Introduction to Deep Learning (I2DL)

Exercise 1: Organization

Today's Outline

- Lecture material and COVID-19
- How to contact us
- Exam
- Introduction to exercises
  - Overview of practical exercises, dates & bonus system
  - Introduction to exercise stack
- External students and tum online issues

The Team

Lecturers

Prof. Dr. Laura
Leal-Taixé

Prof. Dr. Matthias
Niessner

PhDs

Franziska
Gerken

Andreas
Rössler

Student Tutors

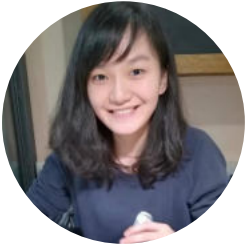Hannes
Stärk

Kejia
Chen

Hanzhi
Chen

Daoyi
Gao

Pascal
Herrmann

Can
Gümeli

Ye
Liu

PS Rahul

Yujiao
Shentu

Jingpei
Wu

Xinpeng
Wang

Lecture Material

- Lectures
  - Videos and slides are re-used from the previous online-only iteration of the class in SS2020
  - They are all available on both Piazza and our webpage https://niessner.github.io/I2DL/
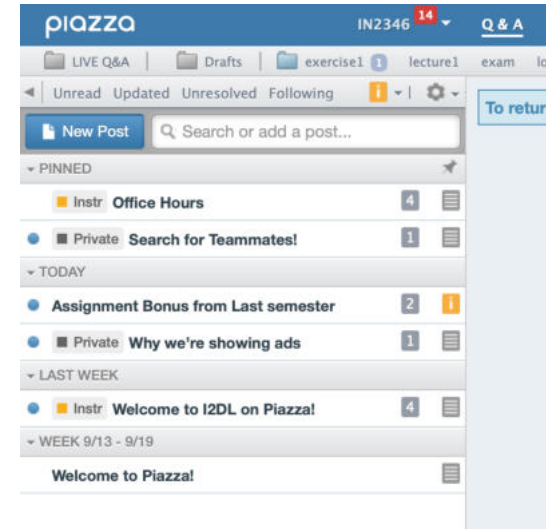 - Recommendation: watch in a weekly fashion

- Exercises
  - Will occur on a weekly basis and material will be uploaded accordingly
  - Release date: Thursdays 10am
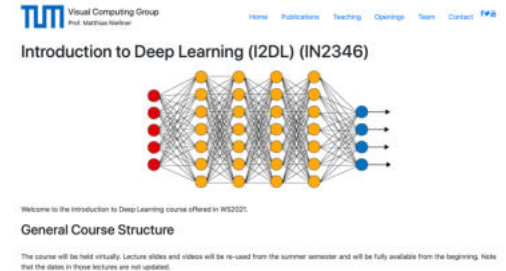
Availability

- ## Website
  - Public
  - Contains all videos, exercise material and solutions

- ## Piazza
  - Link on our website and moodle
  - Only for LMU/TUM students
  - Links and dates of office hours
  - Exam related information

Office Hours

personal

- Starting from: 16.11.2020 (week 3)

- Location: virtual via TUM-Zoom

- Office hours

  – 1 hour long, we offer about 2 each day

  – The precise time slots and links are published on Piazza

Use them to ask questions regarding lecture content or exercises!

Contact

- Any lecture related content:
  https://piazza.com/tum.de/winter2021/in2346

- Any personal questions:
  private question on Piazza

  Private emails or messages on moodle will not be answered!

- Unable to acess Piazza:
  i2dl@vc.in.tum.de

LMU Students & TUM Online Issues

- Check out the google form we are linking on our website. There are separate forms for both TUM and LMU students

- Forms open at the beginning of week 3

Registration for unenrolled TUM students

As some students reported unsuccessful enrollment for I2DL on TUMonline, we offer a form to collect their information for manual registration.

Please fill in this form ONLY if you already signed up for I2DL through the TUM course registration system, but could not get enrolled (e.g. with a status "requirements met", no fix place assgined, etc). You will be assigned a fix place manually on TUMonline soon.

External Students & Late TUM Online Registrations

We want to provide access to our lecture for as many students as possible. If you are affiliated with TUM (e.g. LMU student, Ph.D. student, TUM student who cannot register for courses yet but have a TUM token, etc.), we will add you to our class manually. However, as there are currently issues on the university side to register every TUM student on TUM online, we will postpone the registration until the third week of the semester where we will start with the exercise submissions which are required to obtain the bonus.

That means that you will have no disadvantage starting from the third week and we can assure that most people are able to sign up the regular way via TUM online. The link to the registration form will be posted on 15.11.2020: here.

External Students

- You can:
  - Participate at lectures as well as exercises
  - Exercises have evaluations in notebooks

- You can't:
  - Have access to our submission system
  - Take part in online discussions on Piazza or attend office hours
  - Participate at the exam

Lecture Slides and Recordings

- Week 1 - Lecture 1: Introduction to the lecture, Deep Learning, Machine Learning - Recording
- Week 2 - Lecture 2: Machine Learning Basics, Linear Regression, Maximum Likelihood - Recording
- Week 3 - Lecture 3: Introduction to Neural Networks, Computational Graphs - Recording
- Week 4 - Lecture 4: Optimization and Backpropagation - Recording
- Week 5 - Lecture 5: Scaling Optimization to large Data, Stochastic Gradient Descent - Recording
- Week 6 - Lecture 6: Training Neural Networks 1 - Recording
- Week 7 - Lecture 7: Training Neural Networks 2 - Recording
- Week 8 - Lecture 8: Training Neural Networks 3 - Recording
- Week 9 - Lecture 9: Introduction to CNNs, CNNs for Object Detection - Recording
- Week 10 - Lecture 10: Popular CNN Architectures - Recording
- Week 11 - Lecture 11: Recurrent Neural Networks - Recording
- Week 12 - Lecture 12: Advanced Deep Learning Topics - Recording

Exam

- Format, date and location
  - Nothing fixed yet, but the current plan is to have a regular in-person exam at the university
  - We will publish this information on our website and with an announcement once we have it

Exam: FAQ

- Will there be a <u>retake exam</u>?
  - <u>Not in this semester</u>
  - This class is offered every semester so you will have to pass the exam in the upcoming semester

- What about the bonus?
  - Bonus will be transferred to any future iteration of the class automatically
  - This also applies to students who took this class in any previous semester

Exam: FAQ

- Do you publish <u>previous exams</u>?
  - Yes
  - We will share previous exam questions heading up the exam date

Exercises: Goal

- Gather enough experience to start your own individual project

- Focus:

  – Implementations

  – Introduction of common libraries

  – Practical applications
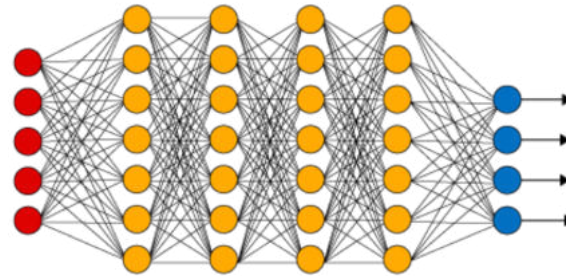
Exercises are exam relevant!

Some notes on "effort" and the exam

- Exercise effort
  - Exercise sessions generally will be short
  - Practical tasks (~3h/week)

- In the end, you will receive
  - A 0.3 bonus on the final grade, if you pass all but one submission
  - Practical experience for work/internships/thesis

Exercises: Content

- Videos
  - Organization details
  - additional lecture information when needed

- Jupyter Notebooks

  > All weekly exercise content is aligned to lectures

  - Contain coding/practical tasks
  - Are self-explanatory
  - Solutions will be published together with the upcoming exercise

Exercises: Software/Hardware

- Programming language
  - Python

- <u>Deep learning library</u>
  - <u>Pytorch</u>

- Hardware
  - A simple CPU will do
  - For later exercises or DL in general: Nvidia GPU

  > Alternative to GPU:
  > Google Colab

Exercises: Schedule

Exercise 01: Organization
Exercise 02: Math Recap

Intro

Exercise 03: Dataset and Dataloader
Exercise 04: Solver and Linear Regression
Exercise 05: Neural Networks
Exercise 06: Hyperparameter Tuning

Numpy
(Reinvent the wheel)

Exercise 07: Introduction to Pytorch
Exercise 08: Autoencoder

Pytorch/Tensorboard

Exercise 09: Convolutional Neural
Networks
Exercise 10: Semantic Segmentation
Exercise 11: Recurrent Neural Networks

Applications
(Hands-off)

Exercises: 8 Submissions

Exercise 01: Organization Exercise 02: Math Recap	Intro
Exercise 03: Dataset and Dataloader Exercise 04: Solver and Linear Regression Exercise 05: Neural Networks Exercise 06: Hyperparameter Tuning	Numpy (Reinvent the wheel)
Exercise 07: Introduction to Pytorch Exercise 08: Autoencoder	Pytorch/Tensorboard
Exercise 09: Convolutional Neural Networks Exercise 10: Semantic Segmentation Exercise 11: Recurrent Neural Networks	Applications (Hands-off)

Exercises: Submissions & Bonus

- Starting from exercise 3:
  - practical exercises, labeled as **submissions**
  - Disclaimer:
    - submissions have a <u>fixed due date</u> until they have to be solved and successfully uploaded.
    - No exceptions

- If you <u>pass 7/8 submission</u> you will receive a -<u>0.3 bonus</u> on the exam grade

Submission Overview

- Every exercise has <u>maximal one submission</u>

- Every submission has a submission goal, e.g.,

  - Goal: Implement a sigmoid function

  - Reachable points [0, 100]

  - Threshold to clear exercise: 100

  - Submission start: **\<date\>**

  - Submission deadline: **\<date\>**

Live Demo

Python Setup

- New users: install python3.7
  - `README.md`

- "Advanced" users:
  - Virtual environment via anaconda/whatever
  - Regular system python install in this environment
    - `pip install -r requirements.txt`

New python users: http://nbviewer.jupyter.org/github/jrjohansson/scientific-python-lectures/blob/master/Lecture-1-Introduction-to-Python-Programming.ipynb

How to submit exercises

- Register at our [submission webpage](#)
  - Sign up with valid matriculation number
  - Get `id` and `password` via mail from tum-online (it will display the email address)

- Submit models with
  - Upload created zip file
  - Note: You will submit your whole code folder as well as your trained models (there are file limits)

How to submit exercises

- On the [submission webpage](#)
  - Upload your zipped exercise folder
  - Select the model you want to evaluate

- Wait for the email with your score
  - Uses email that you signed up with
  - Refresh webpage until it no longer says „job currently waiting in queue" and check out your score on the webpage and via email

Exercises FAQ

- I don't want to code in notebooks. Can I use my favourite IDE?
  - Yes
- Cool, so I can just <u>change the whole code structure</u>?
  - No
  - You can write any helper functions, but keep the skeleton classes intact (i.e., don't rename important functions or variables)
  - You will upload all files and those will be archived on our end

Threshold and Submission FAQ

- How do I know that I passed?
  - Once you submit a <u>score that surpasses the threshold</u>, you will receive an email that contains a message which tells you that you <u>passed this submission</u>

- Help, I got this message a second time!?
  - You will receive this message every time you submit an exercise that exceeds the score

Threshold and Submission FAQ

- I submitted another model which was below the threshold. Do I have to resubmit the old model?
  - No, once one models surpasses the threshold, you are done with this submission (for the bonus)

- Is there a <u>limit on how often I can submit</u>?
  - <u>No</u> ☺

Upcoming Lecture

- Next lecture: Lecture 2: Machine Learning basics

- Next Thursday: Math Recap with Franziska

See you next week!