CNN Image Processing

How computer understand or recognize an image ?

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How does a computer system recognize an image ?

Based on probability, specific calculations , and deep learning algorithms where the machine is first trained with the specific features of object or faces, such as the shape of the face, the distance between the eyes, etc. After teaching the machine these objects faces features, it will start to accept all objects in an image that resemble a similar objects or faces.

How does a computer recognize an image , is it a cat or a do ?

This is a dog.

This is a cat.

Image Processing using CNNs

Convolutional Neural Networks are deep learning algorithms that are very powerful for the analysis of images. Images contain data of RGB combination. Color images are stored in 3-dimensional arrays. The first two dimensions correspond to the height and width of the image (the number of pixels). The last dimension corresponds to the red, green, and blue colors present in each pixel. 2D array or matrix of pixel values representing visual data, where each pixel has a specific color value composed of red, green, and blue intensities**. The image of cat can be represented as array of pixels .**

	0	1	2	3	4
0	**255**	184	178	84	129
1	84	**255**	**255**	130	84
2	78	**255**	0	0	78
3	84	130	**255**	130	84

Layers of CNN in Image Processing

- **Convolutional Layer**

  In a typical neural network, each input neuron is connected to the next hidden layer. In CNN, only a small region of the input layer neurons connect to the neuron hidden layer.

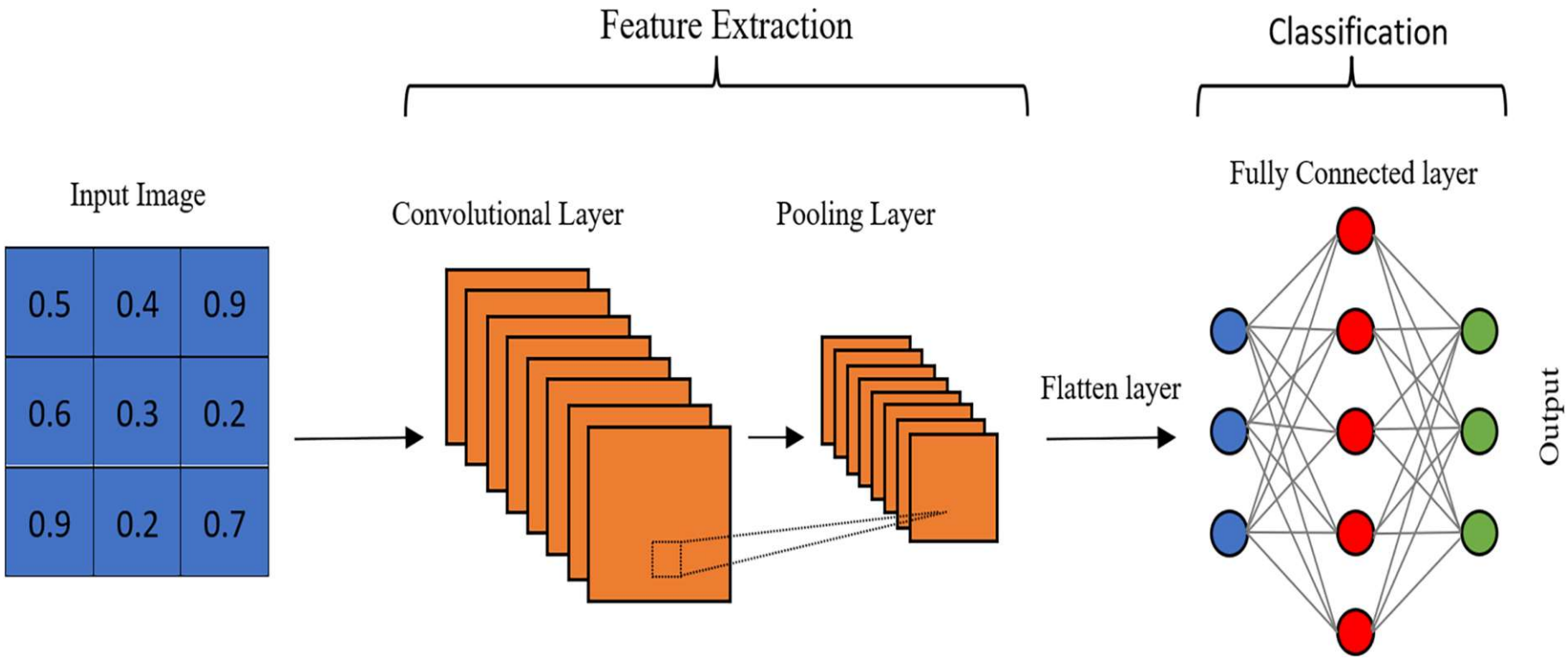
- **Pooling Layer**

  The pooling layer is used to reduce the dimensionality of the feature map. There will be multiple activation & pooling layers inside the hidden layer of the CNN.

- **Fully-Connected layer**

  Fully Connected Layers form the last few layers in the network. The input to the fully connected layer is the output from the final Pooling or Convolutional Layer, which is flattened and then fed into the fully connected layer.

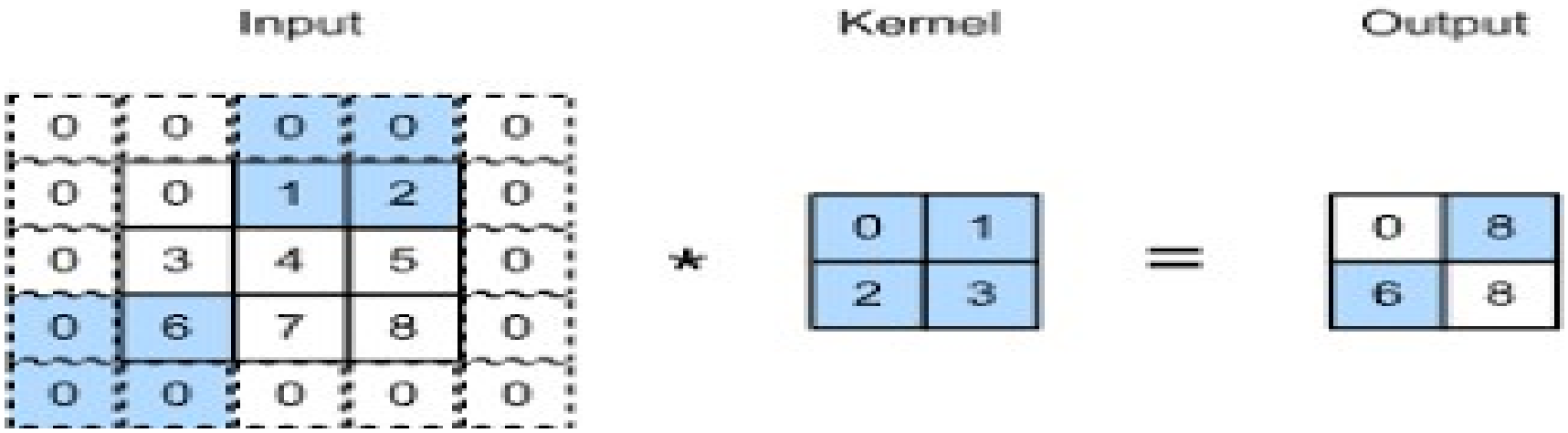
How CNN layers process the Image.



Filter , Resolution and Sizing

- **Stride** is a filter value used for filtration and resolution of array of pixels of array of image .

If stride is one, then the filter moves one pixel and calculates the Convolutional output. If stride is a considerable value, then the Convolutional output complexity decreases, but it also affects the accuracy. The general rule suggested is to take the stride's value less than twice the filter size [21]-[23]. This is used for image resolution and sizing , cropping of the image.



Role of Probability in CNN Image Processing

A Probability map in a CNN is a map that assigns a probability value to each pixel or region in an image, indicating the likelihood of that pixel or region belonging to a certain class or category. It is used for tasks such as object detection, segmentation, and classification. After that based on multiple recognition and probability of images , it identify the objet or face in the image.