Creation of Deep Learning Methods

Practical Course
Winter Semester 2020/2021

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These slides will be available on the course website

Learning Goals

- Theory & Practice:
  - Basics <u>and</u> advanced techniques
- Practical experience in deep learning craftsmanship
  - Understand real open problems
  - Create methods, solutions, insights, systematizations, publications
    - Creating things is crucial for profound understanding of existing things

- The projects are geared towards producing scientific publications

- Presentation skills

Prerequisites

- Good programming skills
  - Python
  - Array programming in NumPy (or Matlab or similar)
  - PyTorch (or TensorFlow or similar)
- Curiosity
- Passion for mathematics
- Time for regular hard work
- Proactivity, soft skills
  - Project success depends on a two-way communication between the students and supervisors
  - If you expect to just passively receive detailed instructions and directions rather than also establishing communication and asking questions, then this practical course is <u>not</u> for you
- Knowledge of deep learning

Structure of Practical Course

- Three lectures in the beginning of the semester (date tba)
- Practical project
  - Students get matched to projects based on their preferences
  - Each project consists of a "pool" of tasks
    - *Requirements elicitation* and agreeing upon solutions
  - Usually 1 or 2 students per task
  - Access to computers and GPUs in Garching and remotely
  - Deep learning requires early and regular efforts
  - Regular communication with supervisors (important for progress of learning and project success)
  - Final presentations
    - Presentation dates chosen based on your wishes & availability

Next Steps

- 16-21 July: Apply for a place at https://matching.in.tum.de/
- There are many applicants
- Sending info about yourself to create-dl@vision.in.tum.de is crucial
- Email us info until 23 July:
  - Your interests, learning goals
  - Short description of your knowledge and programming skills
  - Some code you wrote in any context
  - All grade transcripts
  - Ongoing courses
- If you require project info in advance, contact us
- If you want to propose own projects ideas, they should be discussed with us until 23 July
- Places in the course will be assigned on 30 July

After 30 July

- Projects will be announced and assigned (based on your preferences) as soon as possible
  - Read project descriptions very carefully, ask as soon as possible whenever something is unclear, select projects wisely
  - Follow the recommendations that will be announced

Other Options

- If you don't get a place in the practical course:
  - Email us, enter the waiting list
  - Apply in subsequent semesters

- Whether you get a place or not, also consider applying for:
  - Bachelor Thesis
  - Master Thesis
  - Interdisciplinary Project
  - Guided Research
  - etc.

Literature

- http://www.deeplearningbook.org/

- http://www.mlyearning.org/

- NumPy: Advanced Array Indexing
  https://docs.scipy.org/doc/numpy/reference/arrays.indexing.html

- Christopher M. Bishop: "Pattern Recognition and Machine Learning", Springer, 2006. (Skim the Chapters 1, 2, 5.)