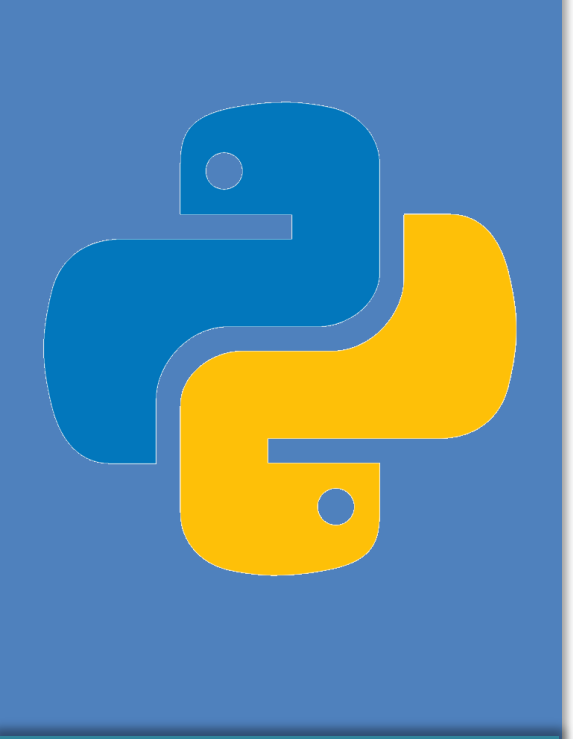

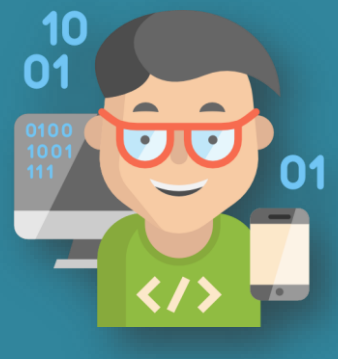

Gender Detection using Python

Sampriti Chatterjee (Great Learning)

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Agenda

1. What is Image Processing?
2. Traditional ML VS Deep learning
3. Human brain VS AI
4. How Image Input work in computer?
5. What is CNN?
6. Layers in CNN
7. Convolutional Layer
8. Relu layer
9. Pooling layer
10. Fully connected layer
11. Demo: Gender detection with Python

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What is Image Processing

Image processing is a method to perform some important operations on an image. In order to get an enhanced high Quality image or to extract the most useful information from that

- It is a one type of signal processing
- In this processing input is an image and output may be image or characteristics/features associated with that image

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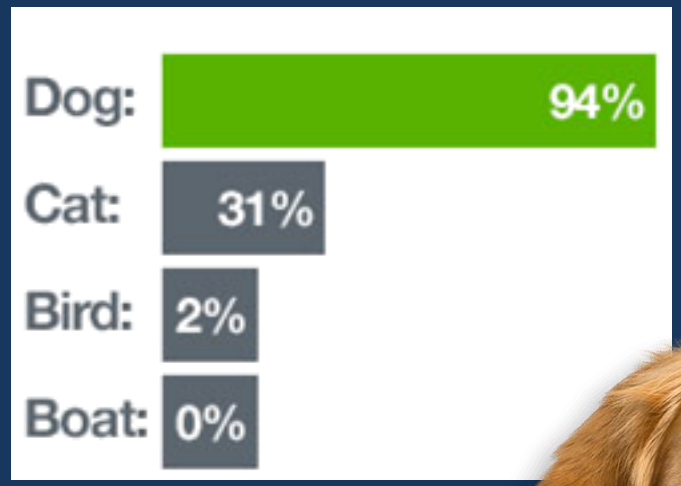
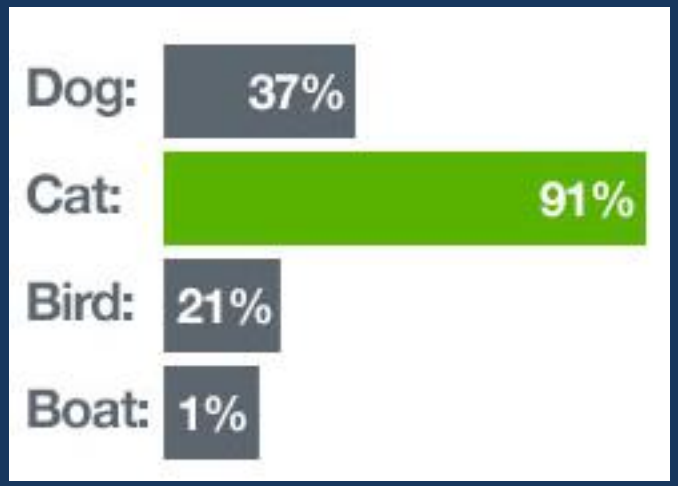
Is It A Cat Or A Dog?





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Is It A Cat Or A Dog?

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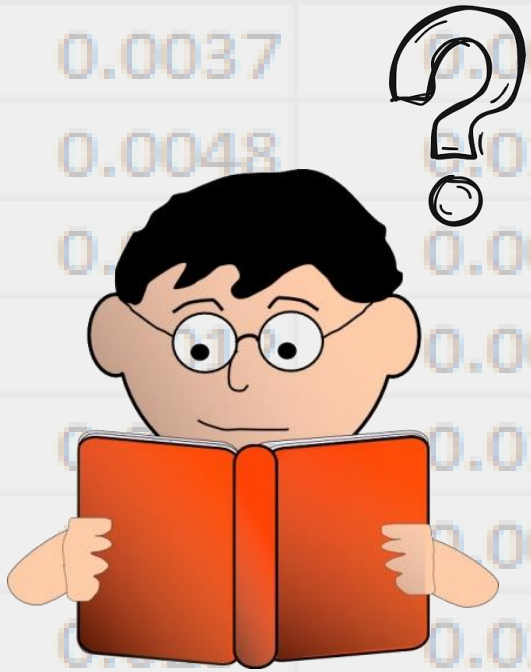
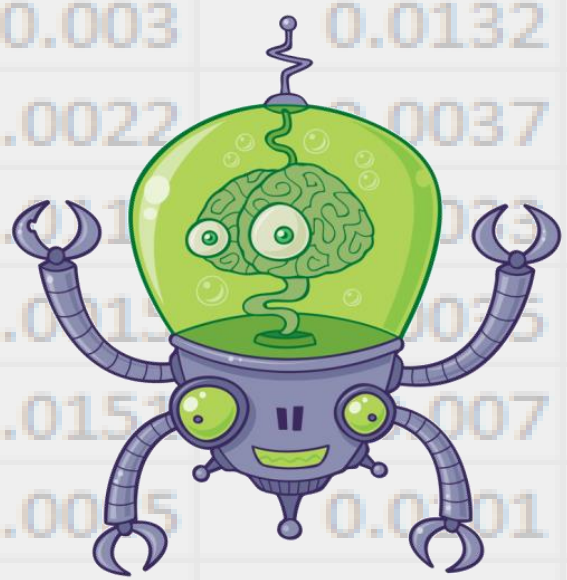
Traditional Machine Learning



Manual selection from so many features is impossible

Deep Learning



This is where traditional machine learning fails and deep learning comes into picture

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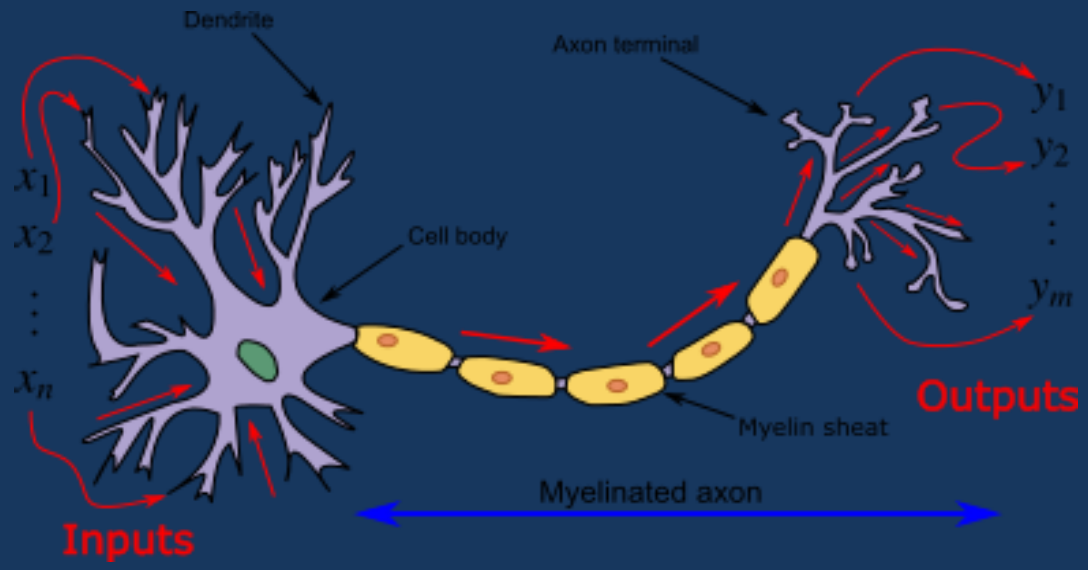
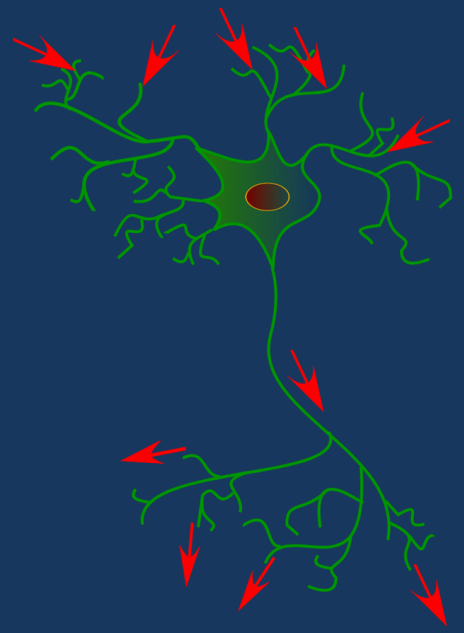
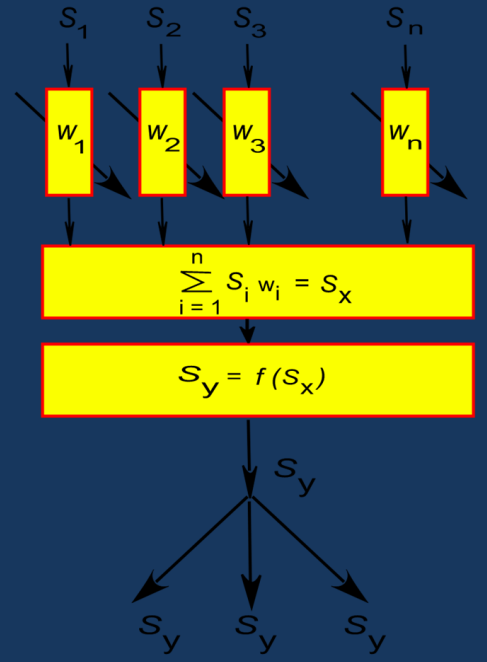
Human Brain VS Neural Network







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Human Brain VS Neural Network

Neuron	Artificial Neuron
• Cell Nucleus	• Node
• Dendrites	• Input: $x1, x2$
• Synapse	• Weights or interconnections
• Axon	• f(x) (mapping, activation, learning)
• Terminal Axon	• Output: y1

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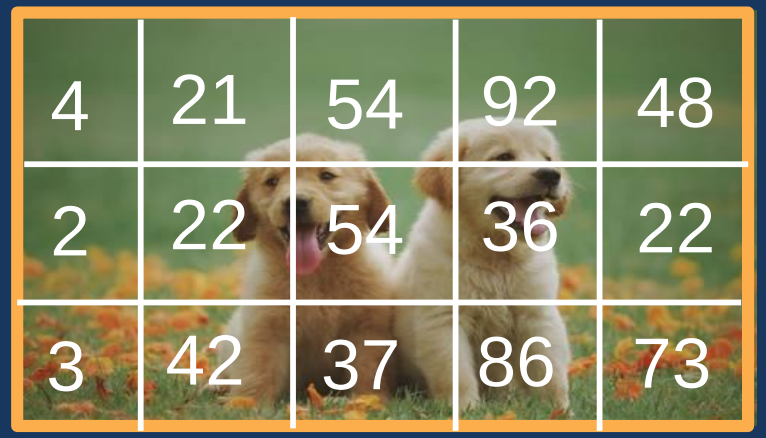
How Image Input Works In Computer?

Converts the image into an array of pixel values where the dimension of array depends on the resolution of the image



Array of dimension 32 X 32 X 3 (The 3 refers to RGB values)

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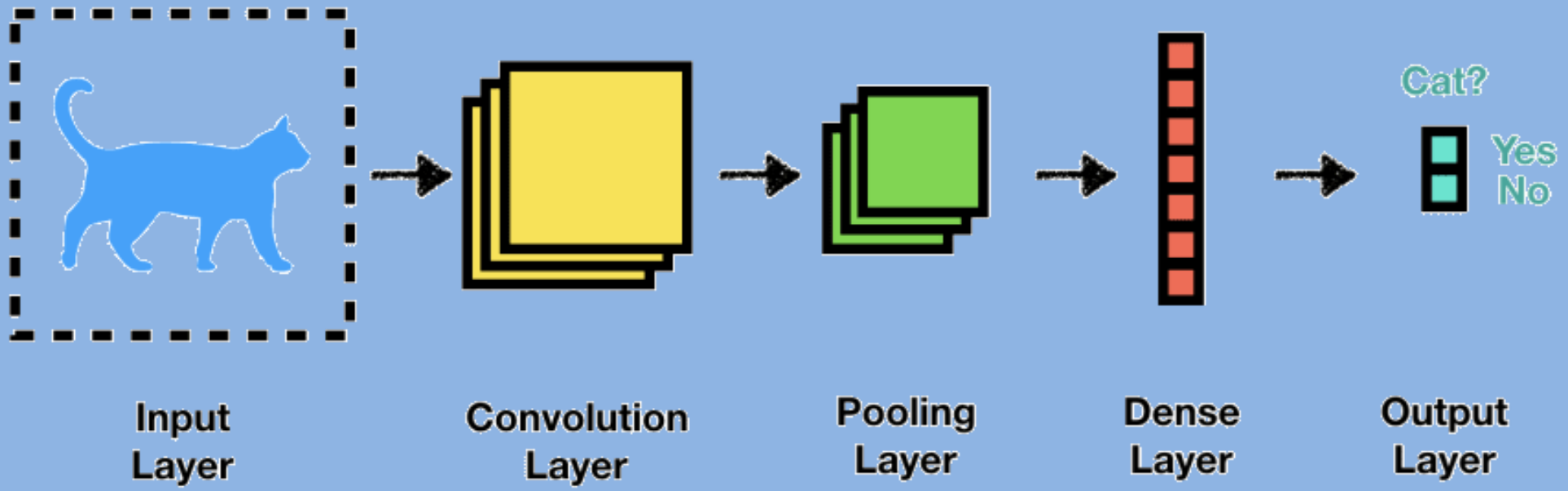
What is CNN?

"A feed forward network to process and recognize image data with the grid version"



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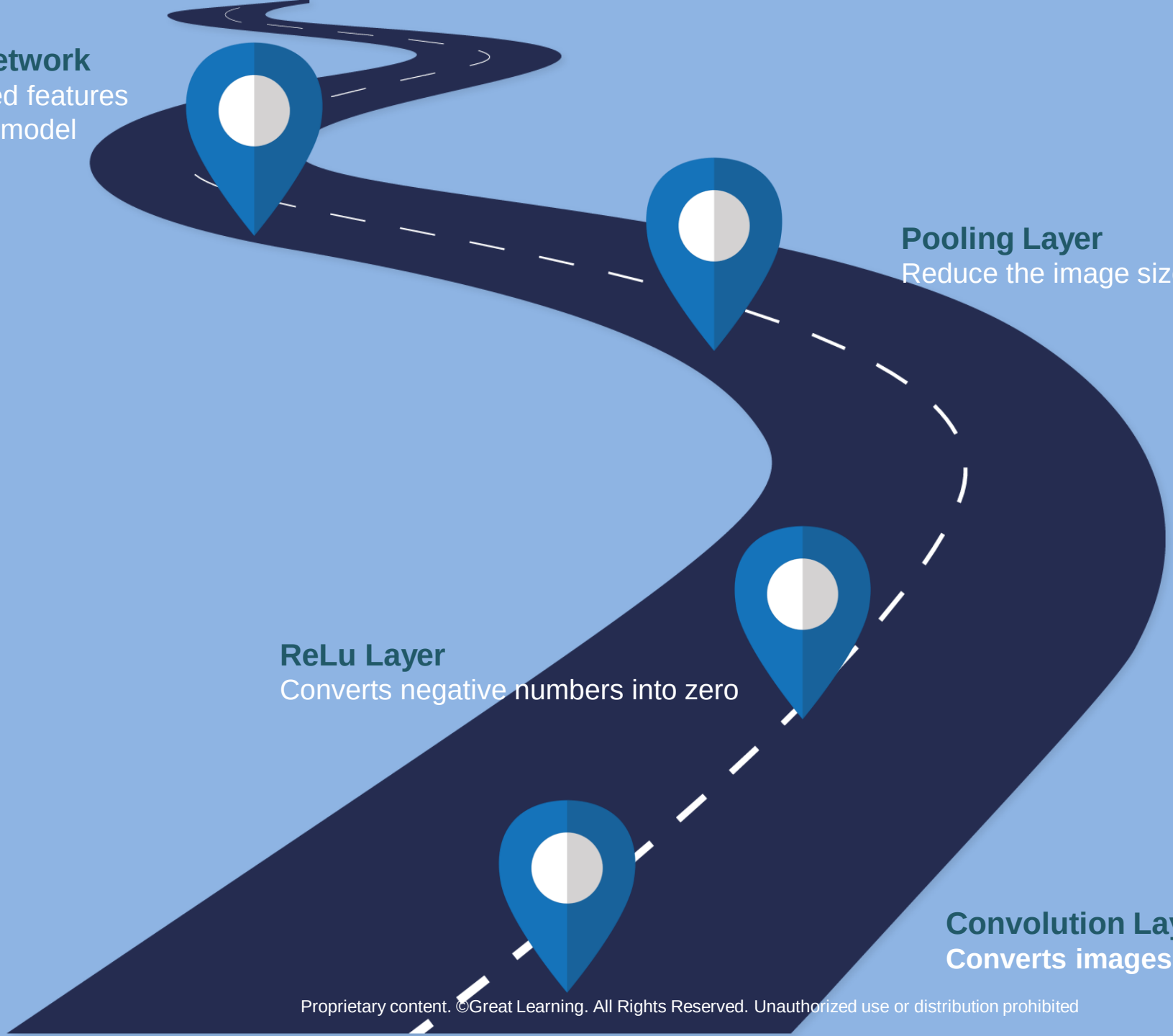
Fully Connected Network
Combines the extracted features and represents a new model



Pooling Layer
Reduce the image size

ReLu Layer
Converts negative numbers into zero

Convolution Layer
Converts images into an array

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Layers In CNN

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Layers in CNN

1. **Convolutional Layer**
2. ReLU
3. Pooling Layer
4. Fully Connected Layer

Convolutional Layer

"Converts images into an array"

- First layer of CNN
- Stores the pixelated values of image into an array
- Used for extracting the features of the image and reducing its dimensionality

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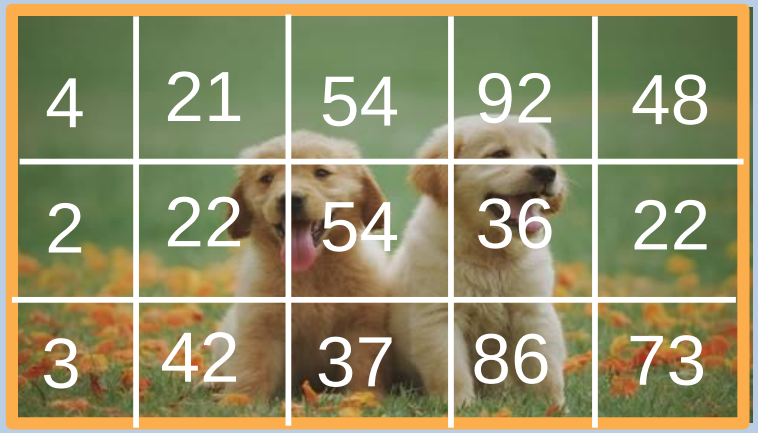
Working Of Convolutional Layer



4	21	54	92	48
2	22	54	36	22
3	42	37	86	73

*

0	-1
1	1

Filter/Feature detector

Terminology Alert!!

3	22	-2	10
23	25	87	139

- Extracted features from the image
- Dimension reduced

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Layers In CNN

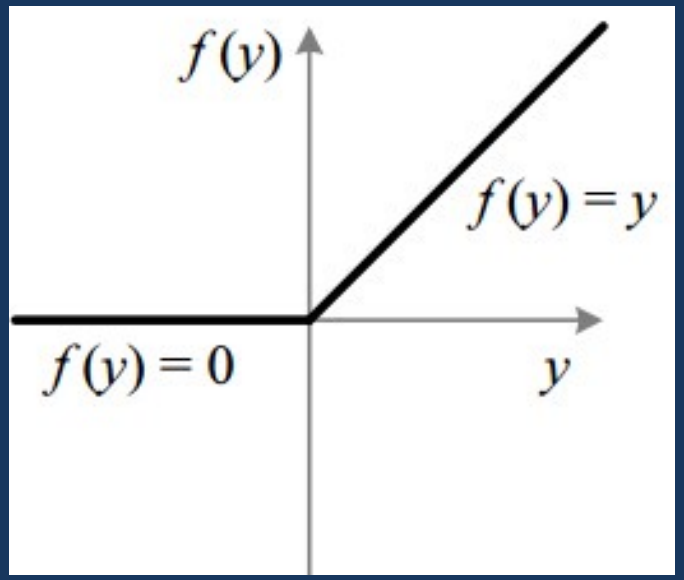
Activation function: ReLu

Layers in CNN

1. Convolutional Layer
2. **ReLU**
3. Pooling Layer
4. Fully Connected Layer

“Converts negative values into zero”

- ReLU is a half rectifier
  - f(y) = 0 when y < 0
  - f(y) = y when y > = 0
- Range of ReLU : [0 to infinity]



ReLu

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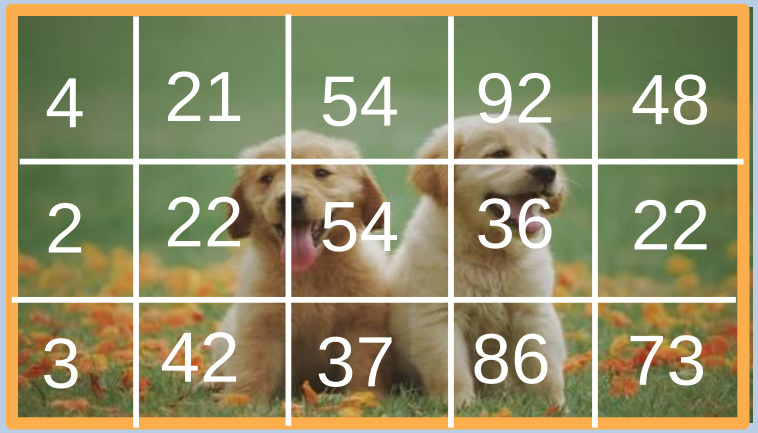
Working Of Relu Layer



3	22	-2	10
23	25	87	139

Applying ReLu layer

3	22	0	10
23	25	87	139

After removing the negative values

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Layers In CNN

Pooling Layer

Layers in CNN

1. Convolutional Layer
2. ReLU
3. **Pooling Layer**
4. Fully Connected Layer

“Reduces the spatial size and the numbers of parameters”

- Used to reduce dimensionality
- Helps to control overfitting
- Filters of size 2x2 are commonly used in it

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Working Of Pooling Layer

3	22	0	10
23	25	87	139

2*2 with stride = 1

Max Pooling

3	22	0	10
23	25	87	139

25			

Terminology Alert!!

Amount of movement between applications of the filter to the input image is referred as stride

3	22	0	10
23	25	87	139

25	87		

3	22	0	10
23	25	87	139

25	87	139	

3	22	0	10
23	25	87	139

25	87	139	139

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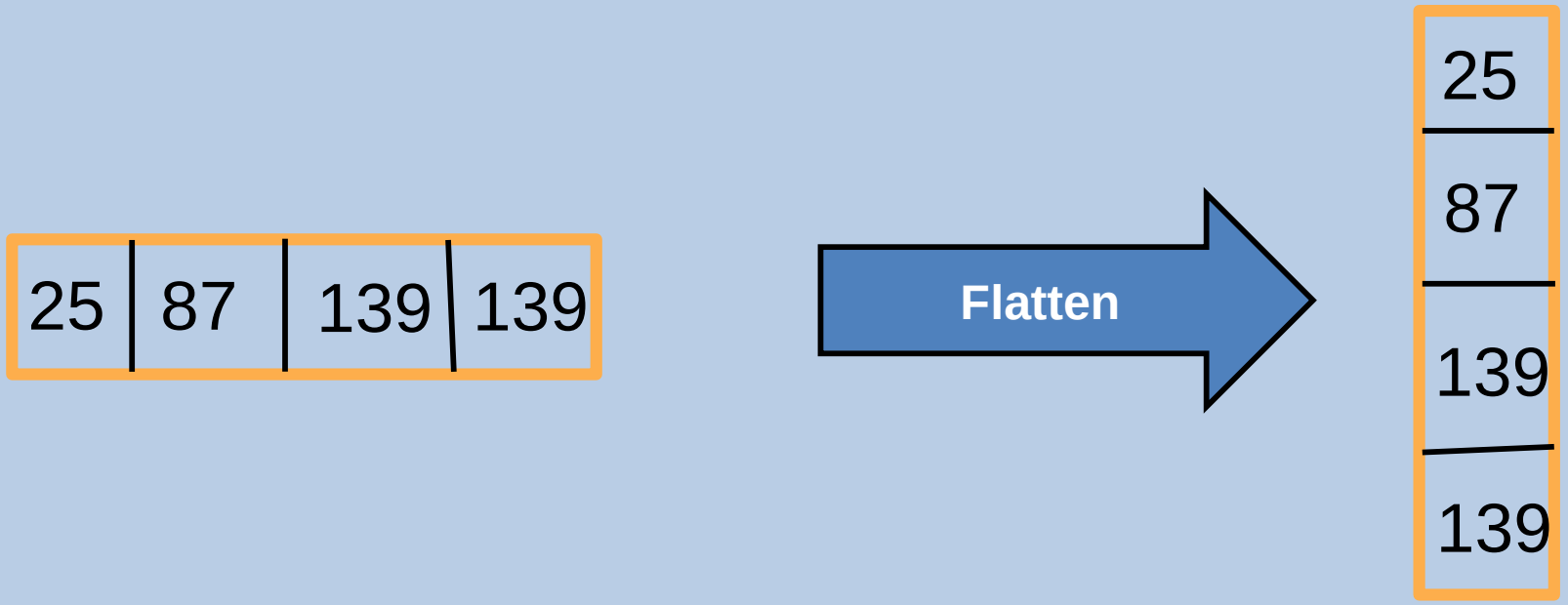
Flatten The Data

“Converting the Pooled feature map into an array is known as data flattening”



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Layers In CNN

Fully connected Layer

Layers in CNN

1. Convolutional Layer
2. ReLU
3. Pooling Layer
4. **Fully Connected Layer**

“Combines all the features together to create a final model”

- Used to reduce dimensionality
- Helps to control overfitting
- Filters of size 2x2 are commonly used in it

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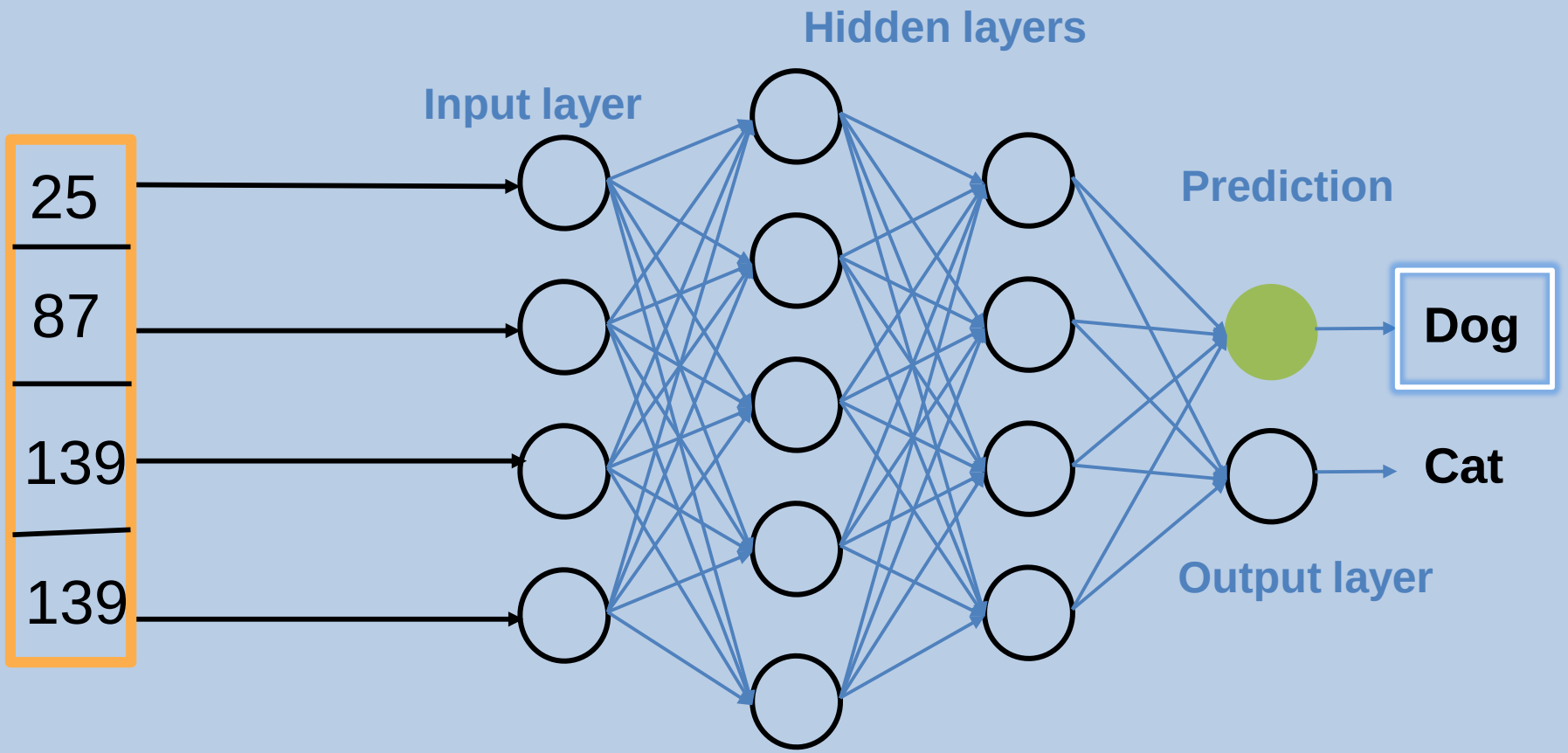
Working Of Fully Connected Layer



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Thank You

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