Lecture 07 – CNN Applications and Tricks

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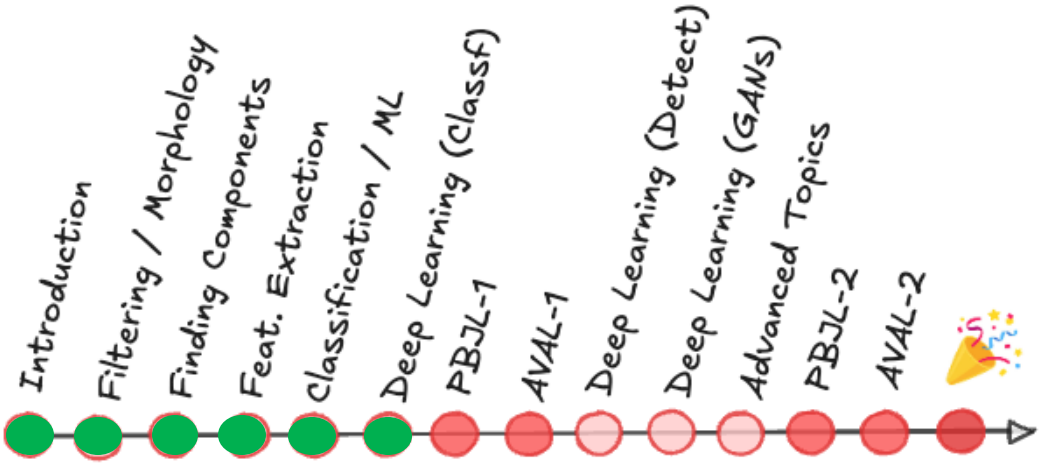
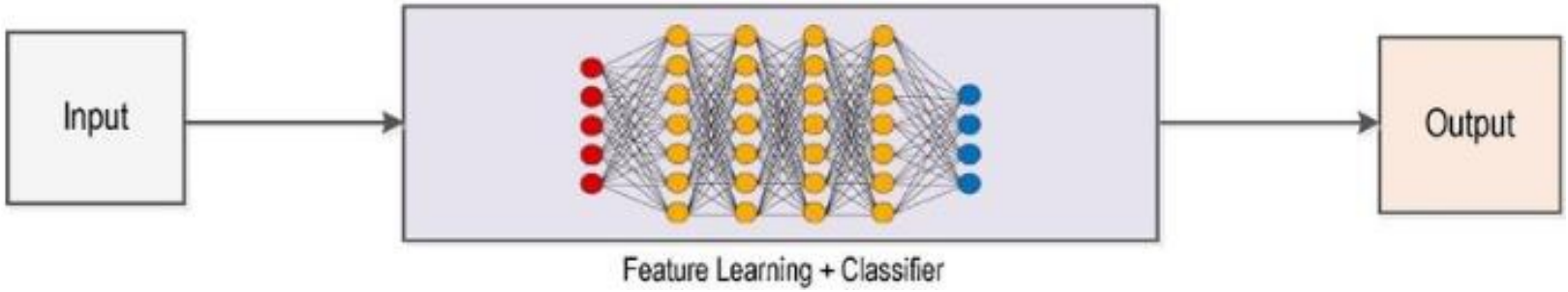
Topics

- Convolutional Neural Network
  - Basic Concepts
  - Archicteture and Hiper Parameters
  - Data Augmentation
  - Transfer-Learning
  - Applications
- Practice

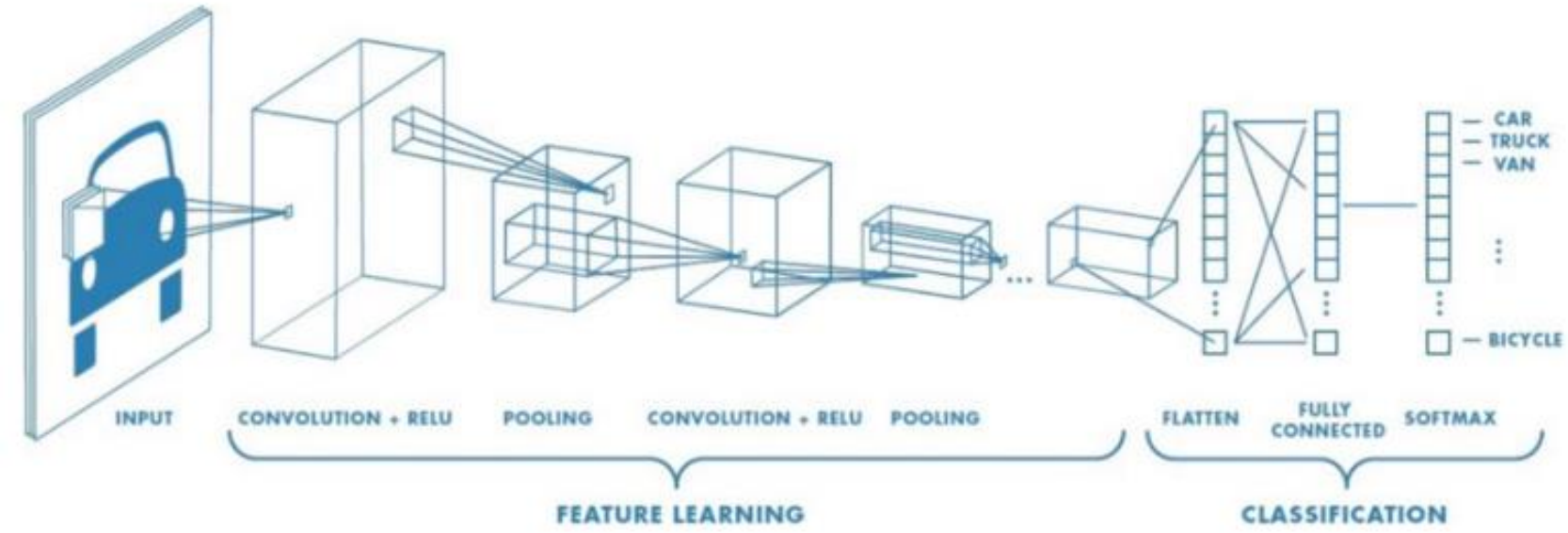


Deep Learning Pipeline



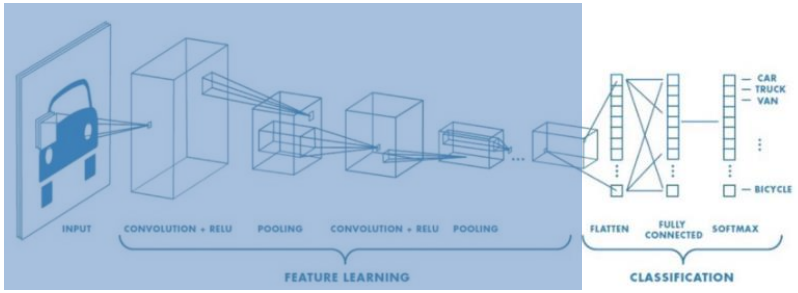
Convolutional Neural Network

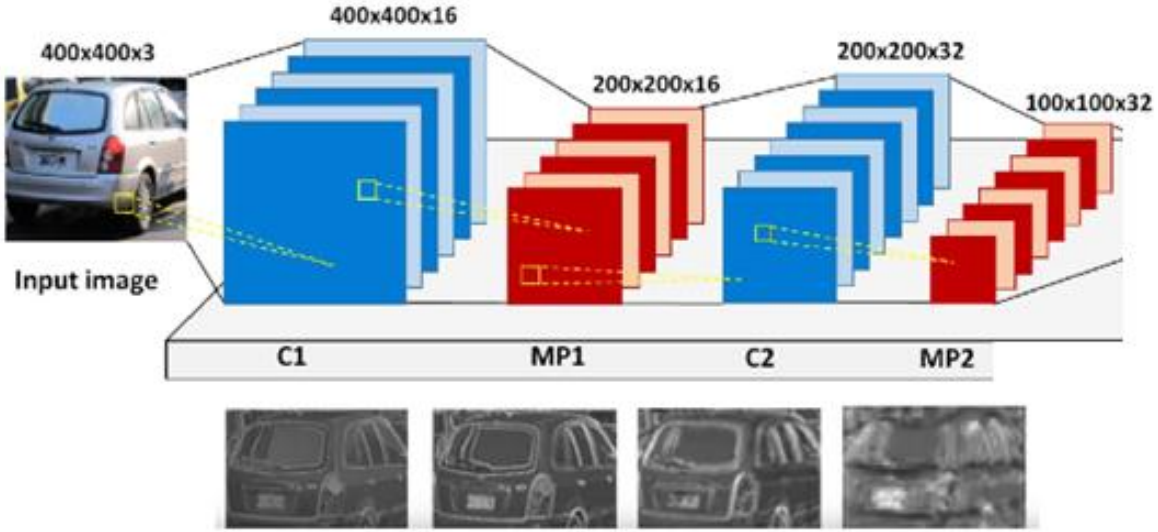
- CNN



Convolutional Neural Network

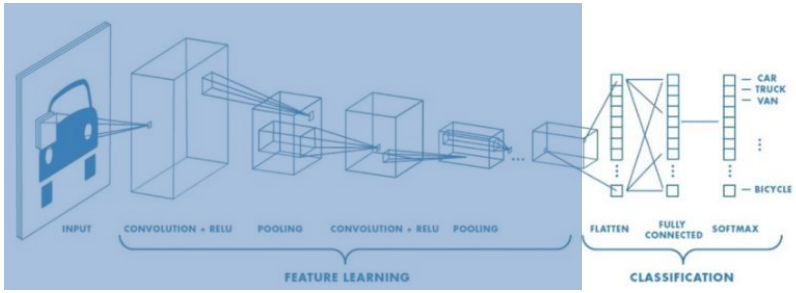
- Feature Extraction

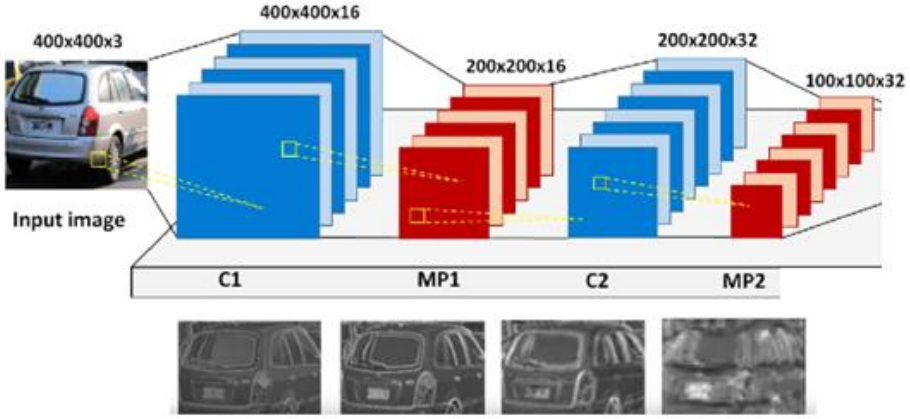


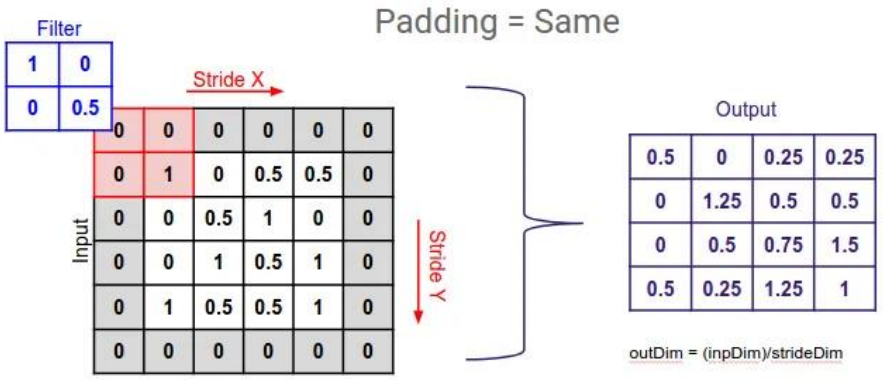


Convolutional Neural Network

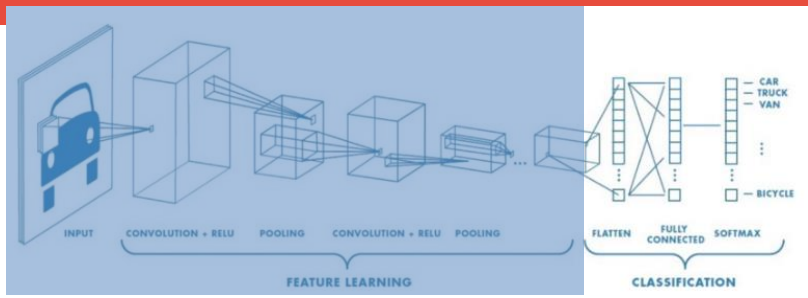
- Convolutional Layer (Learnable Filters)
  - Padding
  - Stride
  - Kernel Size
  - Number of Filters



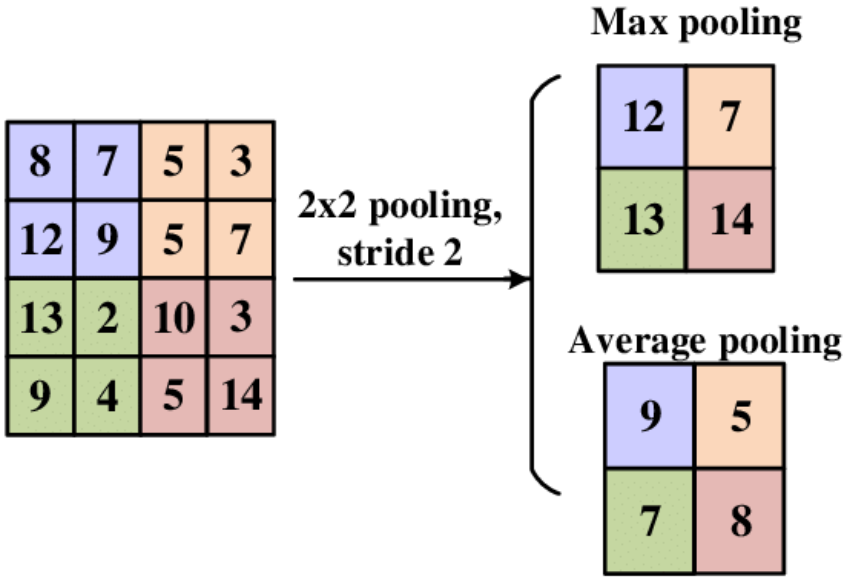




Convolutional Neural Network

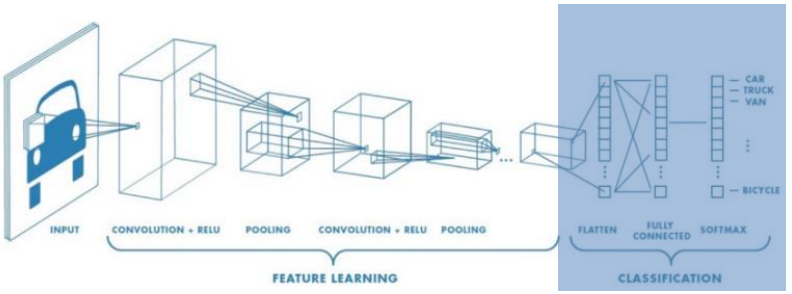


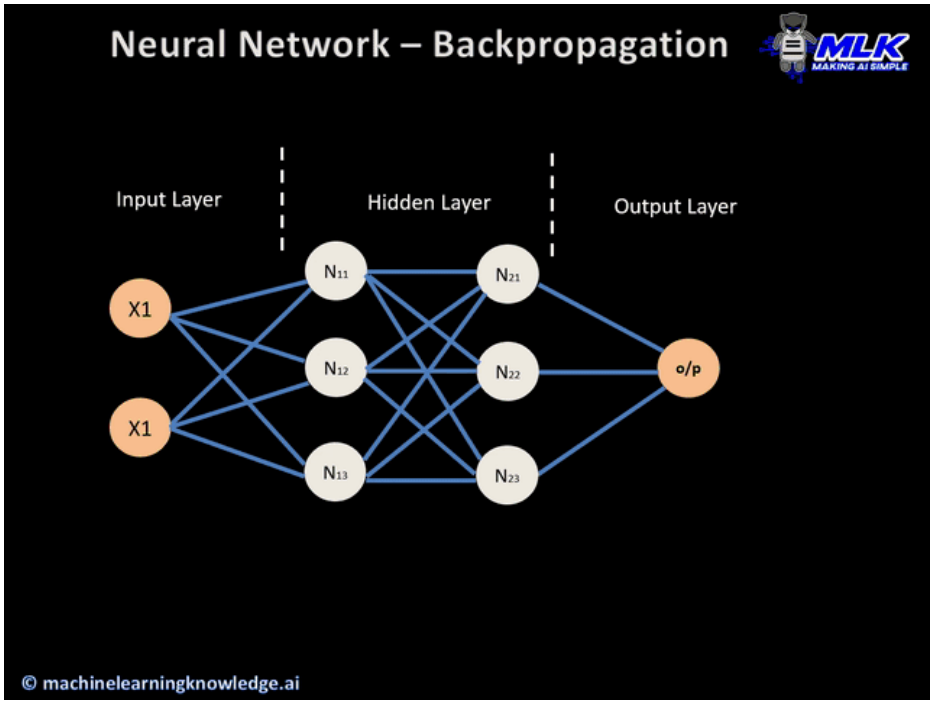
- Pooling Layer
  - Reduce Spatial Dimensions
  - Translation-Invariant
  - Common Filter
    - Max: Preserve the “strongest” features
    - Average: Smooth features, preserves general representations



Convolutional Neural Network

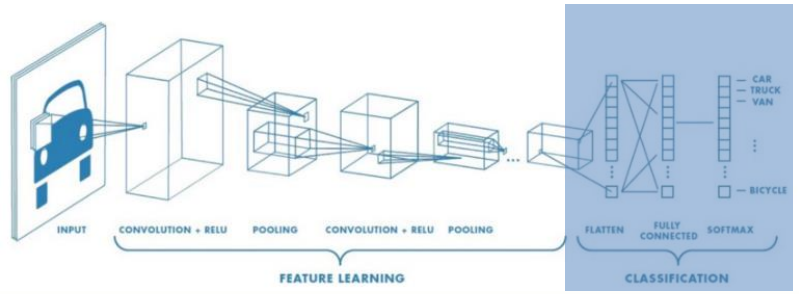
- Classification
  - Forward and Back Propagation

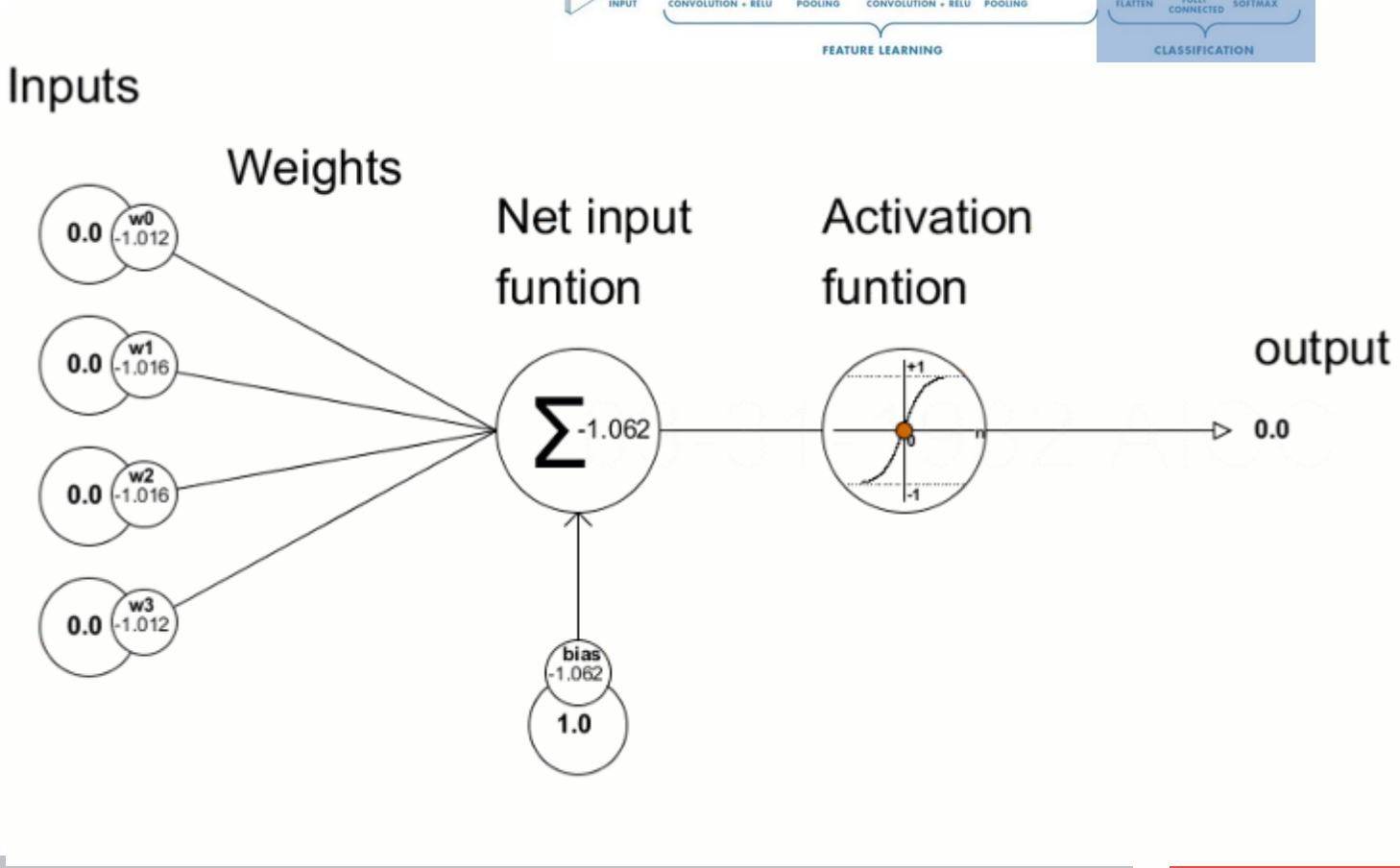




Convolutional Neural Network

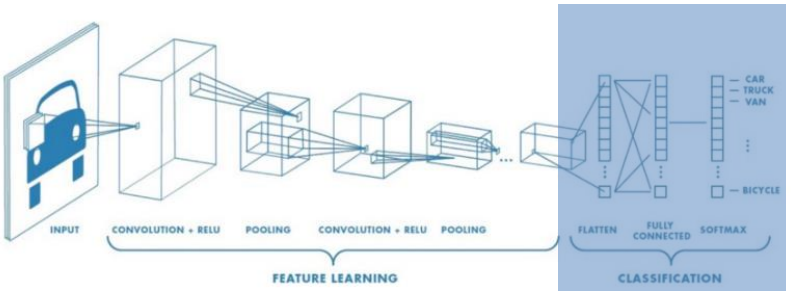
- Forward and Back Propagation

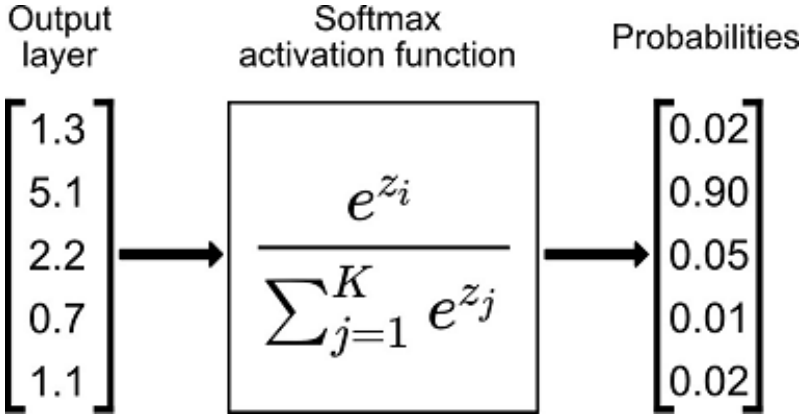


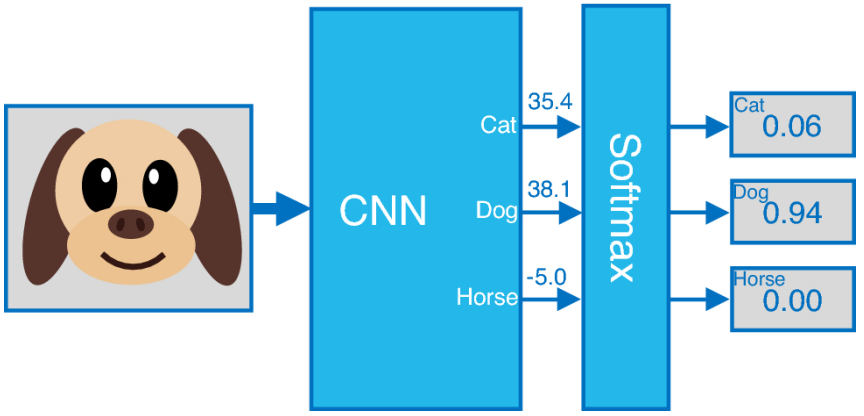


Convolutional Neural Network

- Softmax







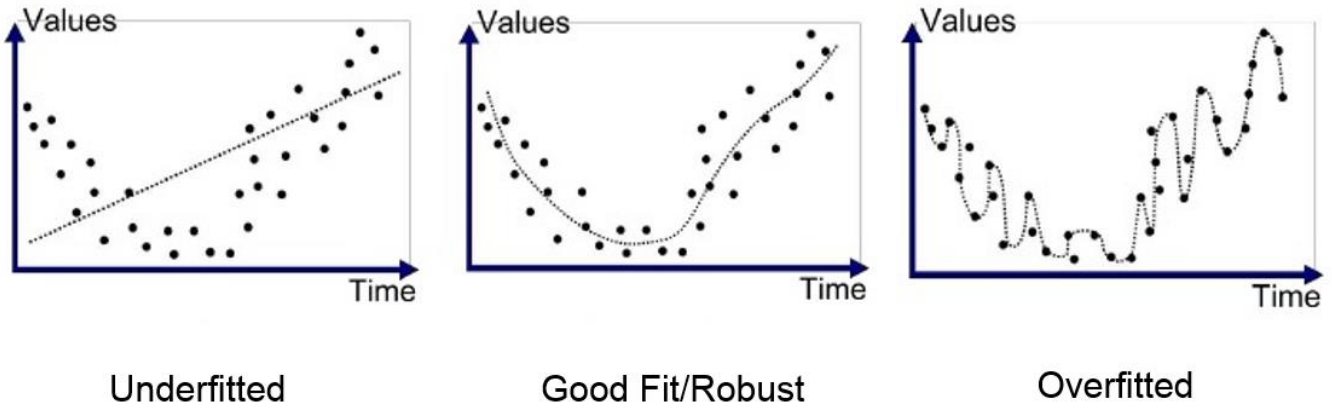
Convolutional Neural Network

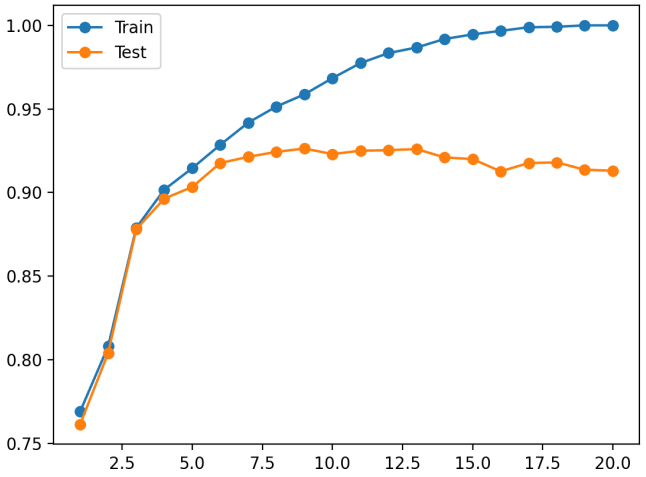
- Lets code our first CNN from scratch

Lecture 07 - CNN Architecture

Overfitting

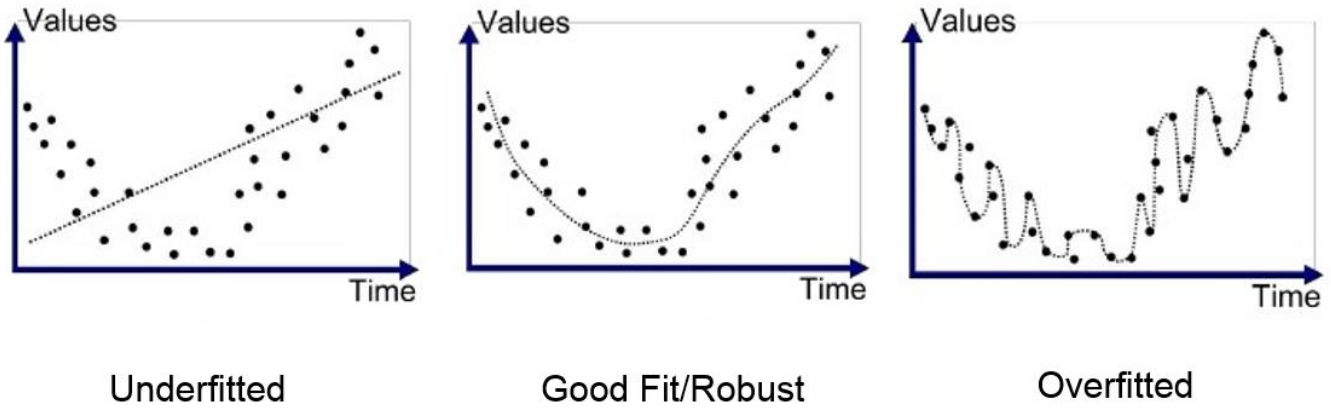
- Bad generalization

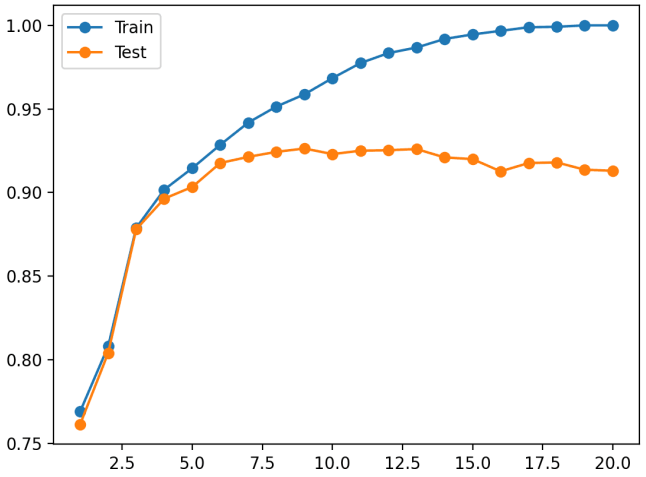




Overfitting

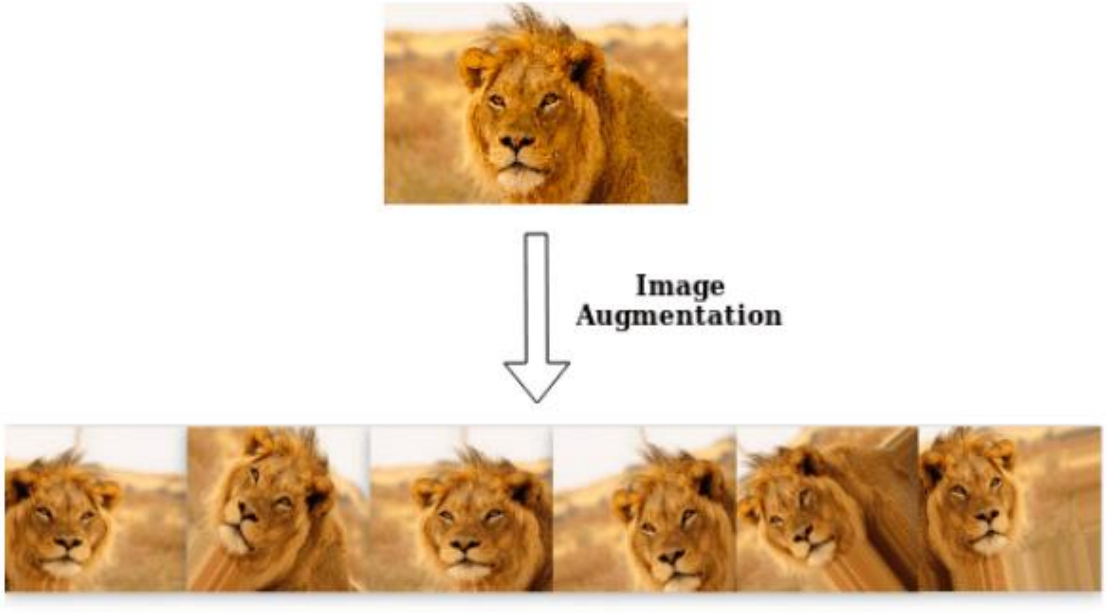
- Bad generalization





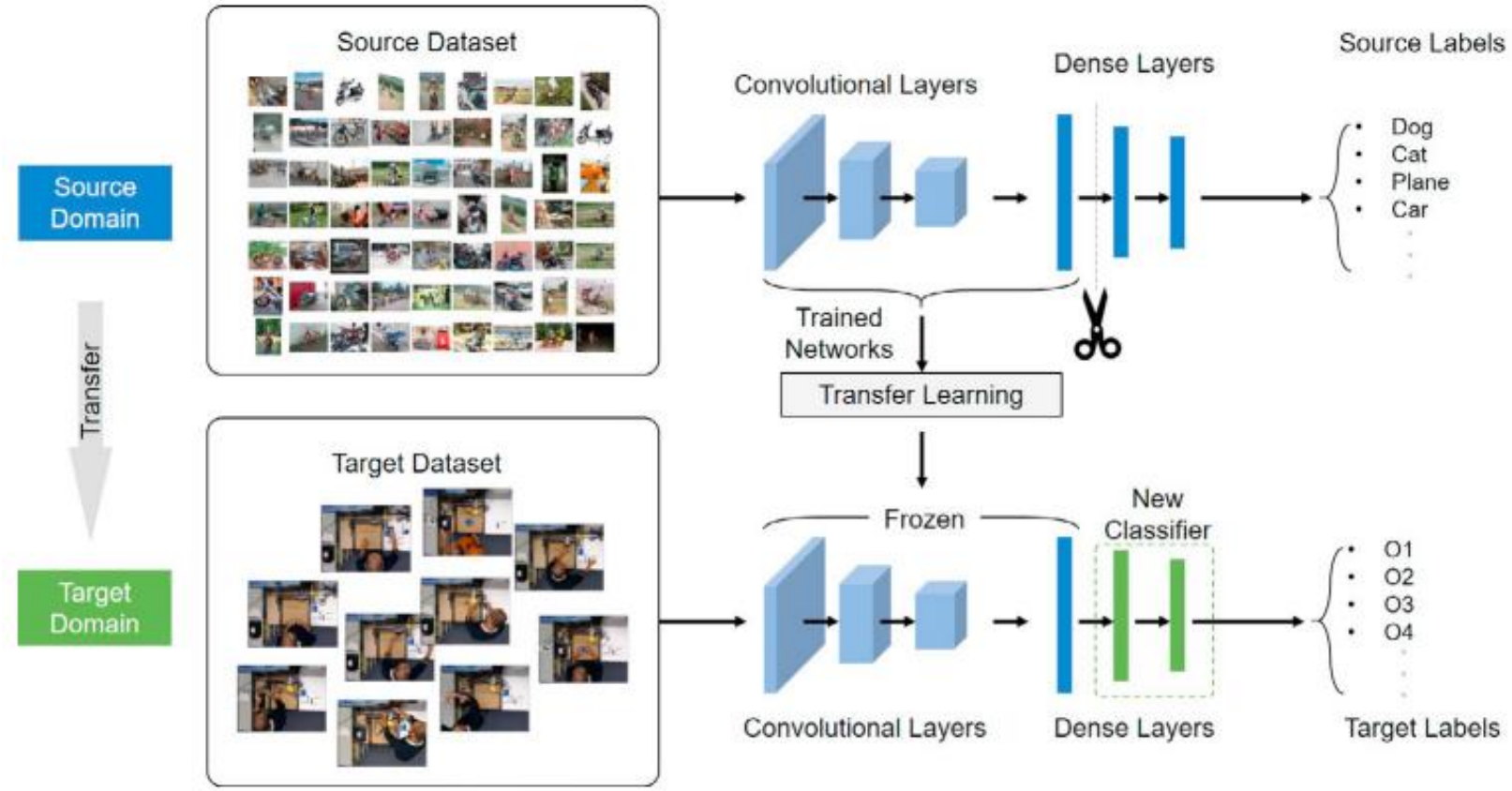
Data Augmentation

- Enlarge the dataset with synthetic samples



Transfer Learning

- Weight Sharing
- Feature Extraction weights are frozen (or not...) during learning



Let's Code

- [LINK]