

# Lecture 10 – CNN Applications and Tricks

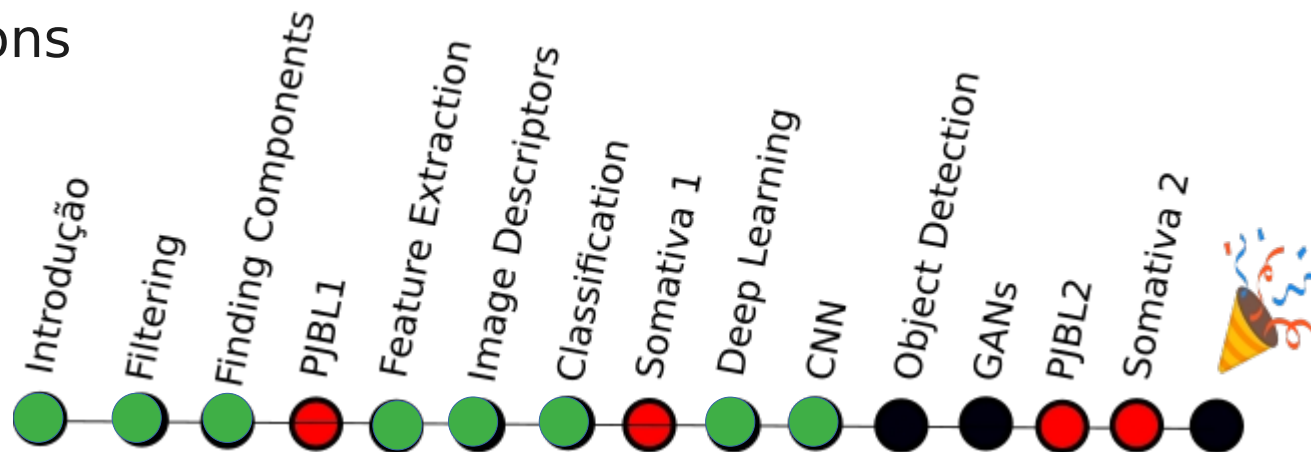
Prof. André Gustavo Hochuli

[gustavo.hochuli@pucpr.br](mailto:gustavo.hochuli@pucpr.br)

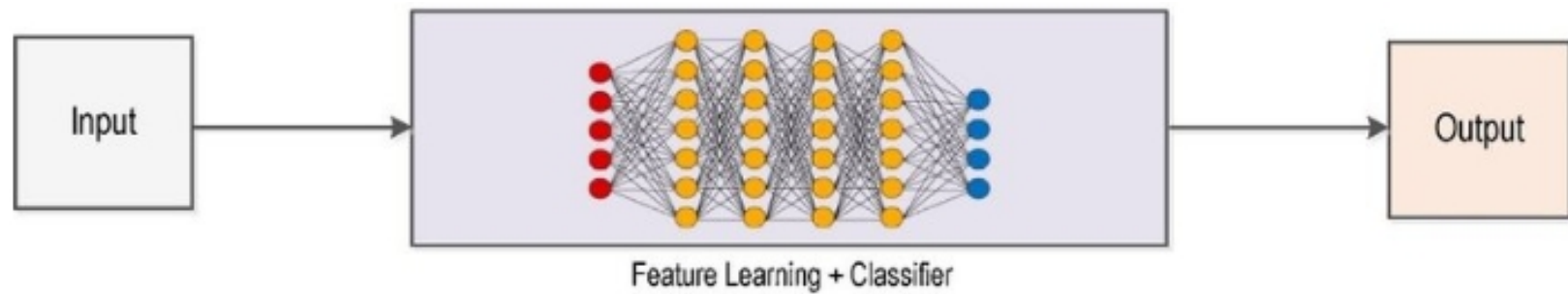
[aghochuli@ppgia.pucpr.br](mailto:aghochuli@ppgia.pucpr.br)

# Topics

- Review of Lecture 09
- Convolutional Neural Network
  - Basic Concepts
  - Data Augmentation
  - Transfer-Learning
  - Applications
- Practice

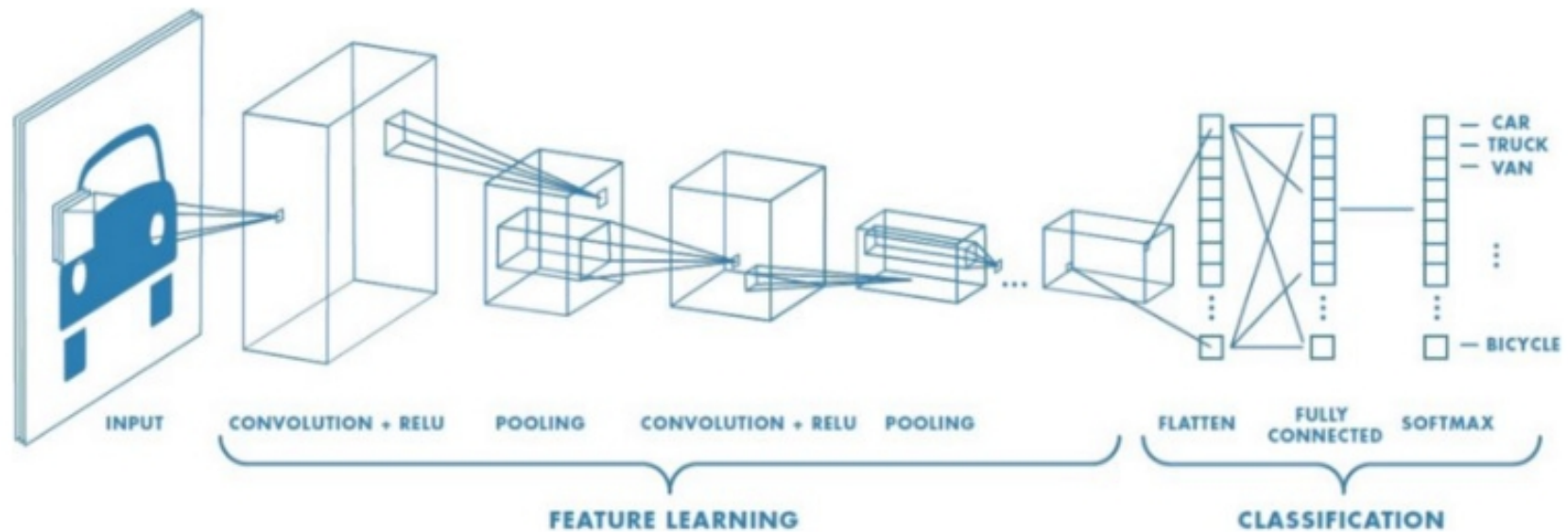


# Deep Learning Pipeline



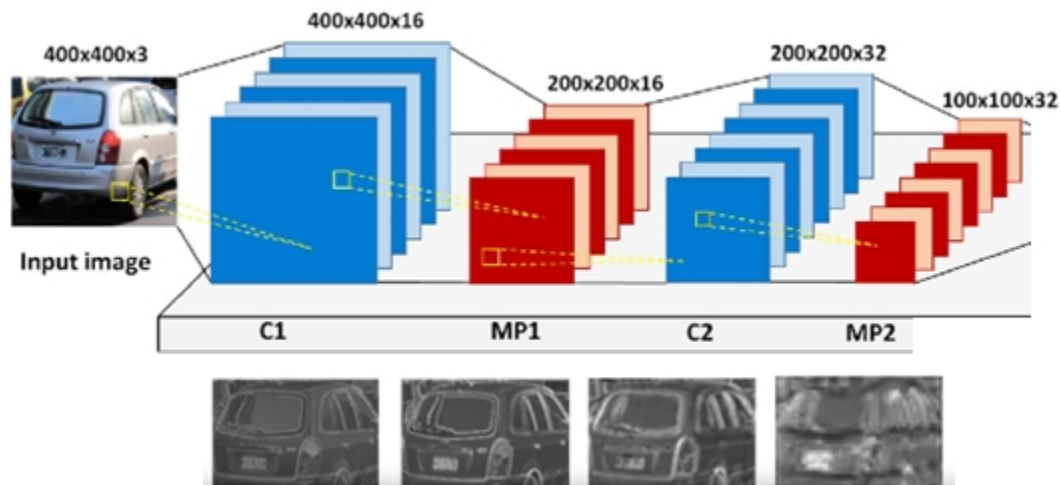
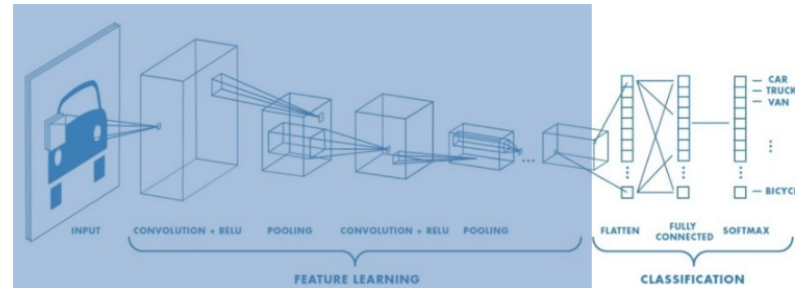
# Convolutional Neural Network

- CNN



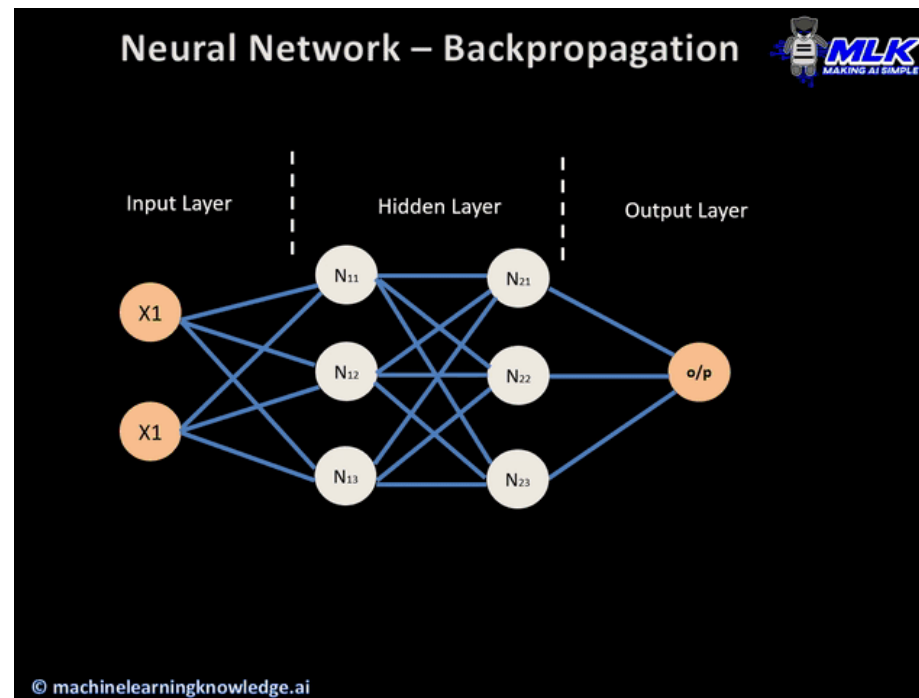
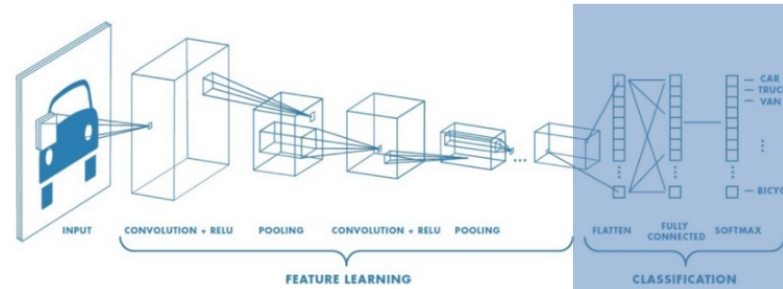
# Convolutional Neural Network

- Feature Extraction



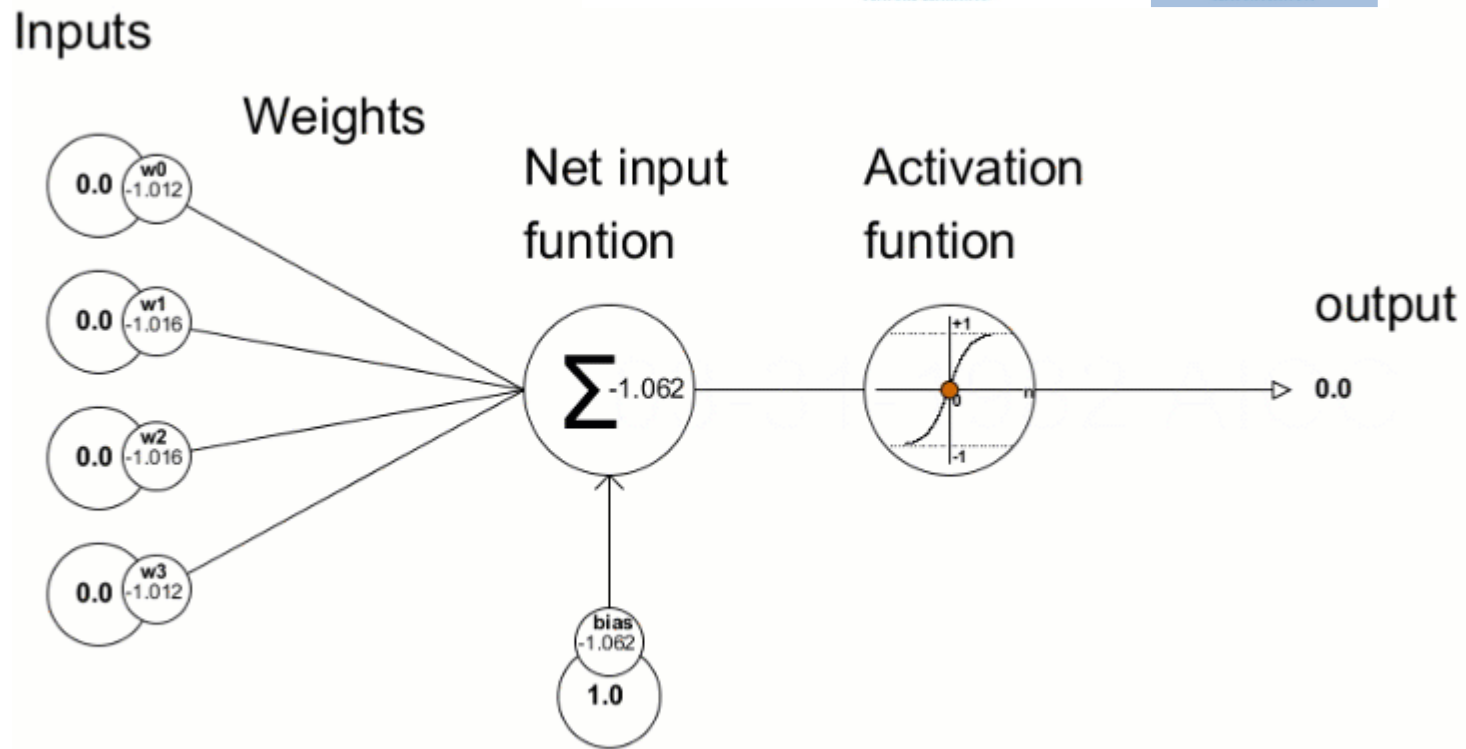
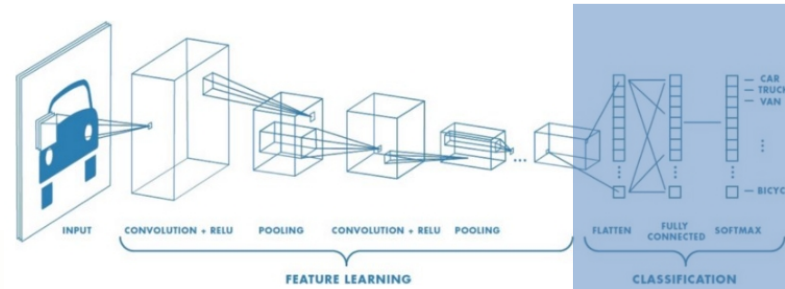
# Convolutional Neural Network

- Classification
- Forward and Back Propagation



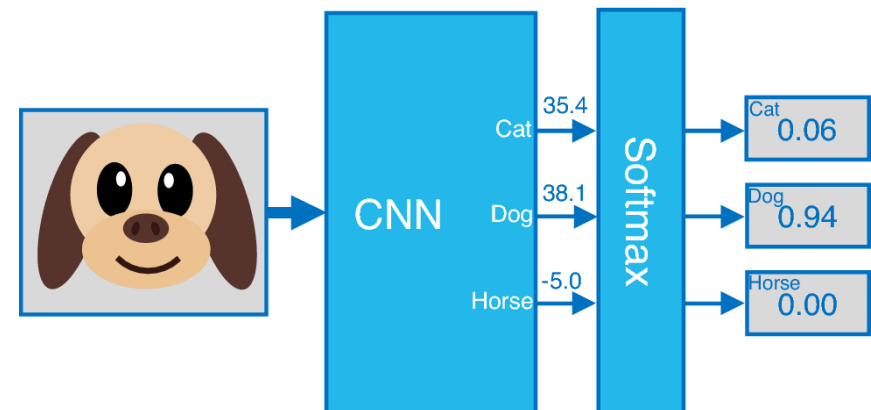
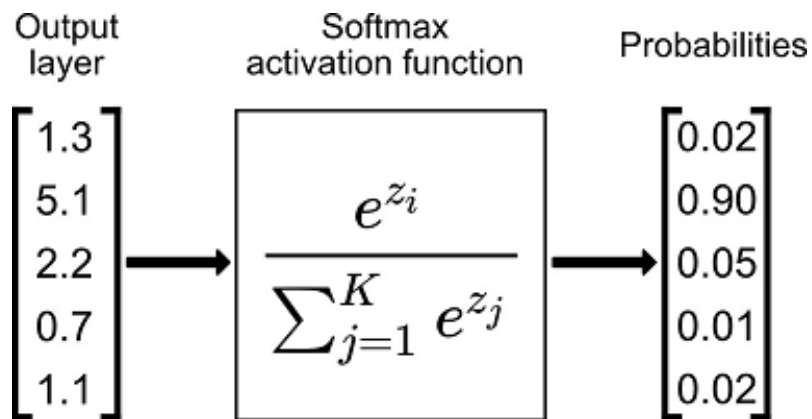
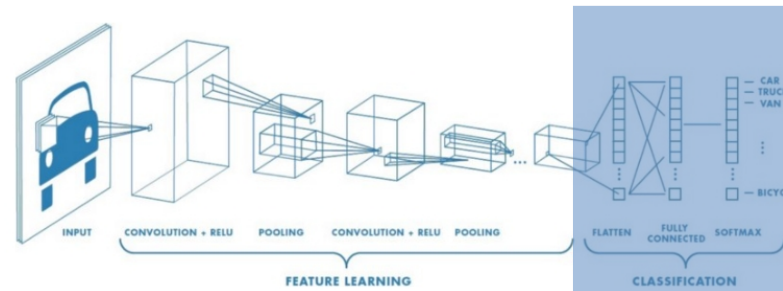
# Convolutional Neural Network

- Forward and Back Propagation



# Convolutional Neural Network

- Softmax

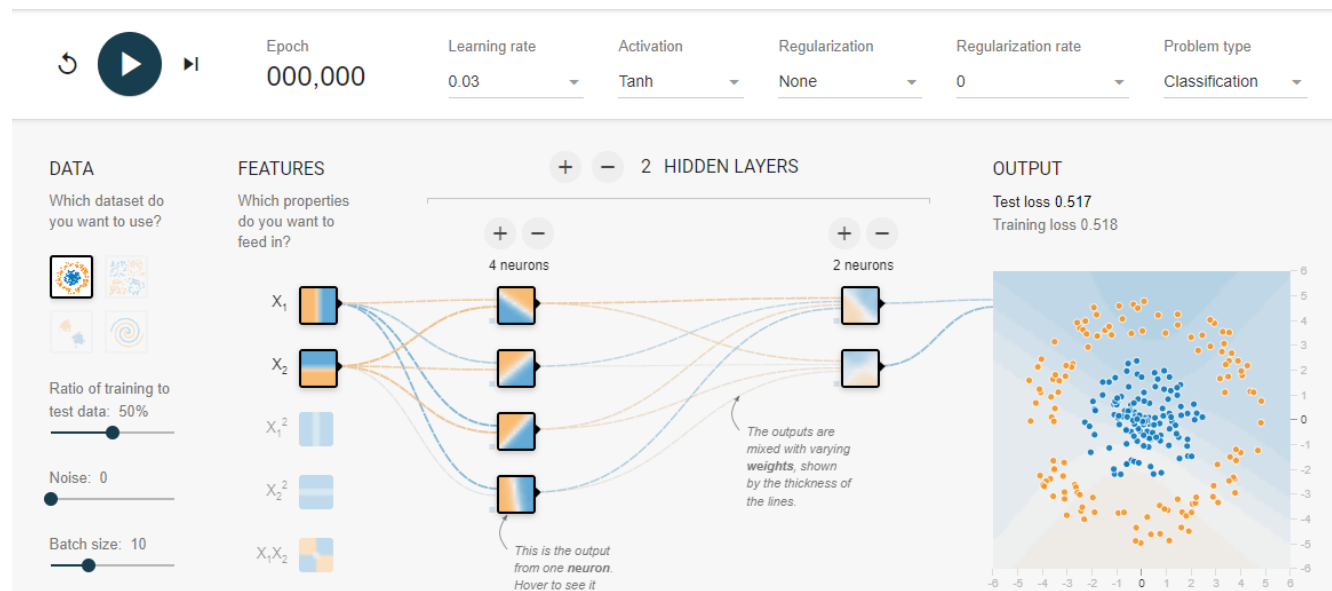




# Convolutional Neural Network

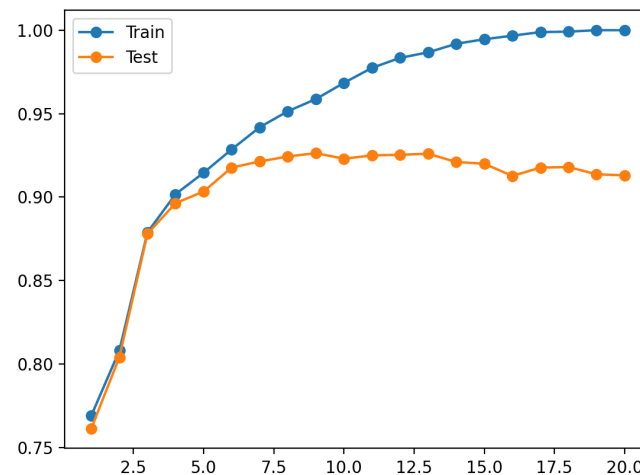
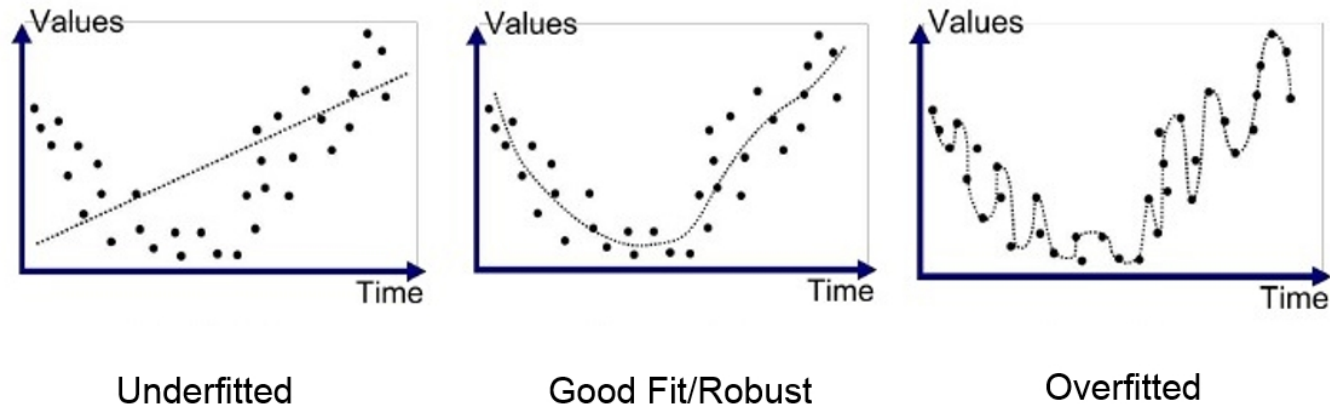
- Tensorflow Playground

<https://playground.tensorflow.org/>



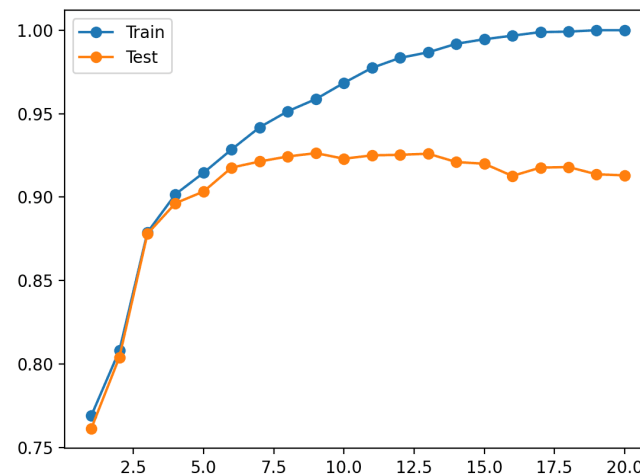
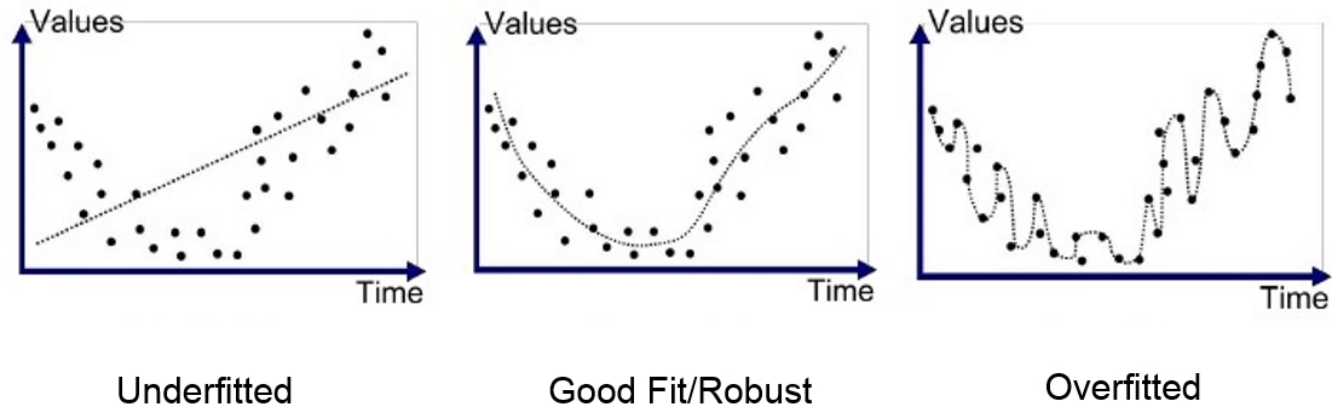
# Overfitting

- Bad generalization



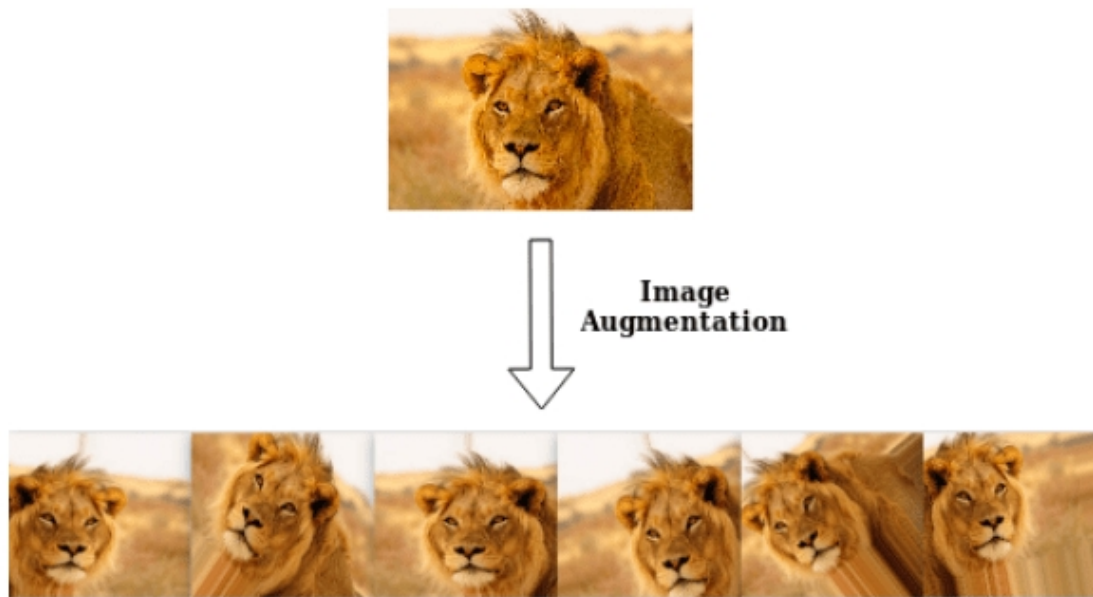
# Overfitting

- Bad generalization



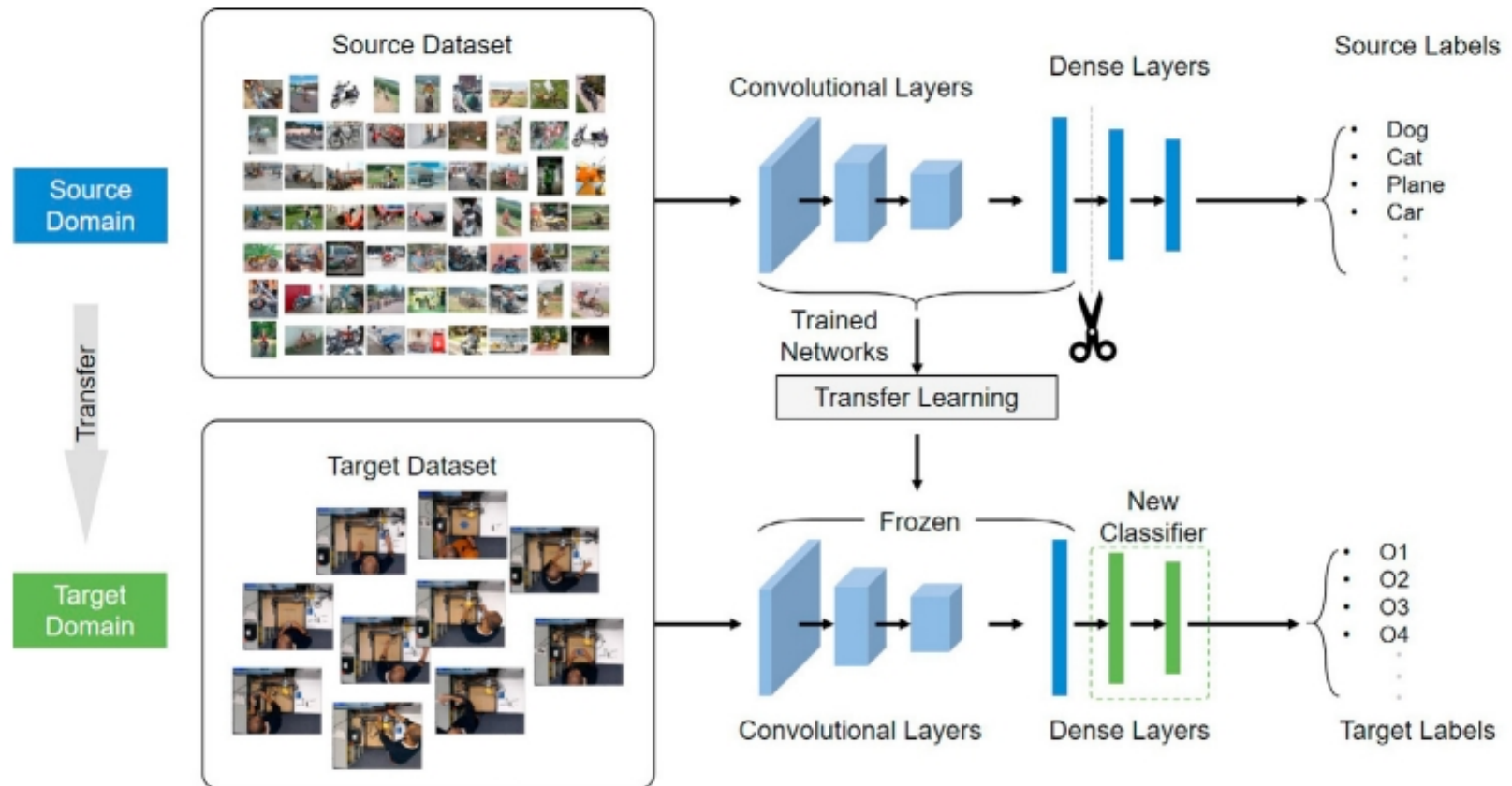
# Data Augmentation

- Enlarge the dataset with synthetic samples



# Transfer Learning

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



# Let's Code

- [\[LINK\]](#)
- **Assessment Task: PJBL-3 at Canvas**
  - **Delivery date: 06/11 23:59**