COURSE DESCRIPTION CS4070

JAKOB SÖHL

1. Topic

In this course we aim to give an introduction to statistical learning from both the frequentist and Bayesian perspective. The plan is to cover the following topics

(1) Linear models
(2) Bayesian inference including an introduction to computational methods
(3) Classification problems
(4) Gaussian Processes.

Lectures will be on Monday and Friday.

2. Learning goals

(1) Get familiar with classical and modern methods in **data science** (statistics, machine learning, signal processing...).
(2) Rather than mechanically applying methods to some datasets, try to **understand** methods (weaknesses/strengths).
(3) Focus on methods based on a statistical model that allow for **uncertainty quantification**. Probabilistic approach to statistics/machine learning.

3. Course materials

The book "A first course in machine learning, 2nd edition" by Simon Rogers and Mark Girolami. From this book I hope to cover chapters 1–6 and chapter 8.

4. Examination

Three assignments which will be corrected with grade $\in \{-, 0, +\}$. Most probably, the assignments will be posted at the end of weeks 2, 4 and 6 and the deadlines will be at the end of weeks 4, 6 and 7, respectively.

Software:
- You are free to choose.
- Book is accompanied by R and Matlab scripts. https://github.com/sdrogers/fcmlcode
- Code will be in Julia and R.

Exam regulations:
- Three hour written exam, entrance requires all assignments to be $+$.
- You are allowed to resubmit assignments graded 0 for a second time.
- Once you are allowed to resubmit an assignment graded $-$ for a second time.

5. Tentative week schedule

(1) Chapter 1, Chapter 2 up to 2.10.
(2) Finish chapter 2. Chapter 3.
(3) Chapter 4. Chapter 9 first 3 sections.
(4) Chapter 8.
(5) Chapter 8.
(6) Chapter 5.
(7) Chapter 5.