

Machine Learning and Pervasive Computing

Stephan Sigg

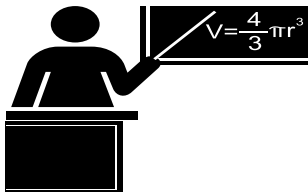
13.04.2015

Overview and Structure

- 13.04.2015 Organisation
- 13.04.2015 Introduction
- 20.04.2015 Rule-based learning
- 27.04.2015** A simple Supervised learning algorithm
- 04.05.2015 Excursion: Avoiding local optima with random search
- 11.05.2015 –
- 18.05.2015** High dimensional data
- 25.05.2015 –
- 01.06.2015 Artificial Neural Networks
- 08.06.2015** Decision Trees
- 15.06.2015 k-Nearest Neighbour methods
- 22.06.2015** Probabilistic models
- 29.06.2015 Topic models
- 06.07.2015** Unsupervised learning
- 13.07.2015** Anomaly detection, Online learning, Recom. systems

Objectives

- Acquire detailed knowledge on selected tools and methods in Machine Learning
 - Overview
 - General principles
 - Algorithms and implementation
 - Various input data sources
- Practical experience of the lecture topics in hands-on projects



Components

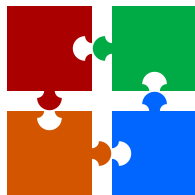
Lecture Tools and theoretical background

Practical exercises Applying ML-methods in small groups

Short presentations On selected topics (10-15min)

Invited talks Short (20-30min) presentations by selected experts

Datasets for self-study (optional) Additional data collections on which the discussed methods can be applied



Practical exercises – in small groups

- Groups of 2–3 students
- Timely topics on machine learning (open outcome)
- Simulation of academic writing process
 - Find a topic
 - Research on related work
 - Generate novel results
 - Summarise in the form of an academic publication
- Submission to workshop or conference (optional)

(mandatory ⇒ instead of Oral exam)

Register in flex-now by the end of this month !

Short presentations – possible topics

- Good features for ML applications
- Dealing with noise and missing values (Compressive Sensing)
- Function principles of physical sensors and sensing modalities
- Body sensor networks
- Challenges in pervasive sensing (e.g. drift)
- Milestones in the history of ML
- Activity recognition
- ... Further special applications of ML

Requirements and lecture material

Requirements to successfully complete the lecture :

- Interest
- Ability to work self-employed and in teams
- Ask !!! when you do not understand something
 - In the lecture
 - In the exercise
 - Via Email

Material :

- [https://wiki.net.informatik.uni-goettingen.de/wiki/Machine_Learning_and_Pervasive_Computing_\(Summer_2015\)](https://wiki.net.informatik.uni-goettingen.de/wiki/Machine_Learning_and_Pervasive_Computing_(Summer_2015))
 - Lecture slides
 - Additional information

Coordination : Stud-ip

Organisation

Lecture : Mondays, 08:15 - 09:45

Exercises : **tbd**

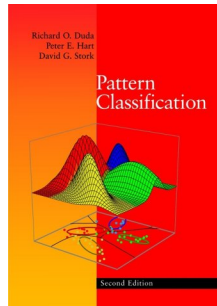
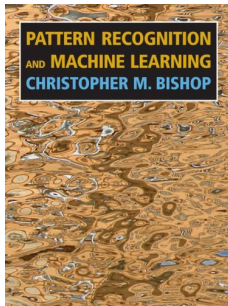
- Every two weeks

Examination : Research project (register until 30.04.2015)



Literature

- C.M. Bishop: Pattern recognition and machine learning, Springer, 2007.
- R.O. Duda, P.E. Hart, D.G. Stork: Pattern Classification, Wiley, 2001.



Questions?

Stephan Sigg

`stephan.sigg@cs.uni-goettingen.de`