



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore – 35.



## DEPARTMENT OF BIOMEDICAL ENGINEERING

### UNIT 3

### INTRODUCTION OF CONVNET

*ConvNet: In deep learning, a **convolutional neural network (CNN)** is a class of deep neural networks, most commonly applied to analyzing visual imagery.*

ConvNet architectures are basically made of 3 elements:-

1. **Convolution Layers**
2. **Pooling Layers**
3. **Fully Connected Layers**

Let's dig a little deeper into these:

1 <sub>x1</sub>	1 <sub>x0</sub>	1 <sub>x1</sub>	0	0
0 <sub>x0</sub>	1 <sub>x1</sub>	1 <sub>x0</sub>	1	0
0 <sub>x1</sub>	0 <sub>x0</sub>	1 <sub>x1</sub>	1	1
0	0	1	1	0
0	1	1	0	0

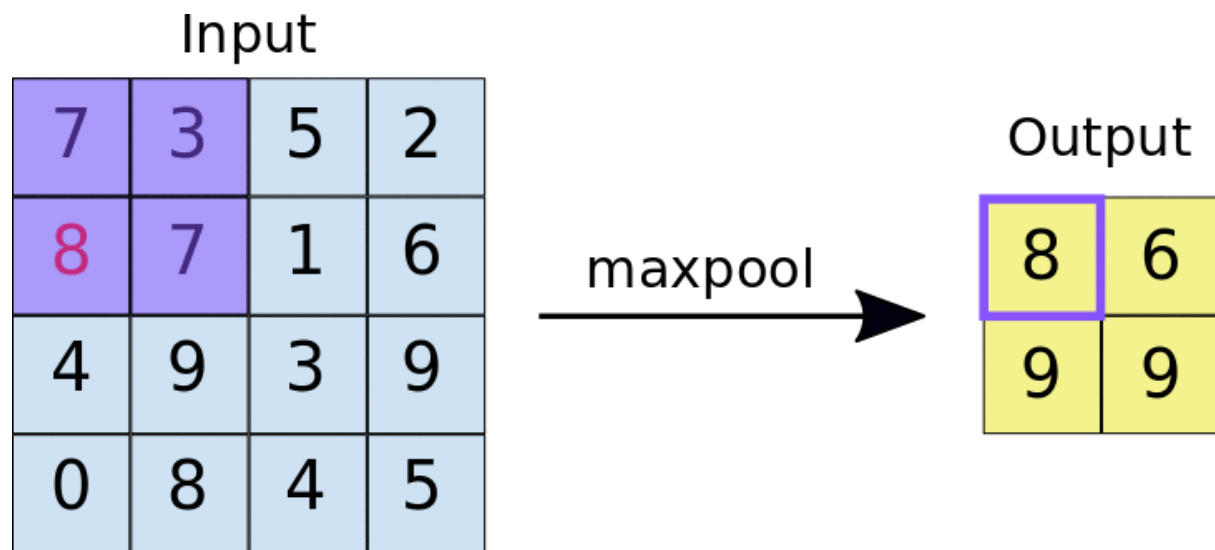
Image

4		

Convolved  
Feature

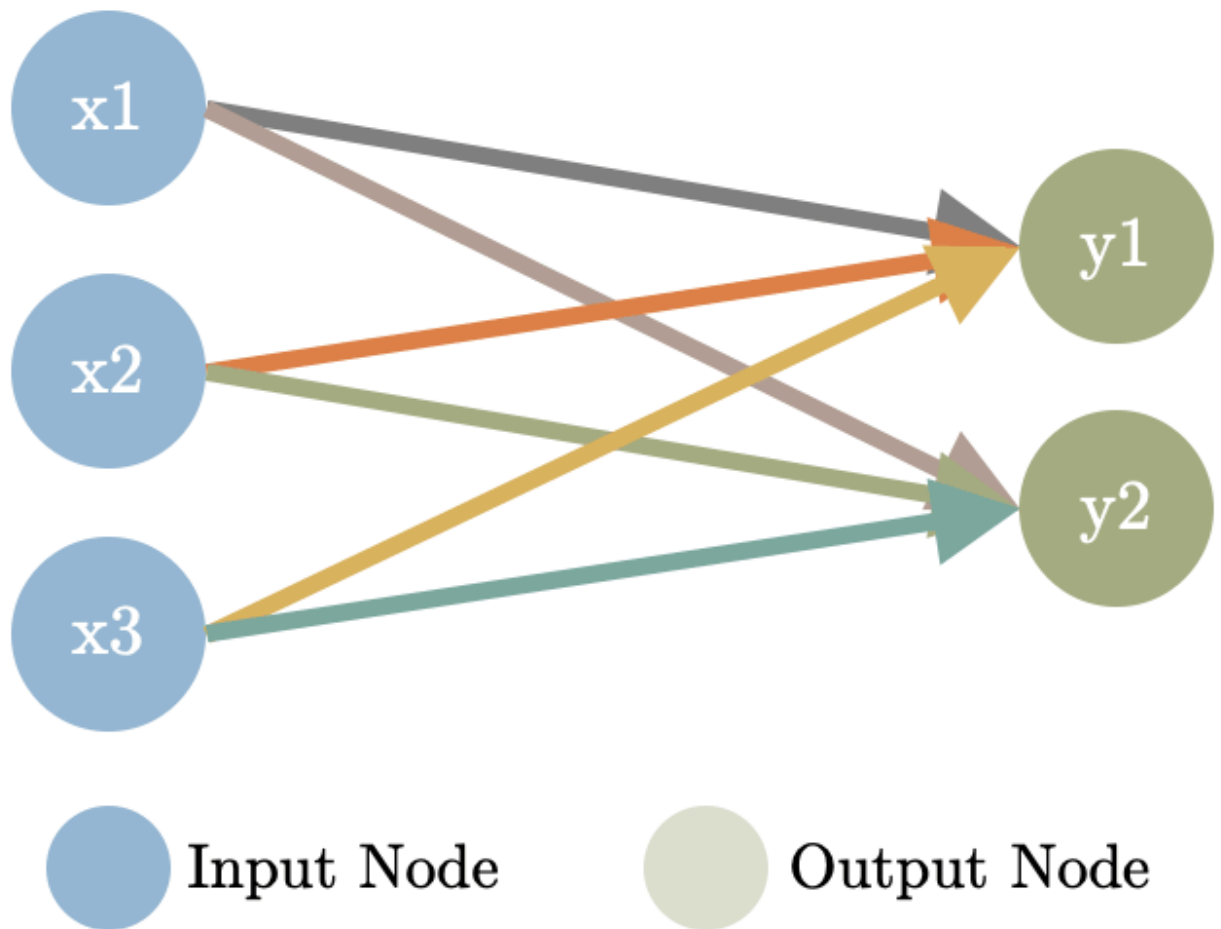
Convolution Layer (source:- giphy.com)

**Convolution-** The term **convolution** refers to the mathematical combination of two functions to produce a third function.



Pooling Layer (Max-pooling) (source:- developers.google.com)

**Pooling-** The objective of **Pooling** is to down-sample an input representation (image, hidden-layer output matrix, etc.), **reducing its dimensions** and allowing for assumptions to be made about features contained in the sub-regions created.

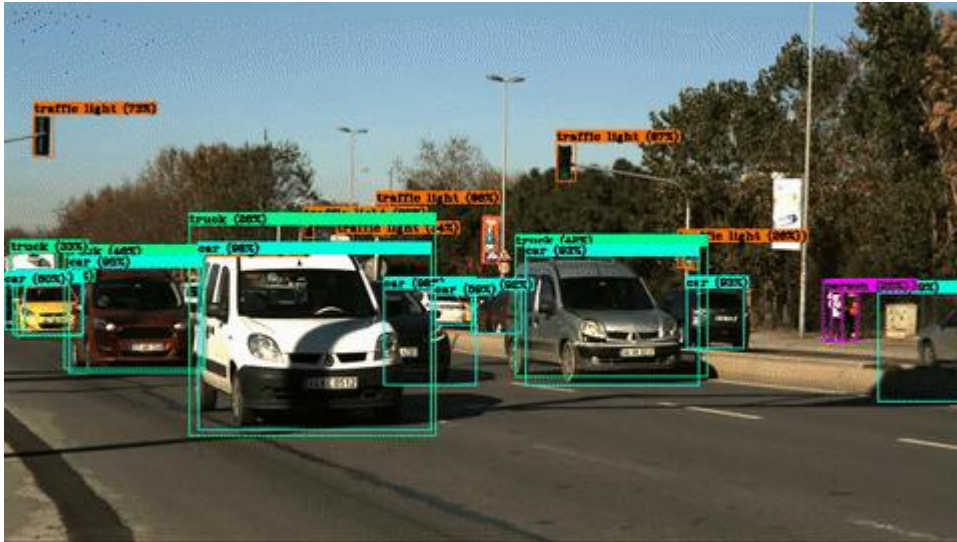


Fully Connected Layers (source:- towardsdatascience.com)

**Fully Connected Layers- FCL** in a neural network are those **layers** where all the inputs from one **layer** are **connected** to every activation unit of the next **layer**.

ConvNet architectures follow a general rule of successively applying Convolutional Layers to the input, periodically down-sampling the spatial dimensions while decreasing the number of **feature maps** using the Pooling Layers.

**Feature Maps-** The **feature map** is the output of one filter applied to the previous layer. I.e at each layer, the **feature map** is the output of that layer.



Object Detection using YOLO (source:- mozanunal.com)

The architectures to be discussed are used as general design guidelines for modern programmers to adapt and used to implement feature extraction and exploring which are further used for image classification, object detection, image captioning, image segmentation and much more.

## References

[https://en.wikipedia.org/wiki/Convolutional\\_neural\\_network#History](https://en.wikipedia.org/wiki/Convolutional_neural_network#History)