Machine Learning

DD2431

Atsuto Maki, Giampiero Salvi, Örjan Ekeberg

Autumn, 2014

1. Who are teaching?
2. What is Machine Learning?
   - Applications
   - Types of Learning
3. About the Course
   - Registration
   - Course Contents
   - Textbook
   - Labs
   - Examination

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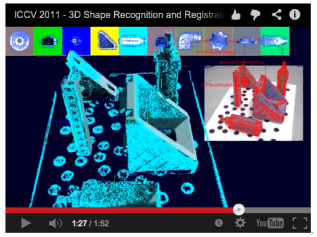
Who are teaching?

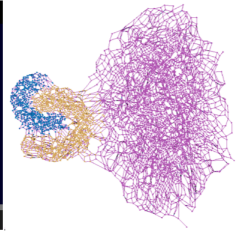
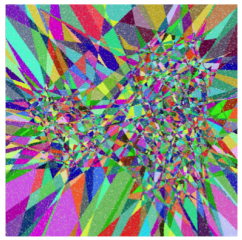
- **Atsuto Maki**
  Dept. Computer Vision and Active Perception
- **Örjan Ekeberg**
  Dept. Computational Biology
- **Giampiero Salvi**
  Dept. Speech, Music and Hearing
- Course Assistant: **Alexander Kozlov**
  Dept. Computational Biology

Who is Atsuto Maki

My research

Machine Learning and Computer Vision.



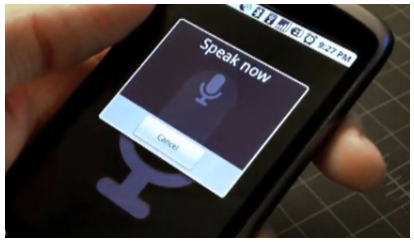



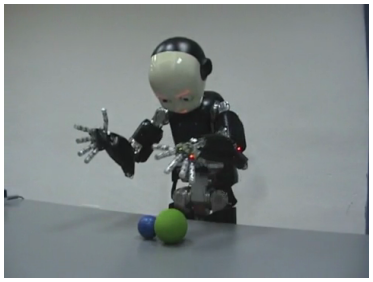
http://www.csc.kth.se/~atsuto/research.html

Who is Giampiero Salvi

My research

Speech Technology, Biologically inspired learning



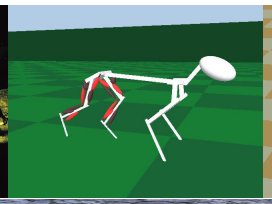


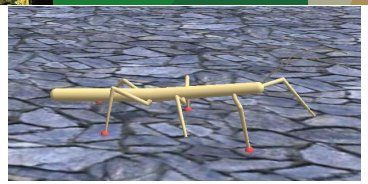
DT2118 Speech and Speaker Recognition, 4th period

Who is Örjan Ekeberg

My research

Simulation of the neural control of movements.



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Applications

Sample Applications

- Speech recognition
- Autonomous driving
- Games: Backgammon
- Autonomous robots
- Spam-filter for e-mail

Role of Learning

Data mining Transform data into knowledge

Vaguely specified tasks Robotics, speech, vision, games

Adaptive programs User adaptable programs/devices

Types of Learning

- Supervised Learning
  - Regression
  - Classification
- Unsupervised Learning
  - Data Modeling
  - Compression
- Reinforcement Learning
  - Behavior Selection
  - Planning
- Evolutionary Learning
  - General Purpose Optimization

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Course Registration

1. Register to become *admitted* (via "Personal Menu")
2. Register as *active*: `https://rapp.nada.kth.se`

Course Information

`https://www.kth.se/social/course/DD2431/`

Course Contents

- Nearest Neighbour Classifier
- Decision Trees
- Probability
- Regression
- Classification
- Probabilistic Methods
- Support Vector Machines
- Learning Theory
- Ensemble Methods
- Learning Representations

Recommended reading

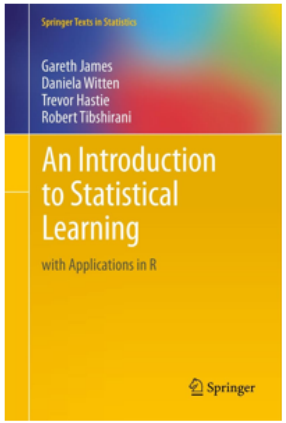
Gareth James, Daniela Witten,
Trevor Hastie and Robert Tibshirani

An Introduction to Statistical Learning

Springer, 2013

Available online:

http://www-bcf.usc.edu/~gareth/ISL/



Labs

1. Decision Trees
2. Support Vector Machines
3. Bayes Classifier & Boosting

Note: Labs are not in the schedule.
Online booking of lab examination time-slots.
Examination:

- It is your task to convince the examiner that you have done the assignment and understood the results.
- 10 minutes
- No computer

Examination

Obligatory parts of the course

- Written exam
- Three labs

Bonus Points

- Each lab finished (successfully examined) before its deadline gives one bonus point.
- Max bonus (=3) may raise the final grade.
- Bonus cannot save you from F (failed).
- Bonus points cannot be saved to next year.