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Machine Learning Lab Course

Organizational Meeting

lecturer: Prof. Dr. Stephan Günnemann

Summer Term 2018

Data Mining
and Analytics

Team

- Prof. Dr. Stephan Günnemann
- Daniel Zügner

This is a practical course (Praktikum) for **Master** students!

Name of module: Large-Scale Machine Learning (IN2106, IN4192)

website: ml-lab.in.tum.de

Why attend our Machine Learning lab course?

1. Get the chance to **implement and apply** state-of-the-art ML algorithms

2. Gain **hands-on experience** working on real-world data, solving real-world tasks (e.g. by working on one of the projects by our **industry partners**).
   – Successful projects might even qualify for a subsequent master thesis.

3. Work on **large-scale problems** with the support of state-of-the-art **GPU computing resources.**

Requirements

- Requirements for the lab course
  - **strong programming skills** (Java, Python, C++, Java, etc.)
  - strong knowledge in data mining/machine learning
  - you should have passed relevant courses (the more, the better)
    - Mining Massive Datasets
    - Machine Learning
    - Our seminars
  - self-motivation

- Additional selection criteria
  - other **relevant** experience (projects in companies, experience as a HiWi)
    - you can send an overview of your experience to us (see end of slides)

Organization

- Groups of 3-4 students
- Each team will work on a different project, e.g. in cooperation with one of our industry partners or on a topic they have suggested themselves

- Groups are allowed (should) collaborate!
  - exchange your experience with the other groups
  - how do the other groups tackle certain problems?

- Technical aspects:
  - each group will get exclusive access to at least one high-end GPU server with
    - 4x NVIDIA GPU w/ 11GB RAM
    - 10-core CPU
    - 256 GB RAM
  - scale up your models and data!

Organization

- Weekly meetings (around 90-120 minutes)
  - each group should briefly report their progress, open problems, and next steps
- Regular documentation of your work
  - status reports and documentation (we might set up a wiki)
  - use of a central code repository

Grading

- The grade is based on the **whole semester's** performance!
  - regular completion of **documentation**
  - **regular presentations**/discussions during semester
  - **final presentation** at the end of the semester
    - overview about what you have done, how did you implement it, what are the results, what went wrong, discussion of the framework, …
    - each member of the team needs to present some parts

Content

- Techniques we might want to look at (if you know these, that's good!)
  - Optimization (e.g. via gradients)
  - Stochastic optimization
  - Neural networks
  - Learning with non-i.i.d. data (e.g. temporal data)
- Tasks:
  - preprocessing
  - classification
  - profiling
  - clustering/topic mining
  - recommendation
  - anomaly detection
  - …

Projects

There are **three types** of projects in this lab course:

- Academic projects
- Industry projects
- Your own projects

Reproduction and improvement of a published model

- Can you spot **inconsistencies** in a **recent publication's** experimental setup? Can you even **improve** their results?

- Students can choose a recent algorithm (e.g. from **ICLR 2018**), and aim to reproduce and improve the results in the paper.

- Given the **computational resources** available to the students, they can even select **large-scale models** and evaluate the validity of the results and claims.

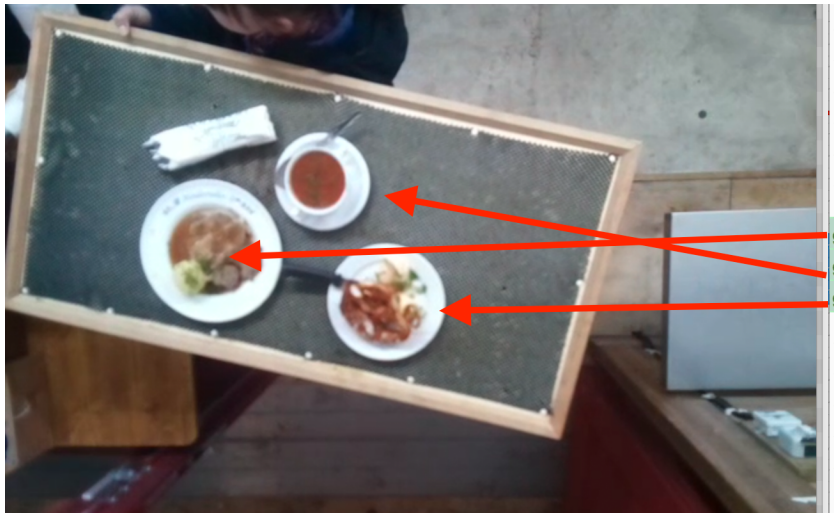
- This can also be a good way to lay the **foundation** of a new algorithm for a **master thesis**.

Industry project: Oktoberfest food classification

- Industry partner: **ilass AG**, maker of software for gastronomy and party tents (e.g. Oktoberfest).

- The project will be about detecting and classifying **food items** on **images** to be extracted from a **video** stream.

- Representative present today: **Peter Vogel**



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9158	16	1.00	Haxe	68	2017-10-02	18:58:12	10
9159	35	1.00	Ochsenmaulsalat	58	2017-10-02	18:58:13	1
9160	16	1.00	Haxe	78	2017-10-02	18:59:13	1
9161	31	1.00	Leberkäs warm	135	2017-10-02	18:59:54	1
9162	19	1.00	Käsespätzle	135	2017-10-02	18:59:54	1
9163	25	1.00	Kinder-Schweinebraten	82	2017-10-02	19:00:48	10
9164	14	1.00	Gulaschsuppe	82	2017-10-02	19:00:48	10
9165	32	1.00	Obazda	82	2017-10-02	19:00:48	10
9166	26	1.00	Kl. Breze	190	2017-10-02	19:00:51	10
9167	61	1.00	Wurstsalat	174	2017-10-02	19:01:20	1
9168	100	1.00	Matjessalat m. Semmel	174	2017-10-02	19:01:20	1
9169	19	1.00	Käsespätzle	174	2017-10-02	19:01:20	1
9170	19	1.00	Käsespätzle	174	2017-10-02	19:01:20	1
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Industry project: Automatic anonymization of faces

- **Automatic anonymization** of faces in image and video data is important to protect the privacy of people.
- Blurring or completely graying out parts in images where faces are detected means a **loss of information** since all facial features are removed.
- **Goal**: develop a method for **face anonymization** while preserving the **most relevant facial features** to still recognize basic information like emotions.

Industry project: Siemens

SIEMENS

- Details to be announced.

Own projects

- You can submit a **brief exposé** of your project idea provided that:
  - There is a considerable challenge from a machine learning perspective, e.g. **non-i.i.d. data** (graphs, temporal data), **very noisy data**, **new application**,
  - You have a sufficiently large and **challenging dataset** at hand (e.g. from an open data platform),
  - The project is suitable for a group of 3-4 students.

Own projects: exposé

- The **exposé** should contain
  - a brief description of the problem and why it is important,
  - a description of the dataset you plan to use
  - a rough outline of an approach you would like to pursue

- If you are a group of students, **only one** student should fill in the exposé and add the others‘ student ID

- Max, 3,000 characters

- Submit via **online form** (see end of slides)

Registration

Registration via the matching system!

Module name: Large-Scale Machine Learning (IN2106, IN4192)

+ fill out the application form (see next slide)

Your Experience

- Fill out our brief online form about your experience until 14.02.2018
  - you can provide us with a list of your experience in data mining/machine learning (courses, projects, …)
  - please send a short overview only (bullet list); not a complete CV
  - (**optional**) attach a brief exposé of your own project idea.

- Check ml-lab.in.tum.de for a link to the form.