



Hands on Machine Learning

Raghavendra.M.J

Department of ECE, PESU.

Hands on Machine Learning

TEXT BOOK AND REFERENCES



TEXT BOOK:

Book Type	Author & Title	Edition	Publisher	Year
Textbook 1	“Hands on Machine learning with scikit learn and scientific Python Toolkits”, Tarek Amr	1 st	Packt	2020
Textbook- 2	“Python Machine Learning”, Sebastian Raschka, Vahid Mirjalli	3 rd	Packt	2019

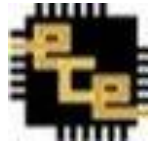
UNIT-2 Convolution Neural Networks(CNN) Basics

- The building blocks of CNNs
- Understanding CNN and Feature hierarchies

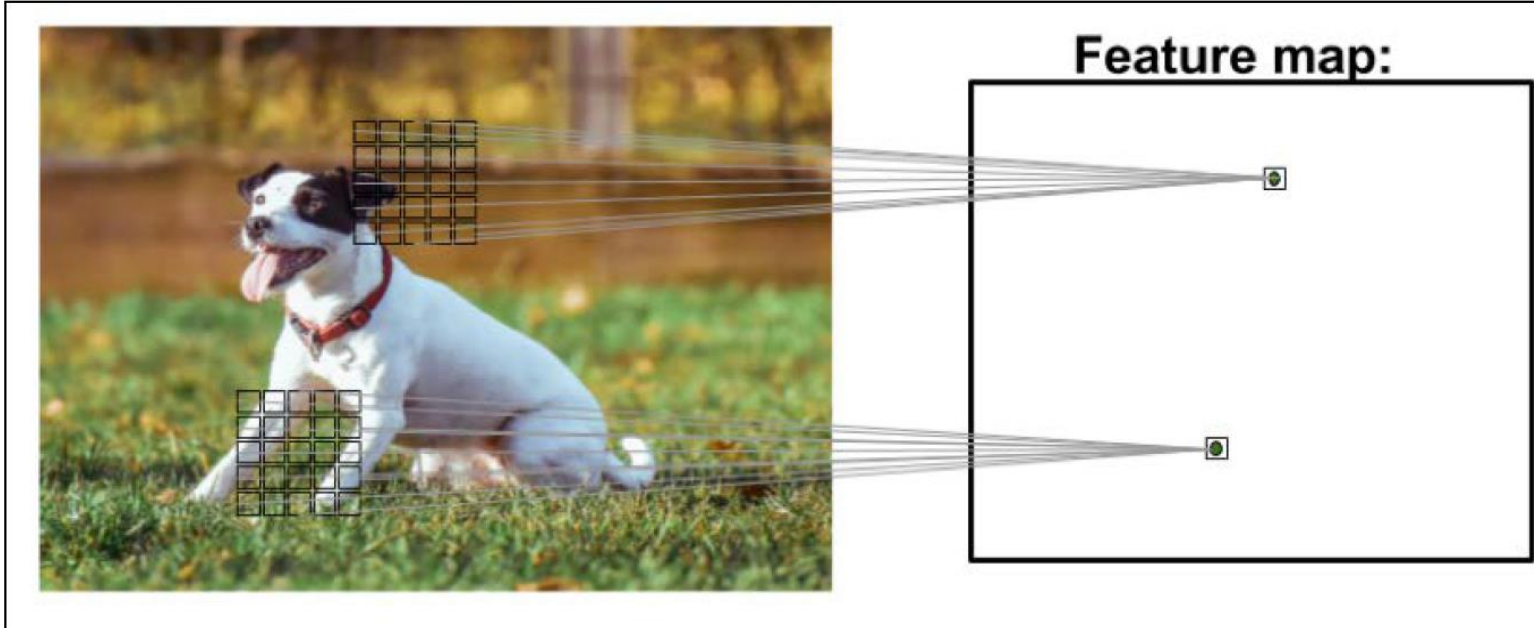
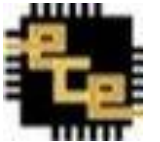


Convolution Neural Networks Basics- The building blocks of CNNs

- CNNs are developed in 1990
- Outstanding Performance in Image Classification
- It led to lot of development in Computer Vision and Machine Learning
- Why Convolution layers are treated as feature extraction layers?

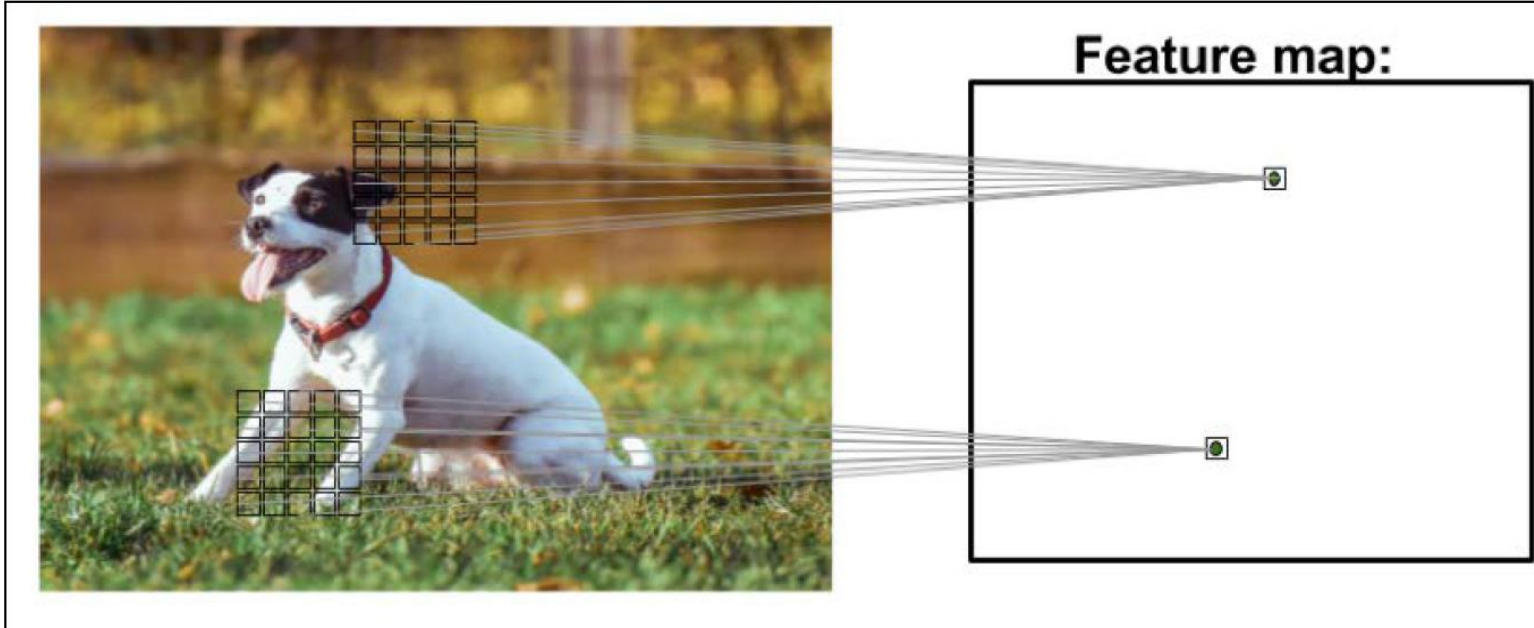
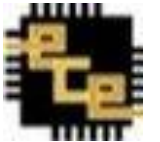


Convolution Neural Networks Basics- The building blocks of CNNs



- **CNN's** are able to learn the features automatically from the raw data which is very useful for a particular task
- **CNN** layers are extract low-level features from the raw data. Then later layers use these features to predict the output
- **Feature Hierarchy:** Feature hierarchy formed by combining the low level features in a layer-wise fashion to form high level features
- For example edges and blobs in the image are low level features , when we combine these features, it may lead to high level features

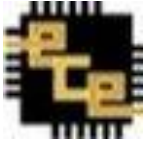
Convolution Neural Networks Basics- The building blocks of CNNs



- **Feature maps:** CNN computes feature maps from an input image, where each element comes from a local patch of pixels in the input image
- The local patch of pixels is referred to as the **local receptive field**.

Convolution Neural Networks Basics- The building blocks of CNNs

- CNNs will usually perform well on image-related tasks and it is due to following two reasons
- **Sparse Connectivity** : A single element in the feature map is connected to a small patch of pixels.
- **Parameter-sharing**: The same weights are used for different patches of the input image.

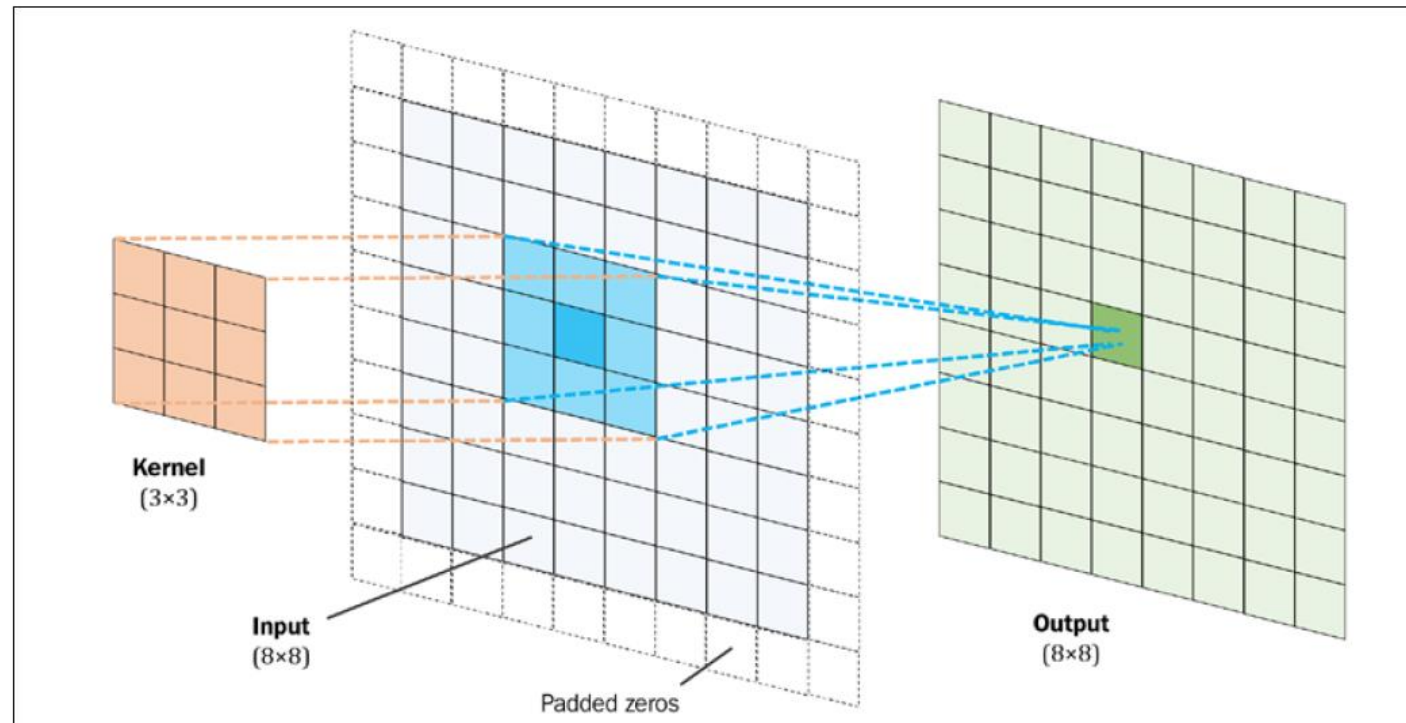


Convolution Neural Networks Basics- The building blocks of CNNs



- Typically, CNN's consists of several **Convolutional** and **subsampling** layers that are followed by one or more **Fully connected layers** at the end.
- The **Fully connected layers** essentially an MLP , where input “i” is connected to every output j with weight W_{ij}
- **Subsampling layers** are commonly known as **Pooling layers**.
- **Pooling layers** do not have any learnable parameters, for instance there are no weights and no bias units.
- Both Convolutional and fully connected layers have weights and biases.





Courtesy :“*Python Machine Learning*”, Sebastian Raschka, Vahid Mirjalli, 3rd Edition, Packt 2019





THANK YOU

Raghavendra.M.J

Department of ECE

raghavendramj@pes.edu