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Machine Learning Lab Course

Organizational Meeting

lecturer: Prof. Dr. Stephan Günnemann

Winter Term 2018/19

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 by working on projects offered 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 students
- Each team will work on a different project in cooperation with one of our industry partners.

- Groups are allowed to (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 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 have set up a wiki)
  - use of a central code repository

This semester‘s industry partners

SIEMENS

Industry project: Situation recognition

- **Autonomous driving** is expected to be one of the most disruptive technologies of the 21st century and an active field of research. One crucial component is the robust and reliable recognition of situations.

- In this project, the goal is to use various (sensor) data collected in cars to recognize certain **driving situations** (e.g. turns, signals, parking, ...).

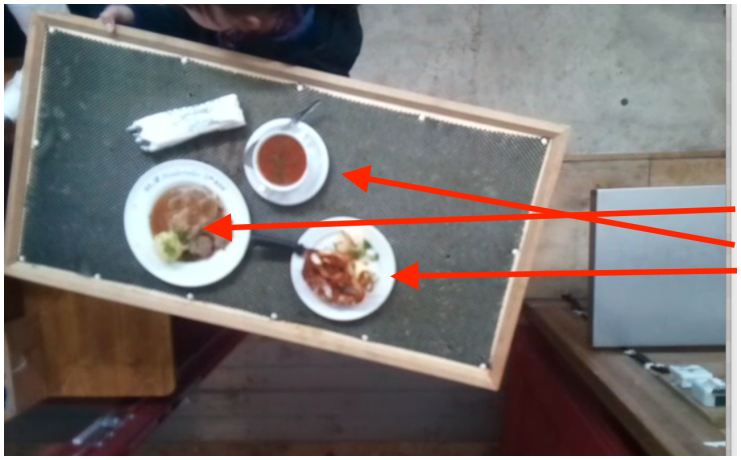
- There are many different **data streams** available for the students (e.g. velocity, acceleration, steering wheel angle, turn signal status) for this task. GPS data can be used for verification of the results.

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.

- This semester‘s focus will be to incorporate the temporal dimension of the video stream



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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
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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
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9170	19	1.00	Käsespätzle	174	2017-10-02	19:01:20	1
	44	1.00	Schweinebraten m. Knödl	174	2017-10-02	19:01:20	1

Industry project: Virtual sensors

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- 3D simulations are an important tool for testing products such as gas turbines or motors.

- During a simulation, we can find out the condition (temperature, rotation speed, etc.) of the product at **any position** we are interested in. In a physical product during operation, the positions at which we can place hardware sensors are **very limited**.

- The goal of this project is to create a **machine learning model** that, based on sensor data at certain positions, can **accurately infer** the conditions at **virtual sensor positions** where we cannot place hardware sensors (e.g. a rotor) **over time**.

Industry project: Health indexing

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- **Predicting failures** in a device during operation **before** they take place can increase product safety, reduce downtime, and reduce repair costs.

- However, it is very difficult to detect **anomalies** or possible failures in the vast stream of sensor data, and the **rarity** of such events means that we have very little ‘labeled’ data.

- In this project, the goal is to simulate **device failures** in products such as gas turbines to record **labeled data** and use this data to **predict** these **failures** based on new data.

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 **by July 4, 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

- A link to the registration form can be found at ml-lab.in.tum.de.