

# Machine Learning

## DD2431

Atsuto Maki, Giampiero Salvi, Örjan Ekeberg

Autumn, 2015

## Who are teaching?

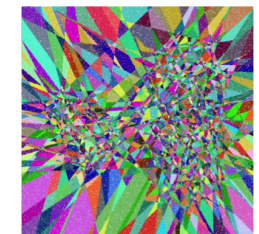
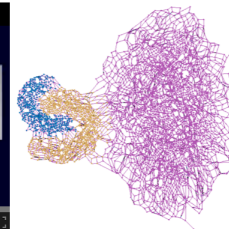
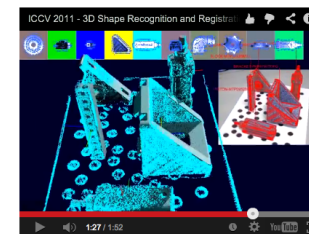
- **Atsuto Maki**  
Dept. Computer Vision and Active Perception
- **Örjan Ekeberg**  
Dept. Computational Biology
- **Giampiero Salvi**  
Dept. Speech, Music and Hearing
- Course Assistant: **Alexander Kozlov**  
Dept. Computational Biology

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

## Who is Atsuto Maki

### My research

Machine Learning and Computer Vision.

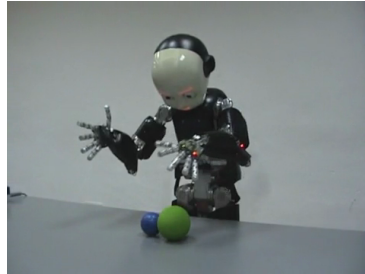
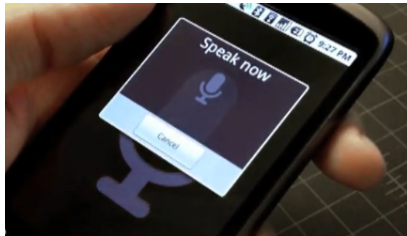


<http://www.csc.kth.se/~atsuto/research.html>

## Who is Giampiero Salvi

### My research

Speech Technology, Biologically inspired learning



DT2118 Speech and Speaker Recognition, 4th period

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- Types of Learning
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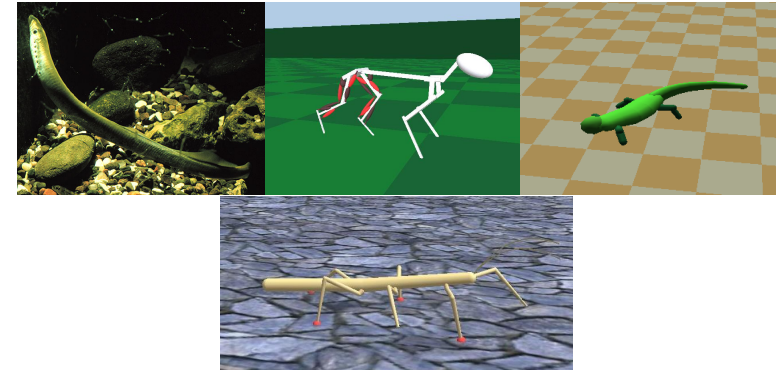
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## Who is Örjan Ekeberg

### My research

Simulation of the neural control of movements.



## Types of Learning

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

## Applications

### Sample Applications

- Speech recognition
- Image recognition
- Natural language processing
- Autonomous robots
- Spam-filter for e-mail

### Where is machine learning useful?

A pattern exists

Data available for training

Hard/impossible to define rules mathematically

### Course Information

<https://www.kth.se/social/course/DD2431/>

### Course Registration

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

Deadline on the "course web": September, 3rd.

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## Course Contents

- Nearest Neighbour Classifier
- Decision Trees
- Probability
- Regression
- Classification
- Probabilistic Methods
- Support Vector Machines
- Artificial Neural Networks
- Ensemble Methods
- Dimensionality Reduction

## Recommended reading

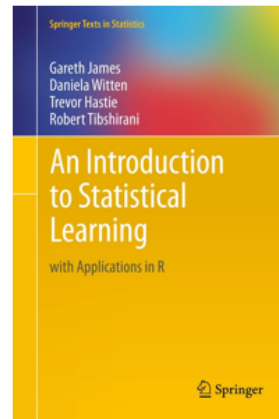
Gareth James, Daniela Witten,  
Trevor Hastie and Robert Tibshirani

An Introduction to Statistical Learning

Springer, 2013

Available online:

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



## Recommended reading

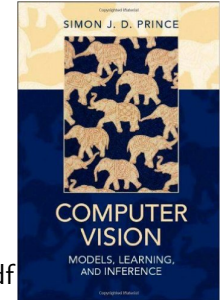
Simon Prince

Computer Vision: Models, Learning,  
and Inference

Cambridge University Press, 2012

Available online:

[web4.cs.ucl.ac.uk/staff/s.prince/book/book.pdf](http://web4.cs.ucl.ac.uk/staff/s.prince/book/book.pdf)



## 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 only valid this year (no saving to the next year).