed and transposability and its applicability in modeling Convolution Neural Networks (CNN). The major assistance of using Caffe's C++ library is retrieving accessible networks from the deep net fountain 'Caffe Model Zoo' which are pre-trained and can be used directly. Caffe is a standard deep learning network for vision recognition.

#### 4.5 Chainer

Chainer is a vastly influential and dynamic. It is a Python constructed deep learning framework for neural networks that is intended by run approach. Compared to other frameworks that use the same approach, it can adjust the networks during runtime, thus permitting to implement random control flow statements.

### 5. CONCLUSION

In this paper, a study on deep learning applications and the frameworks used are highlighted. Deep learning is different from machine learning. Deep learning is invested through multi layered neural networks to get the particular result. Deep learning has been used for image recognition, speech recognition. There are different frameworks used in deep learning that allows the user to interact with deep learning more easily and quickly. Thus, this paper is concluded that deep learning is more powerful to predict the image, voice, etc., and deep learning future is especially relevant in the advanced smart sensors, which gather information.

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