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 and 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 not 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.)