

UNIT-III

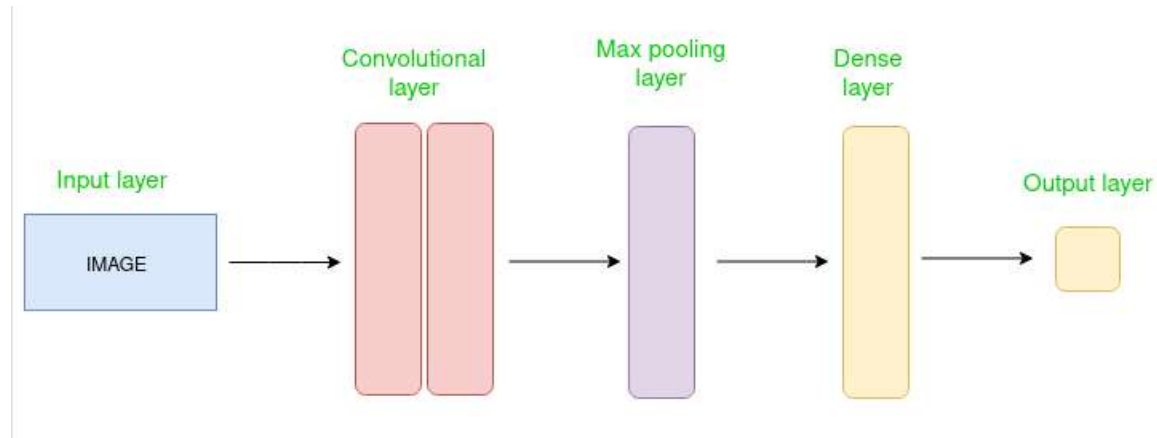
CONVOLUTIONAL NEURAL NETWORKS

PRESENTED BY:
MRS.J.BENITA
AP/CSE
KARE

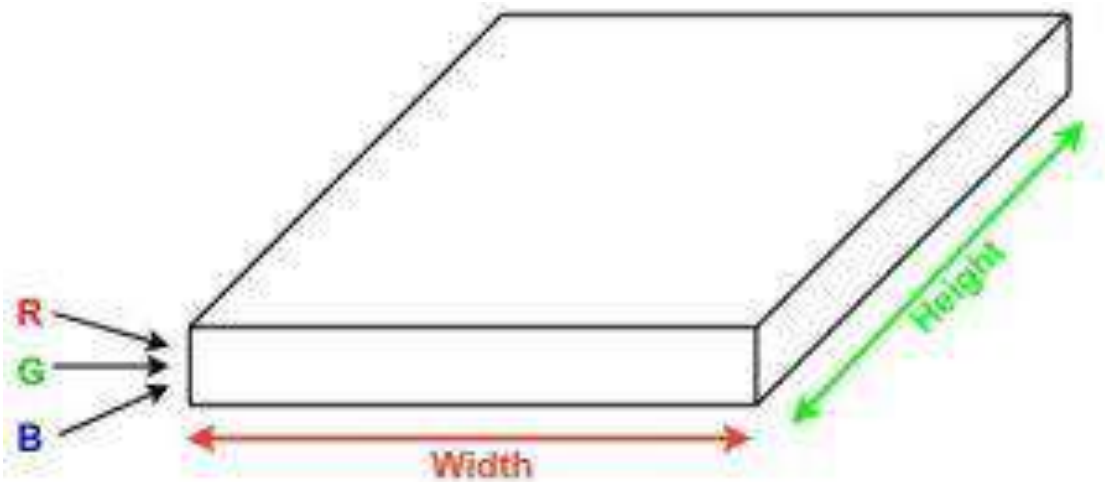
DEFINITION

- ▶ A **Convolutional Neural Network (CNN)** is a type of Deep Learning neural network architecture commonly used in Computer Vision. Computer vision is a field of Artificial Intelligence that enables a computer to understand and interpret the image or visual data.

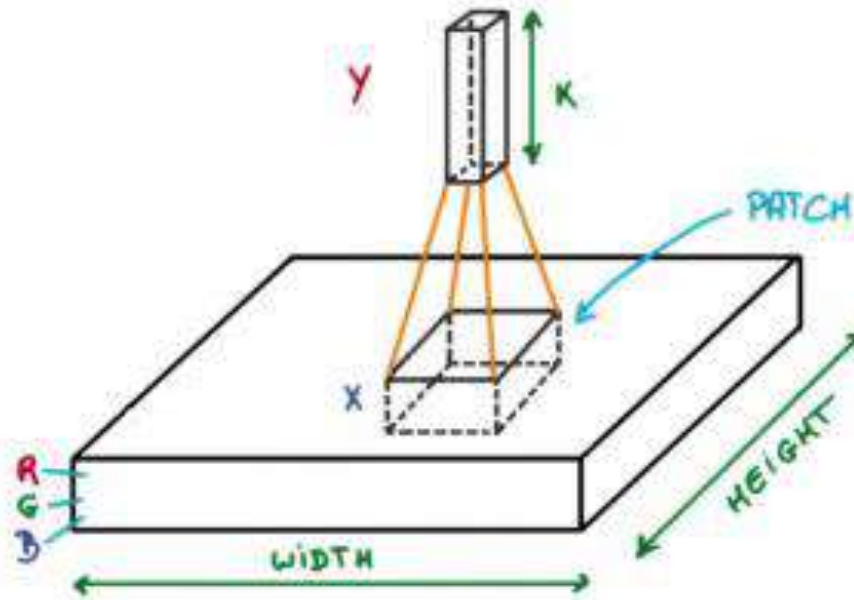
CNN architecture



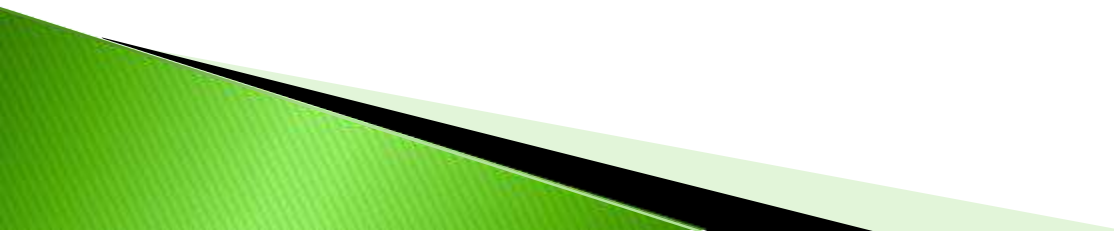
How Convolutional Layers works



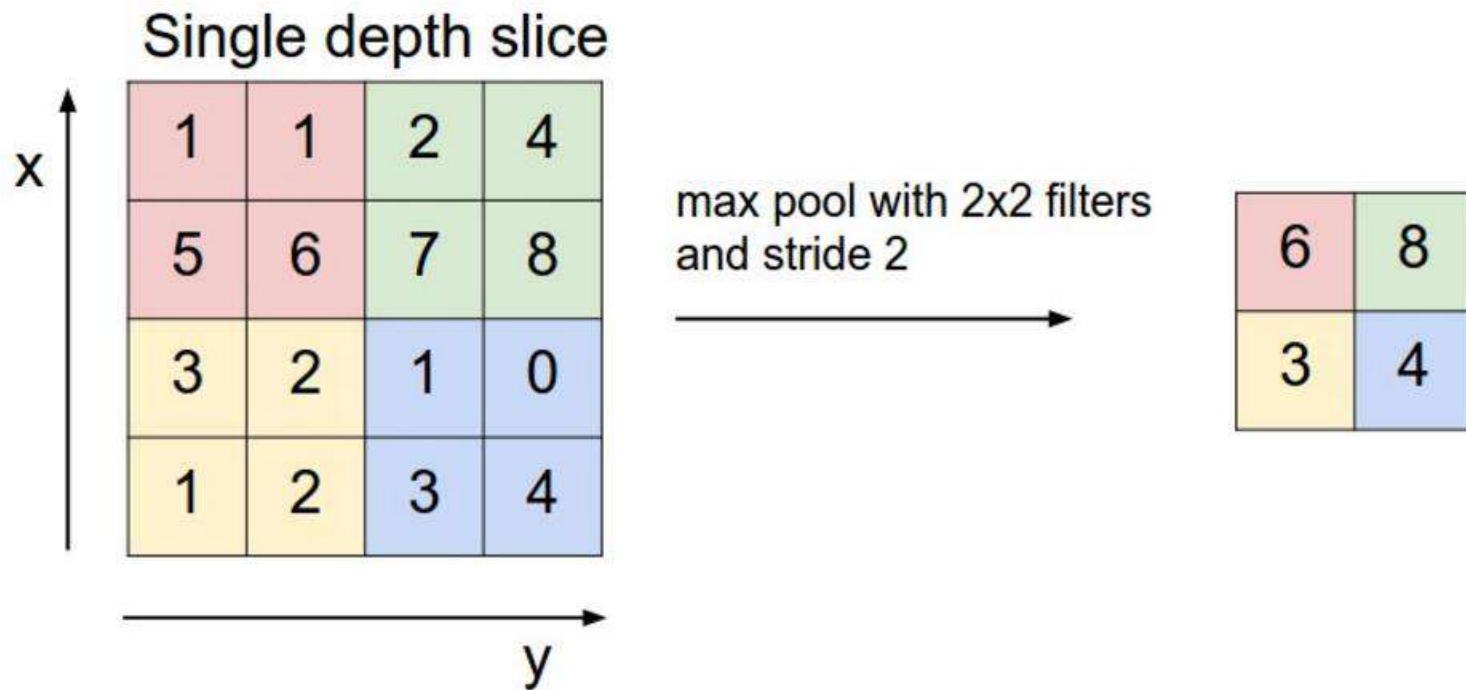
How Convolutional Layers works



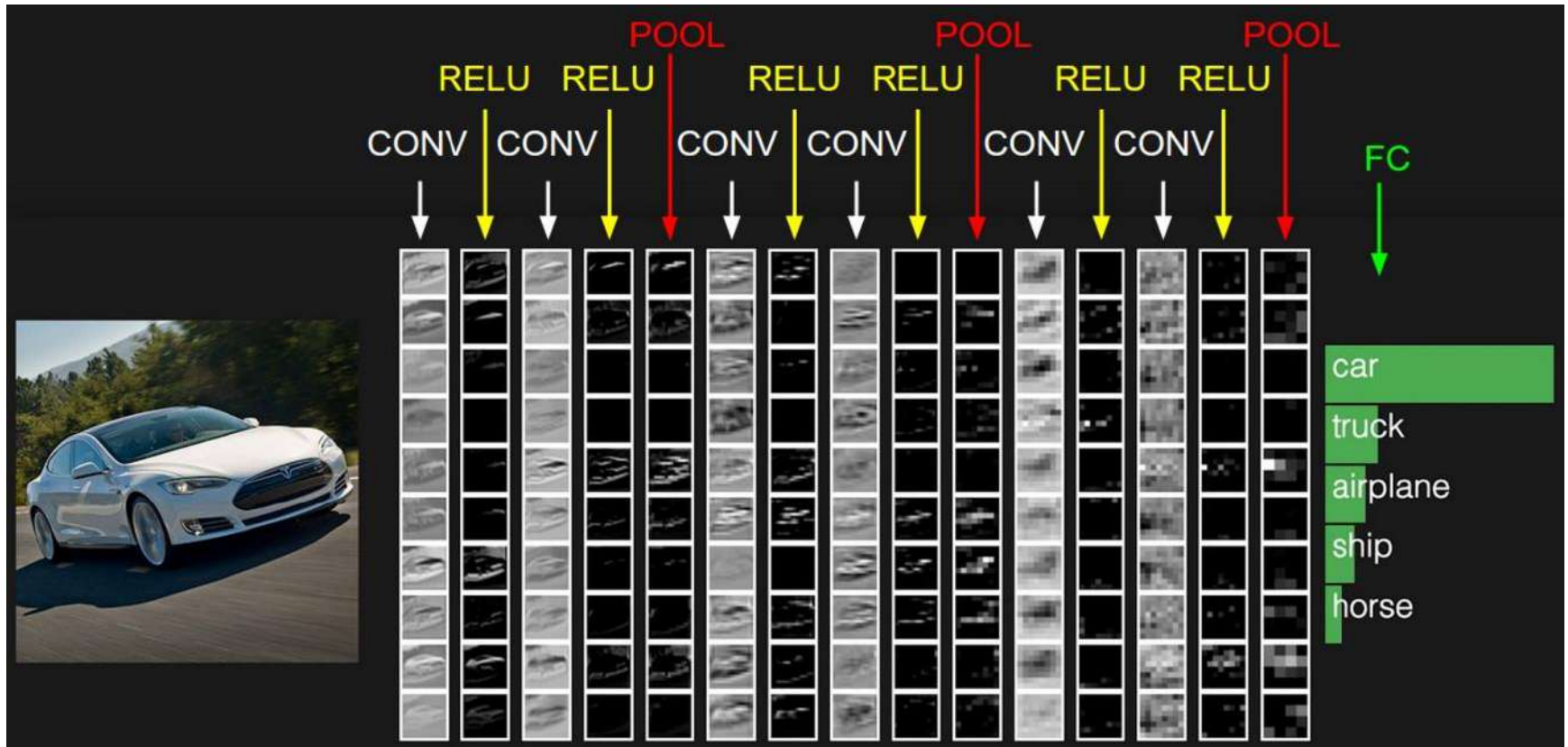
Types of layers:

- ▶ Input Layers
 - ▶ Convolutional Layers
 - ▶ Activation Layer
 - ▶ Pooling layer
 - ▶ Output Layer
- 

Pooling layer



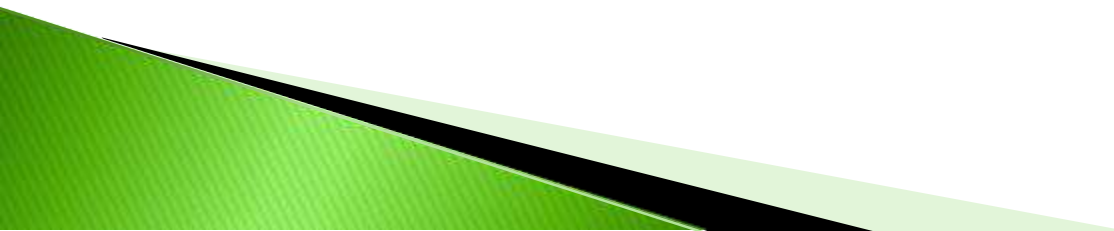
EXAMPLE



Input image



Steps:

- ▶ import the necessary libraries
 - ▶ set the parameter
 - ▶ define the kernel
 - ▶ Load the image and plot it.
 - ▶ Reformat the image
 - ▶ Apply convolution layer operation and plot the output image.
 - ▶ Apply activation layer operation and plot the output image.
 - ▶ Apply pooling layer operation and plot the output image.
- 

Output:

Original Gray Scale image



Output:

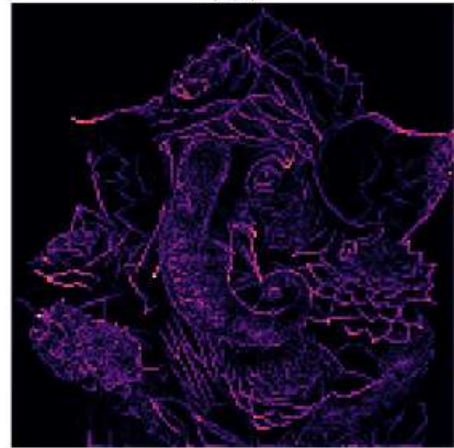
Convolution



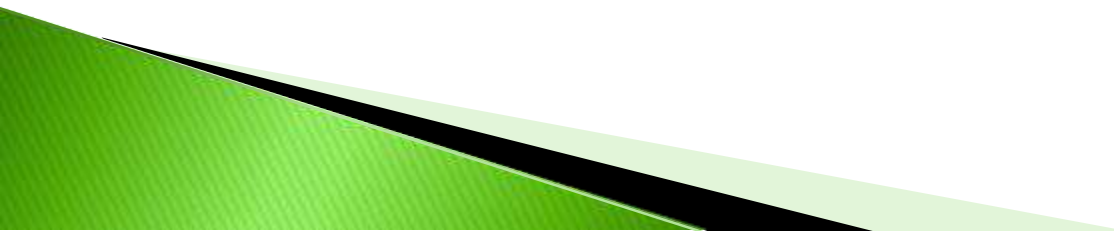
Activation



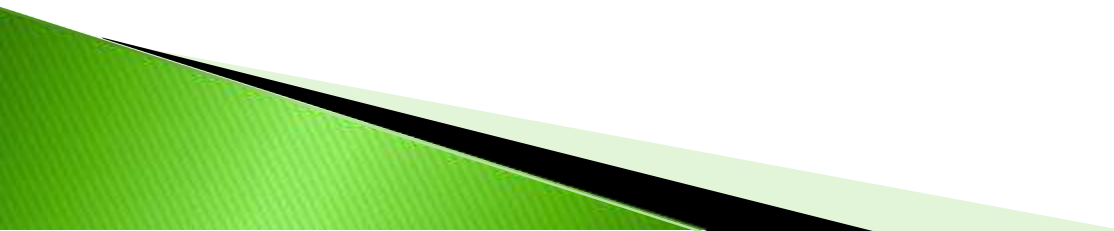
Pooling



Advantages of Convolutional Neural Networks (CNNs):

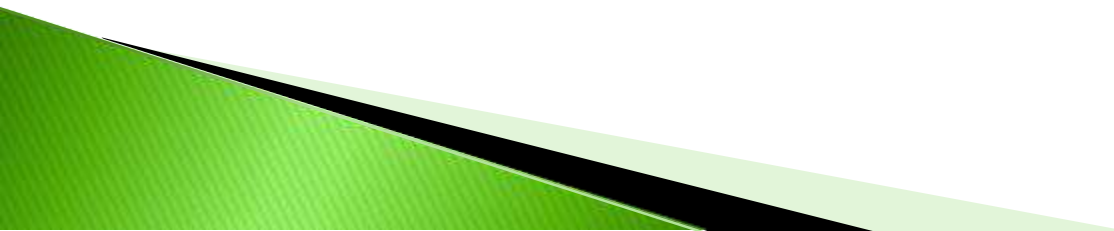
- ▶ Good at detecting patterns and features in images, videos, and audio signals.
 - ▶ Robust to translation, rotation, and scaling invariance.
 - ▶ End-to-end training, no need for manual feature extraction.
 - ▶ Can handle large amounts of data and achieve high accuracy.
- 

Disadvantages of Convolutional Neural Networks (CNNs):

- ▶ Computationally expensive to train and require a lot of memory.
 - ▶ Can be prone to overfitting if not enough data or proper regularization is used.
 - ▶ Requires large amounts of labeled data.
 - ▶ Interpretability is limited, it's hard to understand what the network has learned.
- 

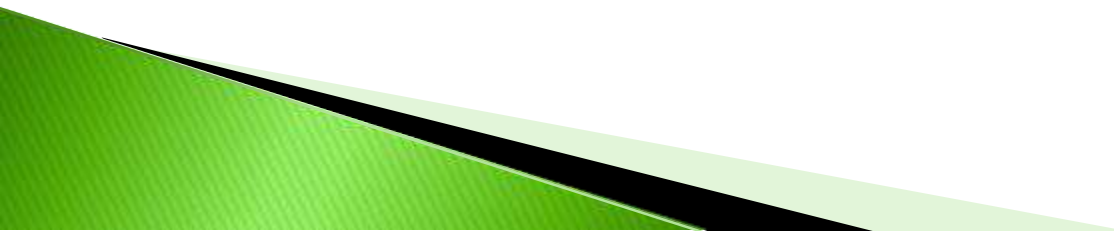
VISUALIZATION OF 2D CNN

- ▶ https://adamharley.com/nn_vis/cnn/2d.html



VISUALIZATION OF 3-D CNN

- ▶ https://adamharley.com/nn_vis/cnn/3d.html



WILL BE CONTINUE IN NEXT
SESSION.....