Hands-on Machine Learning Training

Session 4 – Evaluation, Validation and Model Assessment

Preparation

In this session, you will learn to tune your model's hyperparameters and evaluate performance. There are several potential pitfalls in this areas which you will get to know and learn to avoid. Moreover you will get to know the most common classification metrics and relevant statistical tests. Finally, this session is meant to improve your implementation skills by making heavy use of the most commonly used statistical learning framework `scikit-learn`.

Preparation consists of the following tasks:

- Read and understand the following literature:
  - James, Witten, Hastie & Tibshirani: "An Introduction to Statistical Learning", Chapter 5.1 [1]
  - Hastie, Tibshirani & Friedmann: "The Elements of Statistical Learning", Chapters 7.2, 7.3, 7.10 [2]
  - `https://en.wikipedia.org/wiki/Evaluation_of_binary_classifiers`
  - `http://www.statisticshowto.com/probability-and-statistics/t-test/`
- Based on this literature you should have an understanding of
  - Model selection vs. model assessment
  - Bias-variance tradeoff
  - Cross validation
  - Measures for evaluation of classifers
  - Statistical tests, specifically the Student's T-Test
- Work through the following `scikit-learn` tutorials:
  - `http://scikit-learn.org/stable/tutorial/basic/tutorial.html`
  - `http://scikit-learn.org/stable/tutorial/statistical_inference/model_selection.html`

[1] `http://faculty.marshall.usc.edu/gareth-james/ISL/ISLR%20Seventh%20Printing.pdf`

[2] `https://web.stanford.edu/~hastie/ElemStatLearn/printings/ESLII_print12.pdf`