

Introduction

- What is machine learning?
- What are the machine learning paradigms?
- What is Artificial Neural Network?
- How to implement multilayer perceptron using TensorFlow and Keras?
- How to use multilayer perceptron for solving various real world machine learning tasks?

[In the earlier course, you have learnt.....]

Deep Learning Basics

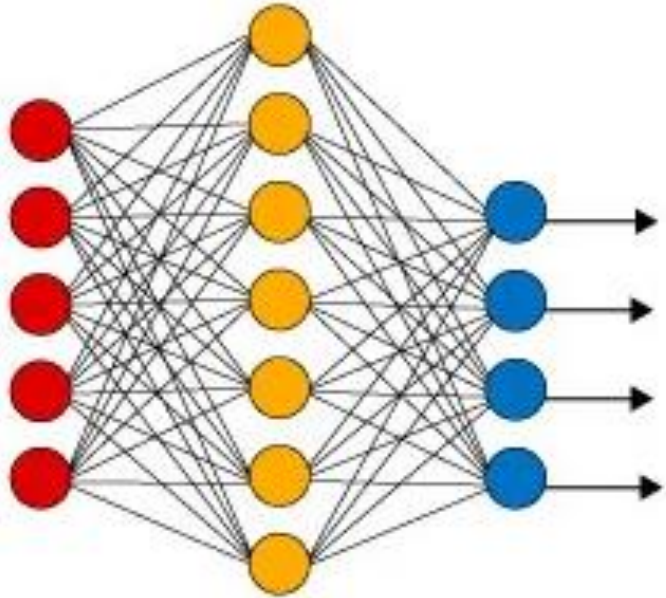
[In this course, we will learning other basic neural network models, and their applications on different machine learning tasks.]

What is Deep Learning ?

What is Deep Learning ?

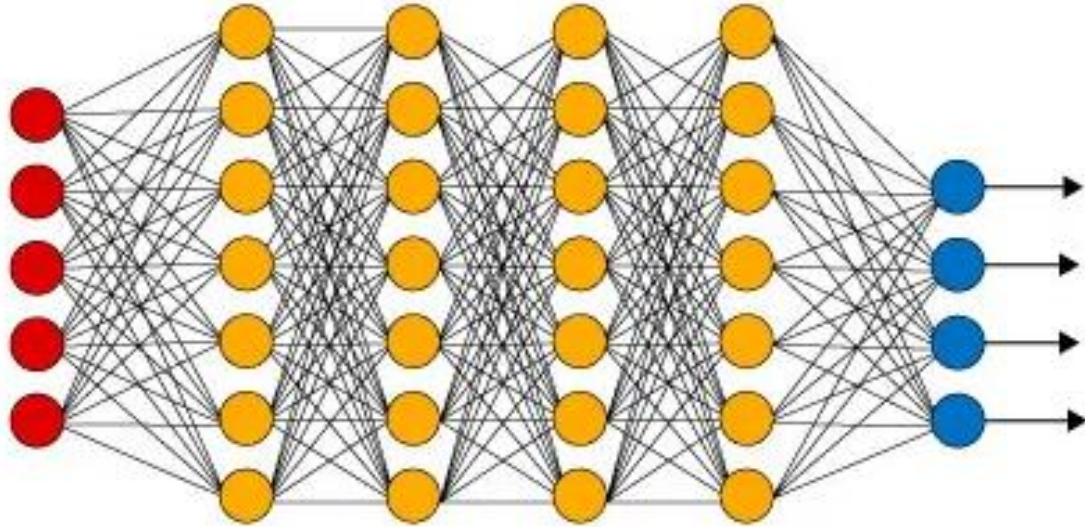
Deep learning is an application of artificial neural networks for performing various machine learning tasks. With the advancement of hardware technologies such as GPU, it allows to develop much larger and complex neural model than what was previously thought possible.

What is Deep Learning?



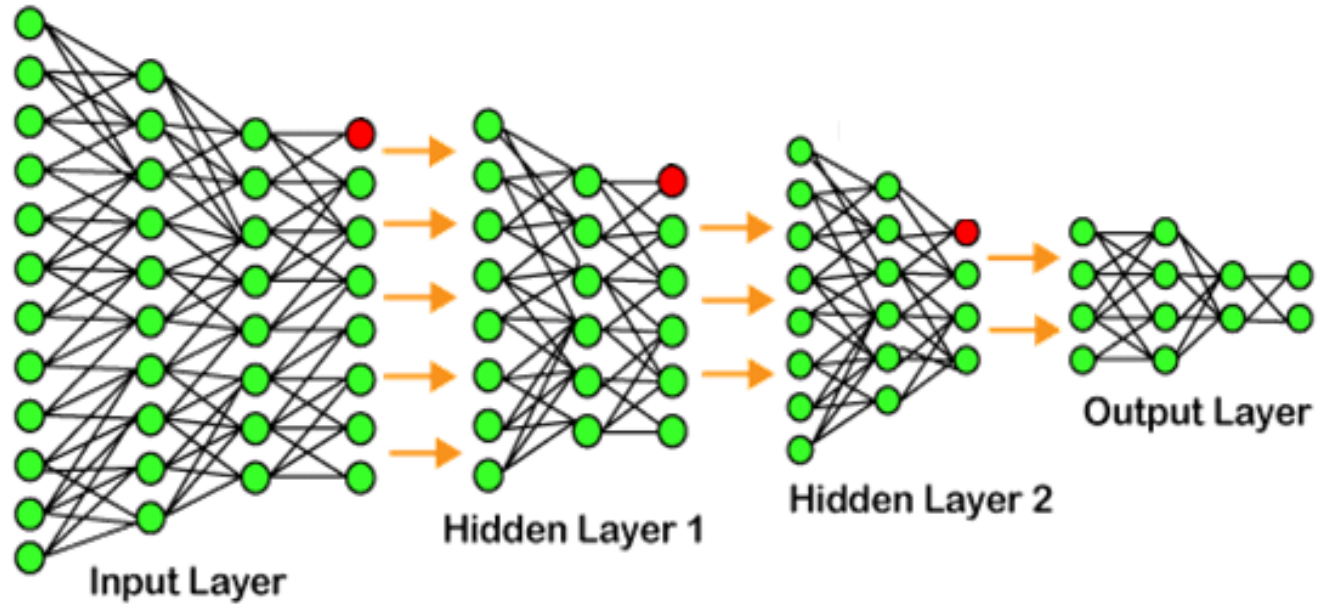
[In the earlier course, we have built simple neural networks with one or two hidden layers. But, the number of hidden layers can be much deeper something like this]

What is Deep Learning?



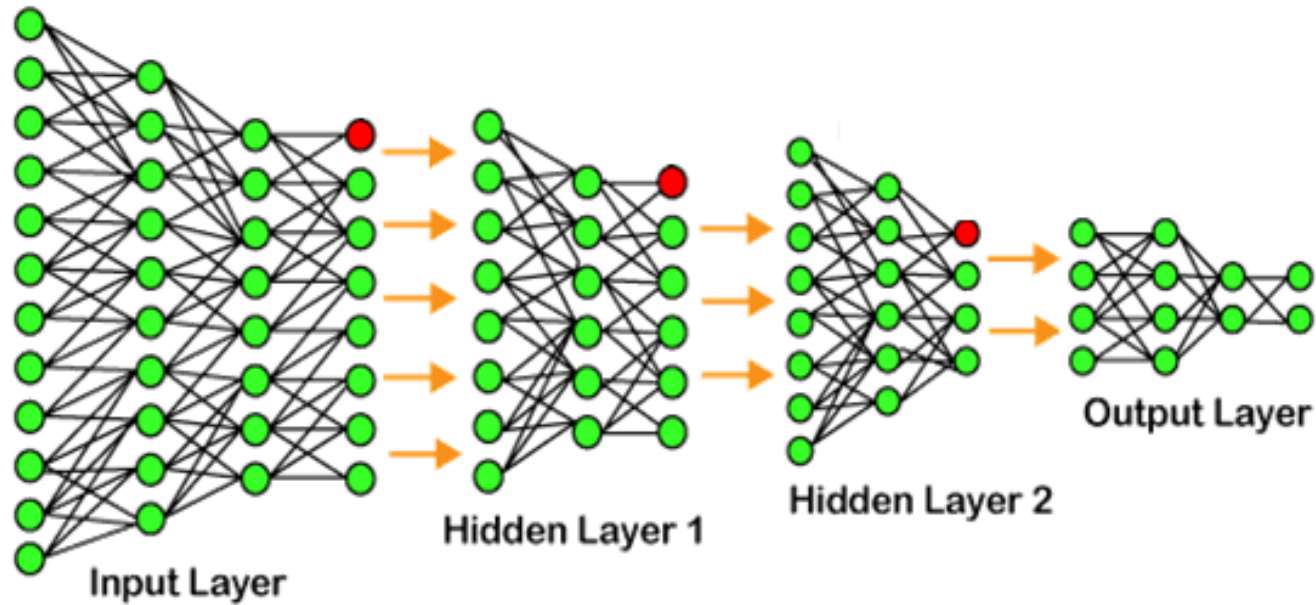
[or, like this]

What is Deep Learning?



[much complex and deeper network. As we increase the number of layers and complexity, the number of the parameters may also be increased making it computationally more expensive.]

What is Deep Learning?



[Earlier, before developing GPU technologies, building such complex models were difficult. But, with GPU, developing such a complex model becomes reality today. So, what is deep learning? Deep learning is neural m]

What is Deep Learning?

Deep learning is development of such a neural network models which can explore much deeper features by adding deeper layers.

[So, what is deep learning?]

Different Types of Basic Neural Models

- **Multilayer Perceptron (MLP)**

[At the core of the majority of the advance deep learning models, three basic neural models are used. Namely ...]

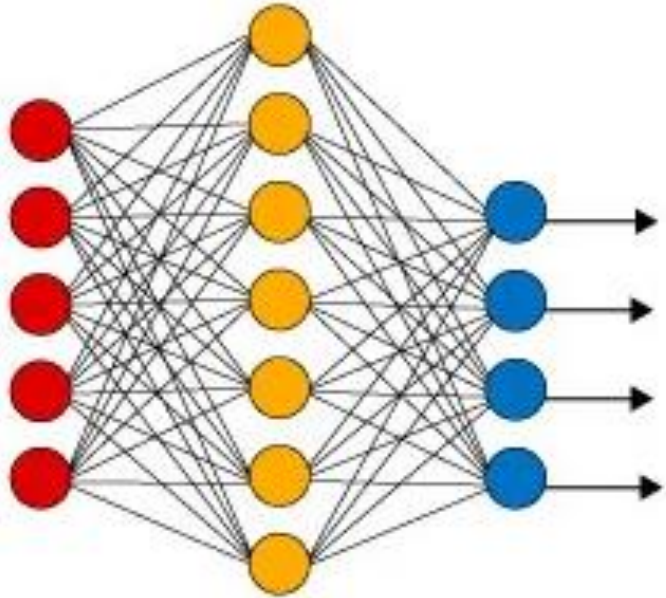
Different Types of Basic Neural Models

- **Multilayer Perceptron (MLP)**
- **Recurrent Neural Network (RNN)**

Different Types of Basic Neural Models

- **Multilayer Perceptron (MLP)**
- **Recurrent Neural Network (RNN)**
- **Convolutional Neural Network (CNN)**

Multilayer Perceptron (MLP)



[You have built multilayer perceptron in the previous course. You have seen that while building MLP, we do not consider context. That means, the model only consider the vector representing the input sample.]

Recurrent Neural Network (RNN)

[However, there are problems which are contextual in nature. For example, natural language processing, where a word is defined by a sequence of characters, a Sentence is define as a sequence of words, document as a sequence of paragraph. If you see]

Recurrent Neural Network (RNN)

- **Machine Translation system**

[For example, machine translation]

Recurrent Neural Network (RNN)

- **Machine Translation system**

Many giraffes at a zoo ⇒ एक चिड़ियाघर में कई जिराफ़

Fruit stand outside market ⇒ बाजार के बाहर फल स्टैंड

[where a text in one language is translated in another language. For this task, the model needs to consider the sequence of the words in the sentence]

Recurrent Neural Network (RNN)

- **Machine Translation system**

Many giraffes at a zoo ⇒ एक चिड़ियाघर में कई जिराफ़

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- **Part – of – Speech Tagging**

[Likewise, part of speech tagging]

Recurrent Neural Network (RNN)

- **Machine Translation system**

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- **Part – of – Speech Tagging**

Why	not	tell	someone	?
adverb	adverb	verb	noun	punctuation mark, sentence closer

[where, given a sentence, we will need to identify the part of speech for each word in the sentence.]

Recurrent Neural Network (RNN)

- Time – Series data

[If you consider time series model, say]

Recurrent Neural Network (RNN)

- Time – Series data



[Price Index, each data point may depend on the previous data point. If we wish to predict a point, we will need to see the previous data points]

Different Types of Basic Neural Models

- Multilayer Perceptron (MLP)
- **Recurrent Neural Network (RNN)**
- Convolutional Neural Network (CNN)

[For such type of contextual problems and data, Recurrent neural network and its variants are used.]

Convolutional Neural Network (CNN)

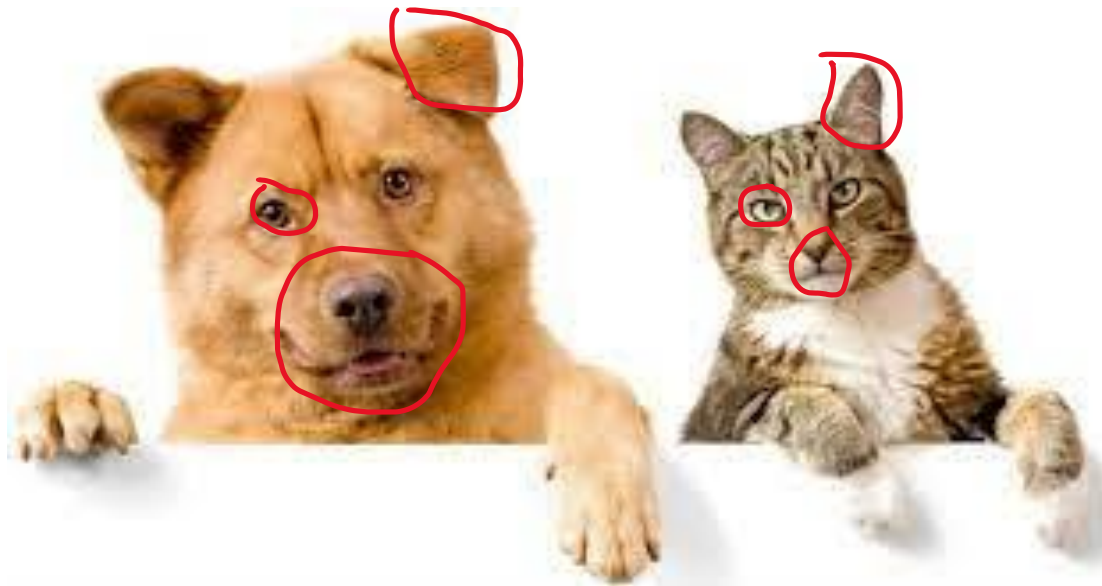
[Initially, Convolutional Neural Network were used mainly for images and videos. As you have seen in the previous course That MLP needs huge parameter when applied on images. Using CNN, the parameters can be reduced. Further, many application domains such as image or videos, one need to focus on localized region of the sample instead of global region.]

Convolutional Neural Network (CNN)



[For example, identifying cat and dog]

Convolutional Neural Network (CNN)



[we may need to focus at localized regions like mount, eyes, ears etc. CNN allows to process and extract information from localized regions. CNN need much smaller number of parameters as compare to MLP. In latter stage, you will also realize that CNN is a sparsely connected version of MLP.]

In This Course, You will Learn

- **RNN and its variants**
- **CNN and its variants**
- **Encoder and Decoder models**

- **And, their applications on real world problems.**