Practical: „Machine Learning for Model Building in the Sciences“

Winter term 2015/2016

Niels Landwehr, Tobias Scheffer

Organization: Overview

- Practical worth 6 „Leistungspunkte“.
- Main contact: Niels Landwehr, Office 03.04.0.13, landwehr@cs.uni-potsdam.de.
- Webpage for practical: http://www.cs.uni-potsdam.de/ml/teaching/ws15/pmlnm.html.
- Today: overview of format of practical, brief sketch of possible topics.

Organization: Format

- Practical covers topics in machine learning in the sciences.
- Significant prior knowledge in machine learning (at least two lectures) is important!

- Format: You get an individual project that you work on autonomously
  - Literature research, starting from a few scientific papers that we provide.
  - Familiarize yourself with the scientific application domain (data, literature).
  - Develop and implement a machine learning model.
  - Conduct experimental studies based on data from the scientific domain.
  - Detailed written report.
  - Defend your project in exam (usually with short presentation).

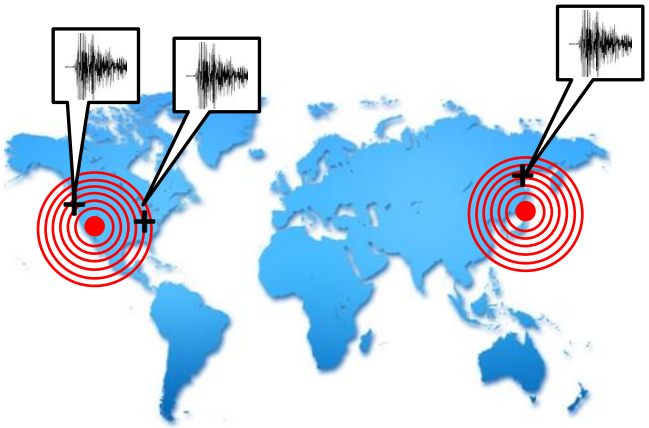
- 6 „Leistungspunkte“: Approximately 180 hours.

Signing Up for the Practical

- If you would like to participate in the practical, please write me an email or come to my office.
- We will propose a possible topic / possible topics to you.
- Please watch our video lecture about how to do scientific projects: http://www.cs.uni-potsdam.de/ml/teaching/ws10/face/wa/Flash/wa.html
- Questions?

Topics in Seismic Risk Analysis

- Goal of seismic risk analysis: predict local peak ground acceleration (i.e., strength of shaking) in the case of an earthquake as a function of magnitude, distance to epicenter, soil properties etc.
- Estimating models based on data from previously observed earthquakes.
- Examples for possible topics:
  - *Transfer learning*: how to integrate data from different regions?
  - *Mixed-effect models*: how to account for dependencies between data points caused by observing the same event multiple times?
  - *Multioutput-Learning*: how to efficiently predict ground movements at different frequencies?



Topics in Eye Movement Modelling

- Eye movements reflect the interplay between vision, cognition, and motor control.
- Eye movements can be observed with high temporal and spatial precision in the lab.

- What can we infer about an individual based on observed eye movement patterns?
- How do eye movement patterns for example correlate with age, education, or intelligence of a person.

LONDON. Um eine Operation für seine erkrank-
te kleine Tochter zahlen zu können, bot ein Brite
seine Niere im Internet zur Versteigerung an. Der
verzweifelte Vater offeriert sein Organ im Rah-
men einer Online-Auktion. Er hoffte auf einen Erlös
von 100.000 Pfund, wie eine englische Zeitung be-
richtete.