Schedule

Week 36 2015

Show in My Schedule

Tue 1 sep 10:00-12:00

LECTURE
Teachers: Giampiero Salvi, Atsuto Maki, Örjan Ekeberg
Location F1

Lecture 1, Introduction

Structure of the Course

- What will the course cover?
- How are labs and examination handled?

Learning Machines

- What do we mean by a "Learning Machine"?
- Supervised vs Unsupervised learning?
- What can learning algorithms be used for?
- How can a simple learning program be constructed?
- What is a Nearest neighbour classifier?

Slides for Lecture 1

Slides for Lecture 1 (Part II)

Thu 3 sep 17:00-19:00

LECTURE
Teachers: Atsuto Maki
Location E1

Lecture 2, Decision Trees

Note: Flyttad från kl 13-15 pga för liten sal
Topics:

- What is a Decision Tree?
- When are decision trees useful?
- How can one select what questions to ask?
- What do we mean by *Entropy* for a data set?
- What do we mean by the *Information Gain* of a question?
- What is the problem of overfitting? Minimizing training error?
- What extensions will be possible for improvement?

Slides for Lecture 2

Related reading:

Chapter 8.1 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www-bcf.usc.edu/~gareth/ISL/

Week 37 2015

Show in My Schedule

Tue 8 sep 10:00-12:00

LECTURE
Teachers: Atsuto Maki
Location D2

Lecture 3, Challenges to machine learning

Topics:

- Challenges to machine learning
- Model complexity and overfitting
- The curse of dimensionality
- Concepts of prediction errors
- The bias-variance trade-off

Slides for Lecture 3

Related reading:

Chapter 2 and 6.4 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www-bcf.usc.edu/~gareth/ISL/

Thu 10 sep 13:00-15:00

LECTURE
Teachers: Atsuto Maki
Location M2

Lecture 4, Regression Introduction

Topics:

- Function approximation
- Linear regression
- RANSAC

- Nearest Neighbours regression
- Linear regression + regularization
- Ridge regression
- Lasso

Slides for Lecture 4

Related reading:

Chapter 3.1, 3.2, 3.5 and 6.2 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www.bcf.usc.edu/~gareth/ISL/

Week 38 2015

Show in My Schedule

Tue 15 sep 10:00-12:00

LECTURE

Teachers: Giampiero Salvi
Location FR4

Lecture 5, Probability I

Topics:

- concepts of probability theory
- random variables and distributions
- conditional probabilities and Bayes rule
- Bayesian inference

Slides for Lecture 5

Related reading:

Prince, S.J.D., Part I (Chapters 2, 3, 5)

If you want to know more a great book on these topics is
Bishop, C. M. Pattern Recognition and Machine Learning,
Springer.

Thu 17 sep 13:00-15:00

LECTURE

Teachers: Giampiero Salvi
Location F2

Lecture 6, Probability II

Topics:

- estimation theory
- Maximum Likelihood, Maximum a Posteriori, Bayesian estimation
- Unsupervised learning and K-means
- Mixture of distributions and Expectation Maximization algorithm

Slides for Lecture 06

Recommended reading:

Prince, Chapter 3, 4, 7.4. (Book available in full PDF here)

Week 39 2015

Show in My Schedule

Tue 22 sep 10:00-12:00

LECTURE

Teachers: Atsuto Maki
Location K1

Lecture 7, Classification Introduction

Topics:

- Naive Bayes
- Logistic regression
- Inference and decision
- Discriminative function
- Discriminative vs Generative model

Slides for Lecture 7

Slides for Lecture 7 (part II)

Related reading:

Chapter 4 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www.bcf.usc.edu/~gareth/ISL/

Thu 24 sep 13:00-15:00

LECTURE

Teachers: Örjan Ekeberg
Location FR4

Lecture 8, Classification with Separating Hyperplanes

Topics:

- Linear separation in high dimensional spaces
- Structural risk minimization
- Support Vector Machines
- Kernels for separating in a higher dimensional space
- Non-separable classes

Slides from lecture 8

2 comments

Week 40 2015

Show in My Schedule

Tue 29 sep 10:00-12:00

LECTURE

Teachers: Örjan Ekeberg
Location FR4

Lecture 9, Artificial Neural Networks

Topics:

- Feed forward networks
- Using multiple processing layers
- Learning with Backprop
- Deep networks

Slides from lecture 9

Thu 1 oct 13:00-15:00

LECTURE

Teachers: Atsuto Maki
Location M1

Lecture 10, Ensemble Methods

Topics:

- Why combine classifiers?
- Bagging
- Decision Forests
- Boosting

Slides for Lecture 10
Slides for Lecture 10 (full size)

Related reading:

Chapter 8.2 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www-bcf.usc.edu/~gareth/ISL/

Week 41 2015

Show in My Schedule

Tue 6 oct 10:00-12:00

LECTURE

Teachers: Atsuto Maki
Location M2

Lecture 11, Dimensionality Reduction

We are going to revisit/resume Boosting at the beginning of the lecture.

Topics:

- Unsupervised Learning
- Principal Component Analysis (PCA)
- Concept of subspace
- Similarity measures
- Subspace methods

Slides for Lecture 11

Related reading:

Chapter 10.2 from **An Introduction to Statistical Learning** (Springer, 2013)

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani
Available online: http://www-bcf.usc.edu/~gareth/ISL/

Thu 8 oct 13:00-15:00

LECTURE

Teachers: Giampiero Salvi, Atsuto Maki, Örjan
Ekeberg
Location FR4

Lecture 12, Summary

Slides for Lecture 12

Note: The scope of the exam is what has been covered in Lecture 1-11.

3 comments

Week 44 2015

Show in My Schedule

Tue 27 oct 14:00-18:00

EXAMINATION

Location D41, D42, E31, E32, ...

Tentamen

Week 1 2016

Show in My Schedule

Fri 8 jan 14:00-18:00

OMTENTA

Location D32, D33, D41, D42

Omtenta