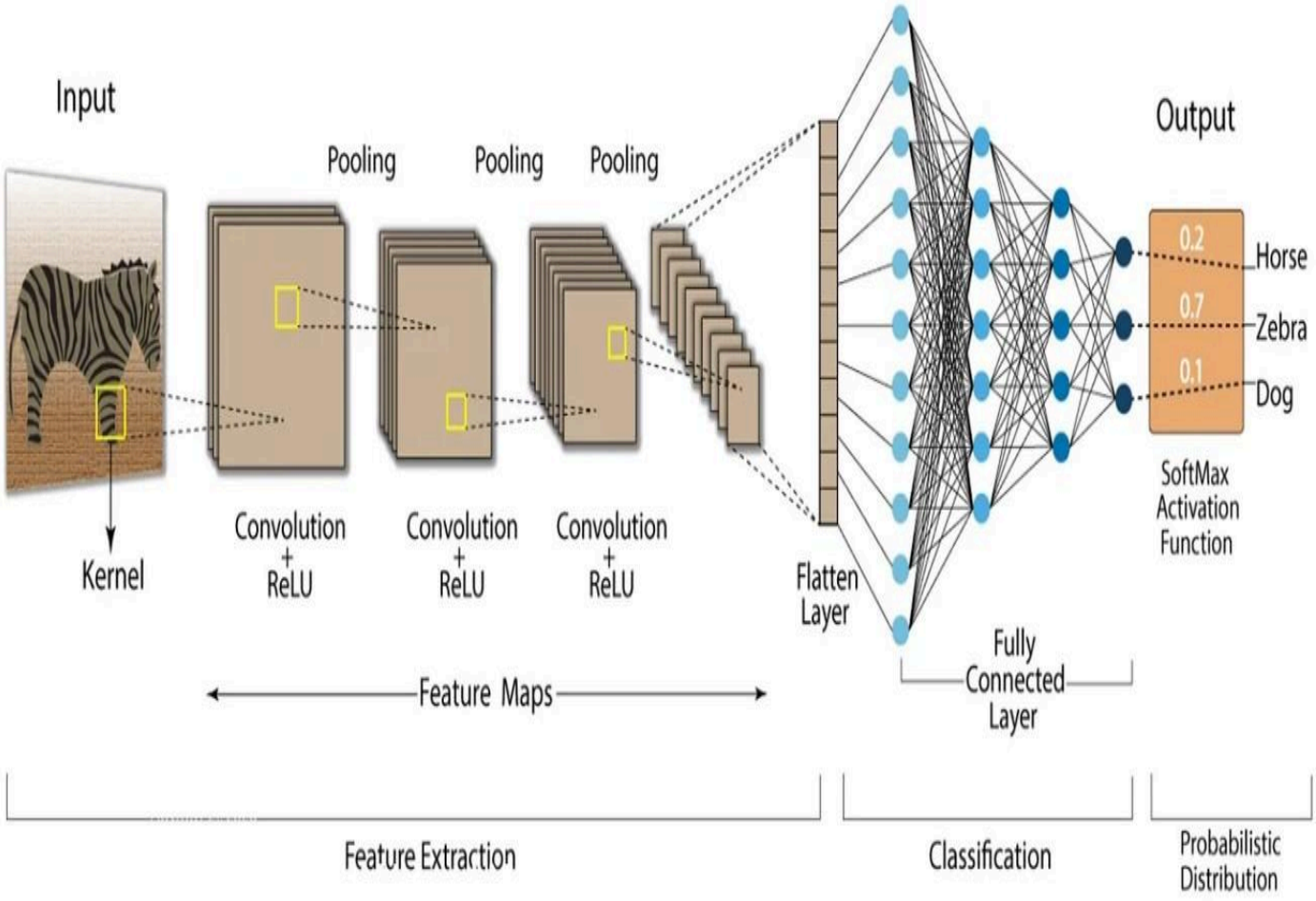
Convolutional Neural Network :

A Convolutional Neural Network (CNN) is a type of deep learning algorithm primarily used for processing and analyzing visual data.
CNNs are especially effective for image recognition, image classification, and other computer vision tasks.

Convolutional neural networks are distinguished from other neural networks by their superior performance with image, speech, or audio signal inputs. They have three main types of layers, which are:

- Convolutional layer
- Pooling layer
- Fully-connected (FC) layer

Convolution Neural Network (CNN)



The biological inspiration behind Convolutional Neural Networks (CNNs) comes from the way the human visual system processes visual information.

You can open this medium post to know more about it : - https://medium.com/@gopalkalpande/biological-inspiration-of-convolutional-neural-network-cnn-9419668898ac

Why CNN and not ANN?

We can definitely use ANNs (Artificial Neural Networks) for image data.
But it results as :-

- High computations
- Overfitting
- Loss of important features (like spatial arrangements of pixels)

(image maa shape,patterns,structure dekhina ko lagi jasari pixel arranged bhako hunxa teslai spatial arrangements of pixels vaninxa)

For example, a 50x50 image has 2,500 pixels, so an ANN would need 2,500 input neurons. However, for larger images, the number of inputs and connections grows significantly, leading to a huge number of parameters.

This makes ANNs less efficient and more resource-intensive for image tasks. In contrast, CNNs (Convolutional Neural Networks) handle images more effectively by focusing on local patterns, reducing the number of parameters, and making the model more efficient and better at recognizing features.

CNN Application :-

CNNs (Convolutional Neural Networks) are widely used in various applications, including:

1. **Image Classification**: Identifying objects in images, such as recognizing animals, vehicles, or everyday objects.
2. **Object Detection**: Detecting and localizing objects within an image, useful in autonomous driving and surveillance.
3. **Face Recognition**: Identifying and verifying individual faces, used in security and social media tagging.
4. **Medical Image Analysis**: Diagnosing diseases from medical scans, like detecting tumors in MRIs and X-rays.
5. **Image Segmentation**: Dividing an image into meaningful segments, used in medical imaging and autonomous driving.

6. **Video Analysis**: Analyzing video frames for tasks like action recognition and video surveillance.
7. **Natural Language Processing**: Using CNNs for text classification, sentiment analysis, and other NLP tasks.