

# Introduction to Deep Learning (I2DL) Tutorial 1: Organization

#### The Team



#### Lecturer





Prof. Angela Dai



## Student Tutors





Alexandra Samoylova



Han Wu



Ivan Vasilev



Shaotong Chen



Estevao Gomes



Ignacio Dassori



Mats Grobe

## Today's Outline

- Organization
  - Lectures, tutorials and schedule
  - Exam
  - Communication

- Exercises
  - General overview
  - Exercise 1



#### 3. Numpy Introduction

Numpy is a high performance framework for operations on multi dimensional arrays. life as a Data Scientist in general.

In [12]: # Create a simple (2, 3) numpy array
# [[ 1 2 3]
# [ 4 5 6]]
a = np.array([[1,2,3], [4,5,6]])
# Print the data type of this array
print(a.dtype)

# print the shape of this array
print(a.shape)

int64 (2, 3)



# Organization

## Lecture Material

- Useful links
  - Lecture live and recordings: <u>https://live.rbg.tum.de/course/2025/S/SoSe25ItDL</u>
  - Course webpage: <u>https://www.3dunderstanding.org/i2dl-s25/</u>
  - Course forum: <u>https://piazza.com/tum.de/summer2025/in2346ss25</u>
  - Exercise submission: <u>https://i2dl.vc.in.tum.de/</u>
- Lectures
  - On-site every Monday from 14:00 to 16:00
  - MI HS 1, Friedrich L. Bauer Hörsaal
  - Live stream and recordings available
- Exercises (Tutorial session + Homework)
  - Recordings + slides + homework uploaded Thursdays 10 AM
  - Homework due following Wednesday 23:59

#### Piazza

- All announcements, Q&A, private questions via Piazza
- Participation in discussions is correlated with success in the exam
- Mark your follow-up questions as (un-)resolved accordingly if attention is needed by the instructors resolve otherwise.



• Set the visibility to stuff-only for personal questions

Post Type	• Question	Note	O Poll/In-Class Response		
	If you need an answer	If you don't need an answ	If you need a vote		
Post To	Entire Class <b>Indiv</b>	idual Student(s) / Instructor( Sel	(s)		

• Do not post exercise solutions before solution release.

#### Exam FAQ

- Date August 6th 8:00-9:30
- Place On-site in campus Garching

#### • Retake?

None this semester, can participate in the exam of next semester's class

## Exam FAQ

- Do we get access to previous exams? Yes, around week 10
- What about my bonus? Bonus from any previous iteration of I2DL will be transferred to this class and all future exam attempts (regardless of I2DL lecturer)
- For whom? TUM/LMU students (who will get a certificate)

## Office Hours

- Daily office hours offered by the tutors
- Via zoom Link and times - Piazza



- Casual, ask anything, be considerate
- Starting Next Monday

## Contact the staff

- Use piazza for all communication
  - Send private note/question to instructors for individual issues

Post Type	• Question if you need an answer Note if you don't need an answer Poll/In-Class Response if you need a vote	l
Post To	O Entire Class O Individual Student(s) / Instructor(s)	I
	Enter one or more names Select "Instructors" to include all instructors.	J

- If you cannot use piazza to contact us:
  - izdl@vc.in.tum.de
  - Please only use it if you cannot access piazza

## If you are not a registered student

- 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 in the exam



# General Exercises & Bonus

### Exercises – Tentative Schedule

#### Lectures

Introduction 0: Organization 1: What is Deep Learning? 2: Machine Learning Basics

#### Neural Networks

3: Introduction

4: Optimization

- 5: Stochastic Gradient Descent
- 6: Training Neural Networks
- 7: Training Neural Networks
- 8: Training Neural Networks

#### Advanced Architectures

g: Introduction to CNNs10: More on CNNs11: Sequence Models12: Advanced Deep Learning Topics

#### Exercises

Exercise 01: Organization Exercise 02: Math Recap

Exercise 03: Datasets Exercise 04: Linear Regression Exercise 05: Neural Networks Exercise 06: Hyperparameter Tuning

Exercise 07: Introduction to Pytorch Exercise 08: Autoencoder

Exercise 09: Convolutional Networks Exercise 10: Semantic Segmentation Exercise 11&12: Transformers

#### I2DL: Prof. Dai

Exercises - Goal

#### • Goal

Gather enough experience to start your own individual (research) project

- Focus
  - Reimplementations
  - Introduction to common libraries
  - Applications



#### Tutorials Sessions & Exercises Format

- Presentation: video w/ slides Posted to webpage and Piazza
- Video length Tutorial sessions are usually much shorter than the lecture
- Exam

All tutorial sessions and optional exercises (incl. coding) are exam-relevant

• Main work Interactive coding notebooks (don't underestimate them – start early!)



#### Exercises – Tech Stack

- Python Jupyter notebooks Numpy
- Deep Learning library
   Pytorch
- Hardware requirements
  - Minimum: CPU
  - Preferred: Nvidia GPU
  - Alternative: Google Colab



## Extra Spice: Leaderboard (Ex6, 9-11)

- Compete against your fellow students on our datasets for a variety of tasks
- Some of the best solutions will be featured in exercise discussions (You can also post on Piazza yourself)

#### Leaderboard

The leaderboard shows for each exercise the highest scoring submission from each user. Only valid submissions are displayed.

Exercise 1	Exercise 3	Exercise 4	Exercise 5	Exercise 6	Exercise 7	Exercise 8	Exercise 9	Exercise 10	Exercise 11
#		User					Score		
1		a0005					68.77		
2		a0010					64.41		

## Submissions & Bonus

- Submissions
  - 9 (out of 12) exercises labelled as *submissions*
  - submissions have a fixed, mostly one week due date until they have to be solved and successfully uploaded.
- Bonus
  - Passing exam grade get's a -0.3 bonus
  - Need to have passed 8/9 submissions

#### **Exercises - Content**

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: Transformers 1 Exercise 12: Transformers 2	Applications (Hands-off)		



## Exercise 1

#### Exercise 1 Goal

- Get your python environment up and running
- Familiarize yourself with our notebooks
- Familiarize yourself with our submission system
- It's short and technical



- Content
  - First experience with our environment and submission system
  - Optional: python refresher
- <u>Counts for the bonus</u> (i.e it's one of the 9 submissions for the bonus)

## Instructions

- Download the zipped folder
- Extract zip locally and follow the instructions in the README.md file to:
  - Install anaconda to create a new python environment
  - Set up your env using the requirments.txt file
  - Execute `jupyter notebook` in the i2dl folder. We recommend using VSCode if you want an IDE.

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

## Hitchhiker's Guide: Notebooks

- 1. Run cells from top to bottom
- 2. Be careful when changing notebook cells
- 3. Edit external code in browser or in your favorite IDE
  - Don't code outside our boxes in exercise\_code files
- 4. Checking other code
  - Generally optional
  - Look out for green boxes

#### **Task: Check Code**

Please read make\_dataset(directory, class tasks. Additionally, it would be wise decision to ge projects. As it is not beginner friendly, we removed i

## Google Colab Instructions

#### (Optional) Set up Google Colab

If you lack resources CPU or GPU resources to finish an exercise or have issues setting up a local python environment, you can also use your google account to access google colab which provides an already set up python environment as well as free resources for training.

In order to use google colab follow these steps:

1. Access your google drive and upload your i2dl folder that contains the respective exercises/datasets etc. in the main directory



	🛆 Drive	Q Sea	
	Folder		
	File upload	1	
	Folder upload		
	Google Docs	>	
2. Open the exercise folder and select the notebook y My Drive > i2dl > exercise_01 -	ou want to open in google colab		
Folders			
models im	ages 💼 ex	ercise_code	.ipynb_checkpoints
Files			
O Preview			
<∱⇒ Open with	> co Go	oogle Colaboratory	
1_introduction.	Suggested app	15	
GD Get link	Te	ext Editor	

## **Exercise Submission**

- Register on submission webpage
   <u>https://i2dl.vc.in.tum.de/</u>
  - Sign up with valid matriculation number
  - Get id and password via email (it will display the email address)
- Submit models:
  - Upload created zip file
  - Note: You will submit your whole code folder as well

#### FAQ

- I don't want to code in notebooks. Can I use my favourite IDE?
  - Yes
- Cool, so I can just change the whole code structure?
  - 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

### FAQ

- How do I know that I passed?
  - Once you submit a score that surpasses the threshold, you will receive an email that contains a message which tells you that you passed this submission
- Help, I got this message a second time!?
  - You will receive this message every time you submit an exercise that exceeds the score
  - Your best perfoming model will count, not the latest submitted one

#### FAQ

- Where can I get assistance?
  - Piazza. Ask there. Maybe someone has asked the same question before.
  - Office hours
  - Other students
  - Note: the tutors are not responsible to help you til the last minute. So start doing the exercise and ask questions early.

## **Upcoming Lecture**

• Next lecture: Lecture 2: Machine Learning basics

• Next Tutorial: Math Recap (+ Math exercise sheet)



# See you next week