Machine Learning

Spring 2017

Contact:	Patrick Beukema	**Time:**	W 12:00 – 1:00
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Course Pagse:

1. Course website: `http://github.com/pbeukema/ML_CNBC`
2. All code referenced in text: `http://github.com/probml/pmtk1/tree/master/pmtk/bookCode`
3. Slack page for quetions about material/exercises: `mlcnbc.slack.com`

Text:

Machine Learning: A Probabilistic Perpspective. Each week we will read, do exercises, and discuss one chapter of this text. https://www.cs.ubc.ca/ murphyk/MLbook/

Schedule & Exercises:

1. Introduction 1/11
   - Write implementation of KNN, exercises: 1.1-1.3
2. Probability 1/18
   - Exercises: 2.1-2.5, 2.12, 2.17 (Prove, and also show with simulation)
3. Generative models for discrete data 1/25
   - Write implementation of Naive Bayes, exercises 3.6, 3.10, 3.18.
4. Gaussian models 2/1
   - Write implementation of LDA/QDA, exercises 4.17, 4.12.
5. Bayesian statistics 2/8
   - Additional reading on bayesian alternative to null hypothesis testing: pubmed
   - For some result in your own research where $p > 0.05$, compute $Pr_{BIC}(H_0|D) = \frac{1}{1+e^{(-0.5\Delta BIC_10)}}$
6. Frequestist statistics 2/15
   - Exercises
7. Linear Regression 2/22
   - Exercises
8. Logistic Regression 3/1
   - Exercises
9. Generalized linaer models and the exponential family 3/8
   - Exercises

10. Directed graphical models 3/15
    - Exercises
11. Mixture models and the EM algorithm 3/22
    - Exercises
12. Latent linear models 3/29
    - Exercises
13. Sparse linear models 4/5
    - Exercises
14. Kernels 4/12
    - Exercises
15. Gaussian processes 4/19
    - Exercises

Course objectives: The idea behind this course is to gain exposure and learn the fundamentals of machine learning through weekly discussions and exercises. Secondary goal is to republish the code that is used throughout the text and excersises in the form of jupyter notebooks in python. The motivation for that is (1) Current implemntations are in Matlab, which some people lack access to and (2) more learning will happen doing things from scratch.

Prerequisites: Calculus, linear algebra, probability.

Resources & Recommendations:

- Learning python: learnpythonthehardway.org
- Programming: jupyter.org notebooks*
- Editor: atom.io

*Kyle Dunovan's themes make your notebooks pretty