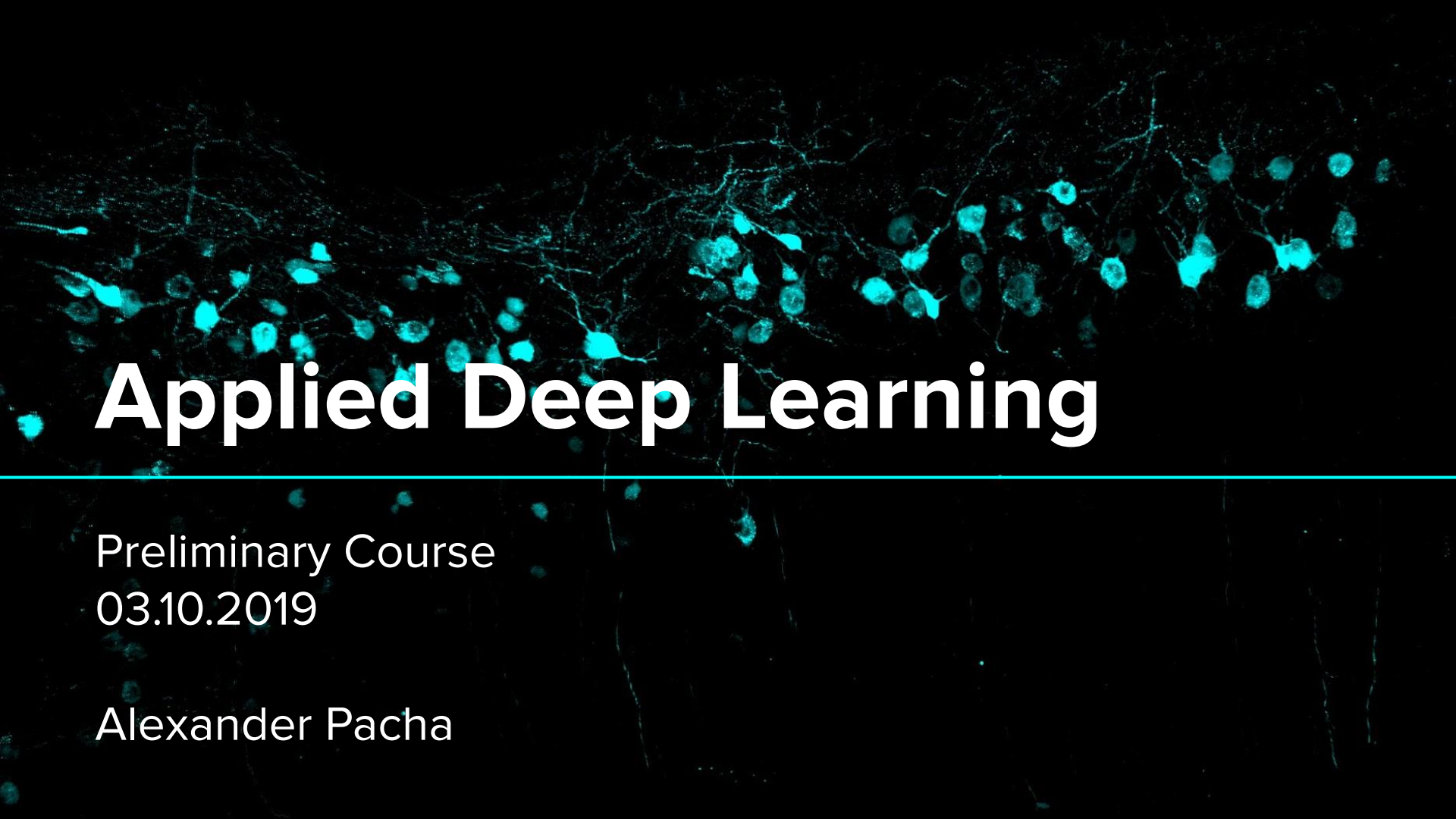


Applied Deep Learning

Preliminary Course
03.10.2019

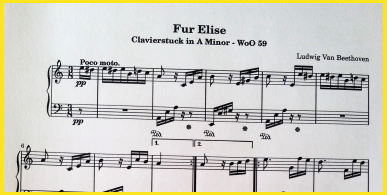
Alexander Pacha

About me

- Alexander Pacha
- Software Engineer at Zühlke Engineering
- Recently completed PhD on Optical Music Recognition

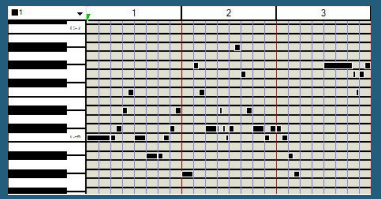
zühlke
empowering ideas

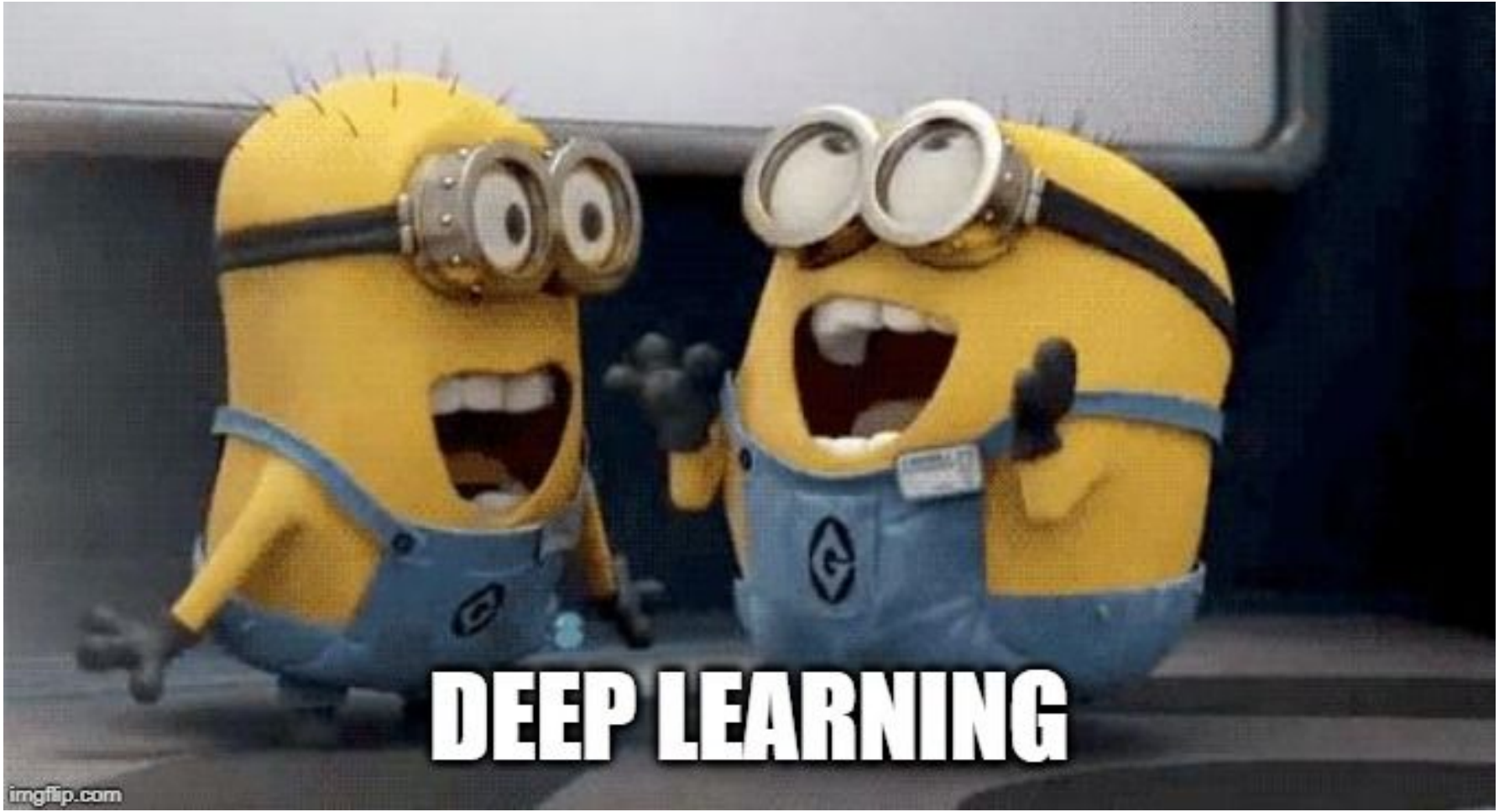
Image of Music Scores



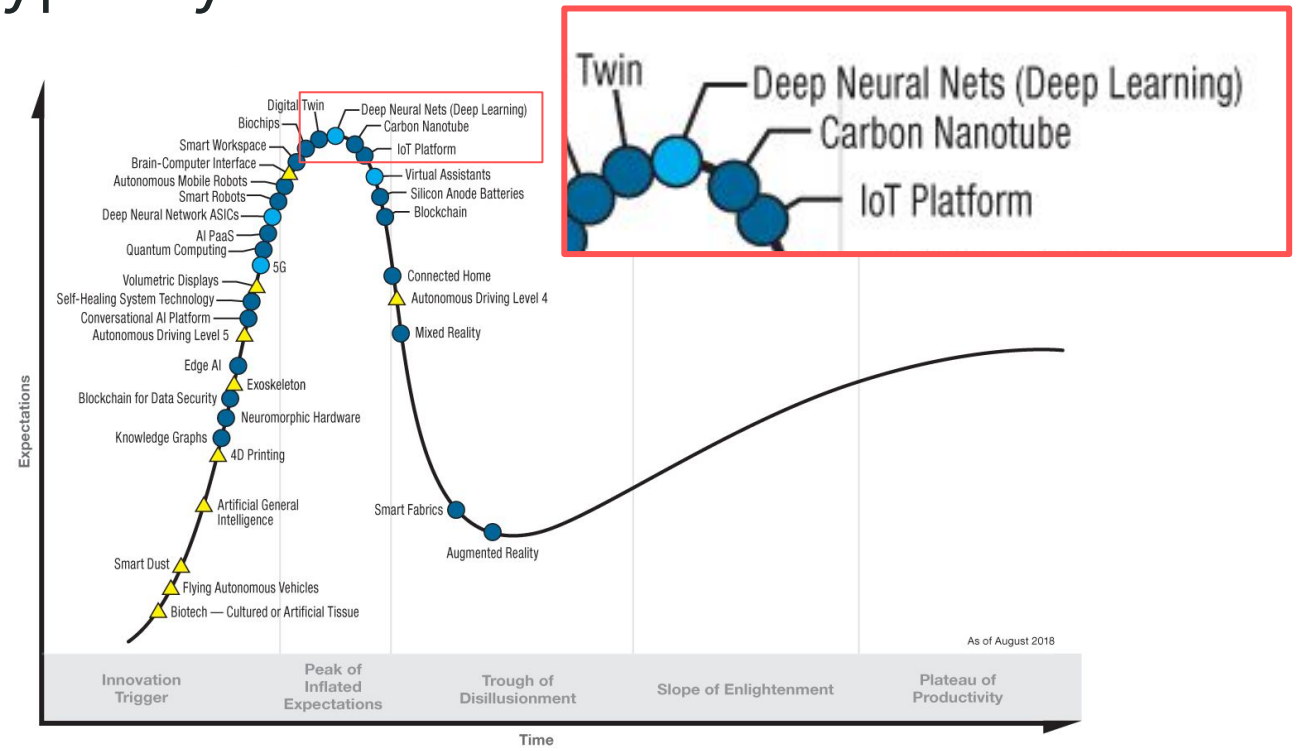
Optical Music Recognition

Machine-readable Music Score




DEEP LEARNING
imgflip.com

Gartner Hype Cycle 2018



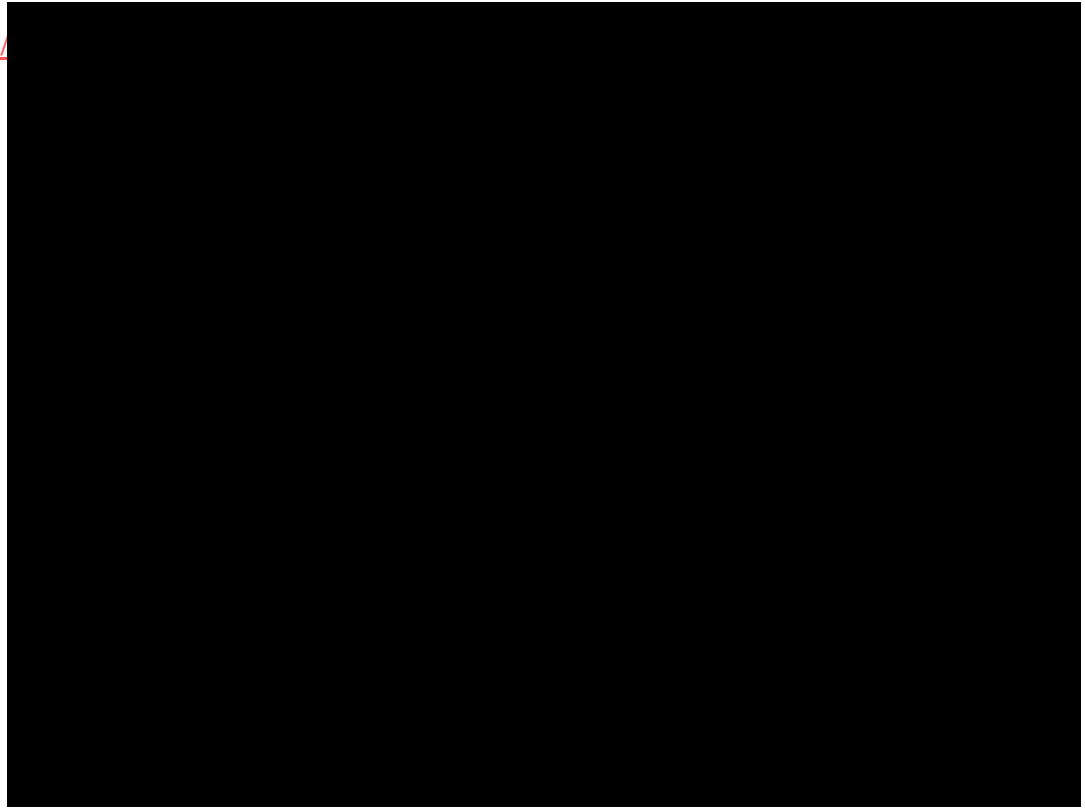
gartner.com/SmarterWithGartner

Source: Gartner (August 2018)

Gartner

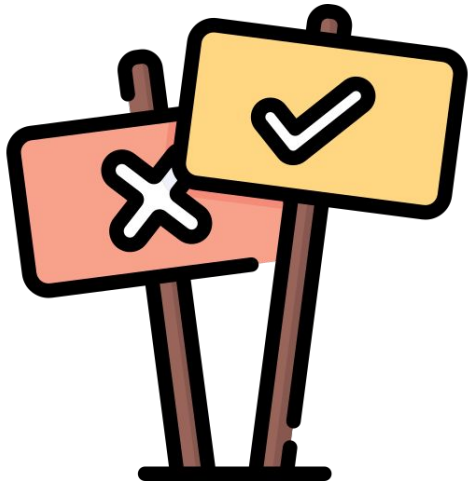
Inflated Expectations

Source: https://youtu.be/



Goals

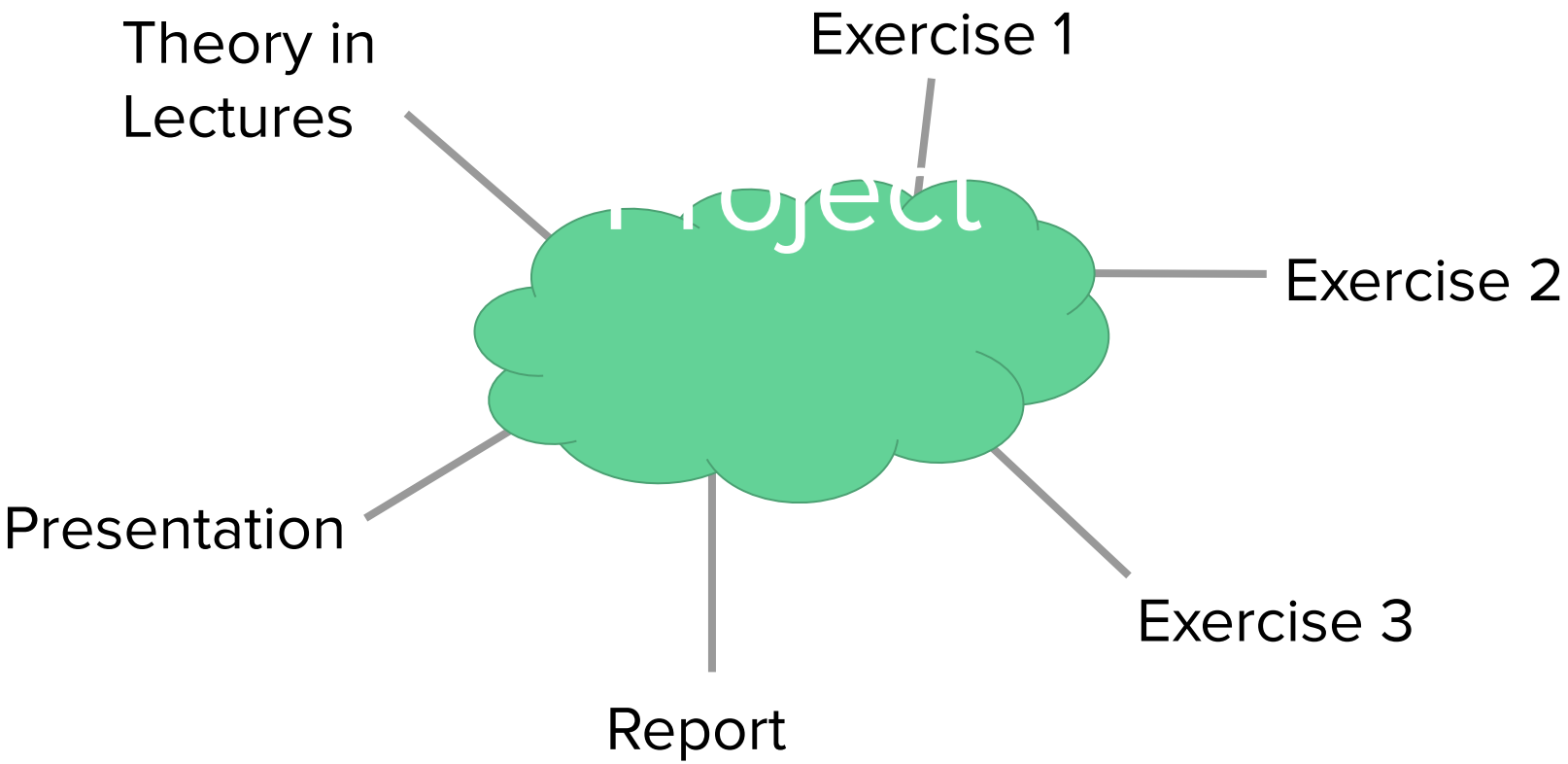
- What can and what cannot be done with Deep Learning?
- Gain hand-on experience on how to pull a Deep Learning project off
- Learn how to present Deep Learning results properly



About this lecture

Applied Deep Learning

You will do most of the work!


Theory in Lectures
Exercise 1
Project
Exercise 2
Presentation
Exercise 3
Report

Project

- You pick a topic
- You pick a project type

Should be:

- interesting
- challenging
- useful to you

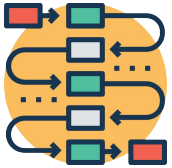
Project Types

Bring your own data

and use an existing approach

Bring your own method

on an existing dataset



Beat the classics

implement a DL method and compare to non-DL baseline

Beat the stars

improve the state of the art

How does grading work?

Immanent - Your project will be graded continuously

5 parts with max. 10 points each:

- Exercise 1
- Exercise 2
- Exercise 3
- Report
- Presentation

Criteria

- Results*
- Creativity
- Complexity
- Code Quality
- Presentation

* failure is acceptable

Exercises

Exercise 1: Initiate

Come up with a topic; Gather data; Research existing approaches; Plan your work

Exercise 2: Hack

Implement your idea; Run training; Improve methods; Optimize as much as you can

Exercise 3: Deliver

Build a small application to run your model; Provide deliverables; Ship it

Schedule (subject to change)

- 03.10.2019 - Preliminary Lecture - Intro to Deep Learning
- 10.10.2019 - Neural Networks, Optimization and Backpropagation
- 17.10.2019 - Convolutional Neural Networks and Visual Computing
- 24.10.2019 - Recurrent and Recursive Neural Networks
- 31.10.2019 - Libraries and Practical Aspects
- 14.11.2019 - Autoencoders and Deep Generative Models
- 21.11.2019 - Preprocessing, Data Augmentation, Regularization, Visualization
- 12.12.2019 - Reinforcement Learning
- 09.01.2020 - Serving, Delivering and Practical Aspects
- 16.01.2020 - Explainable AI
- 23.01.2020 - Presentations
- 30.01.2020 - Presentations

30.10.2019:
Deadline Exercise 1

18.12.2019:
Deadline Exercise 2

22.01.2020:
Deadline Exercise 3

Logistics

- Weekly lecture on topics that are useful for your projects
- Projects are being done alone
  - But please do discuss with your colleagues
  - TUWEL course for open questions - peer help
- Crowded course
  - Please fill in name list
  - Seminar room max. 23 people
  - Not everybody will be able to do the course this year
  - Please only sign up if you really have the resources and are willing to work on the project

Logistics

You need to bring computing resources

- Local machine with a graphics card
- Google Colab (https://colab.research.google.com)
- Azure Notebooks (https://notebooks.azure.com/)
- Amazon Deep Learning AMI (https://aws.amazon.com/de/machine-learning/amis/)