Day1 - Introduction to the course

02476 Machine Learning Operations

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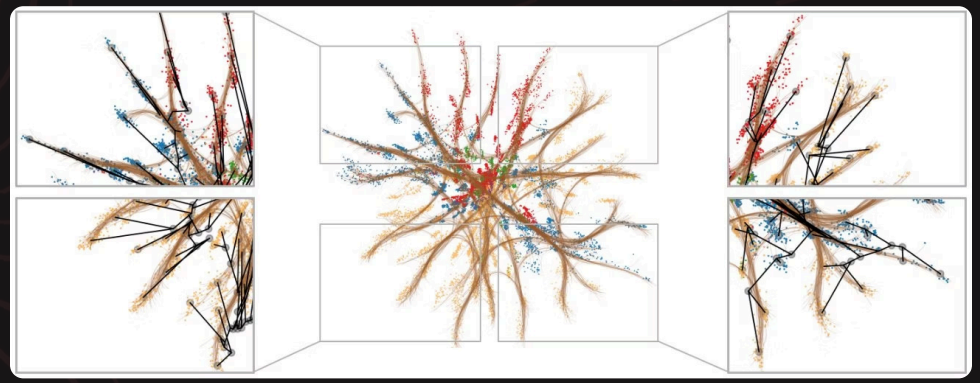
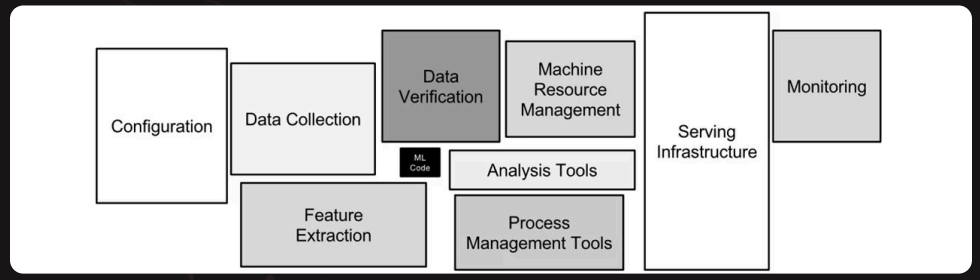
January 2026

Who am I

- Bachelor, master, PhD, Postdoc from DTU
- Currently: Associate Professor
- Old focus:
  - Inductive biases in deep learning
  - Probabilistic generative models
  - Manifold learning
- New focus:
  - MLOps
  - Efficient machine learning



From that to this...



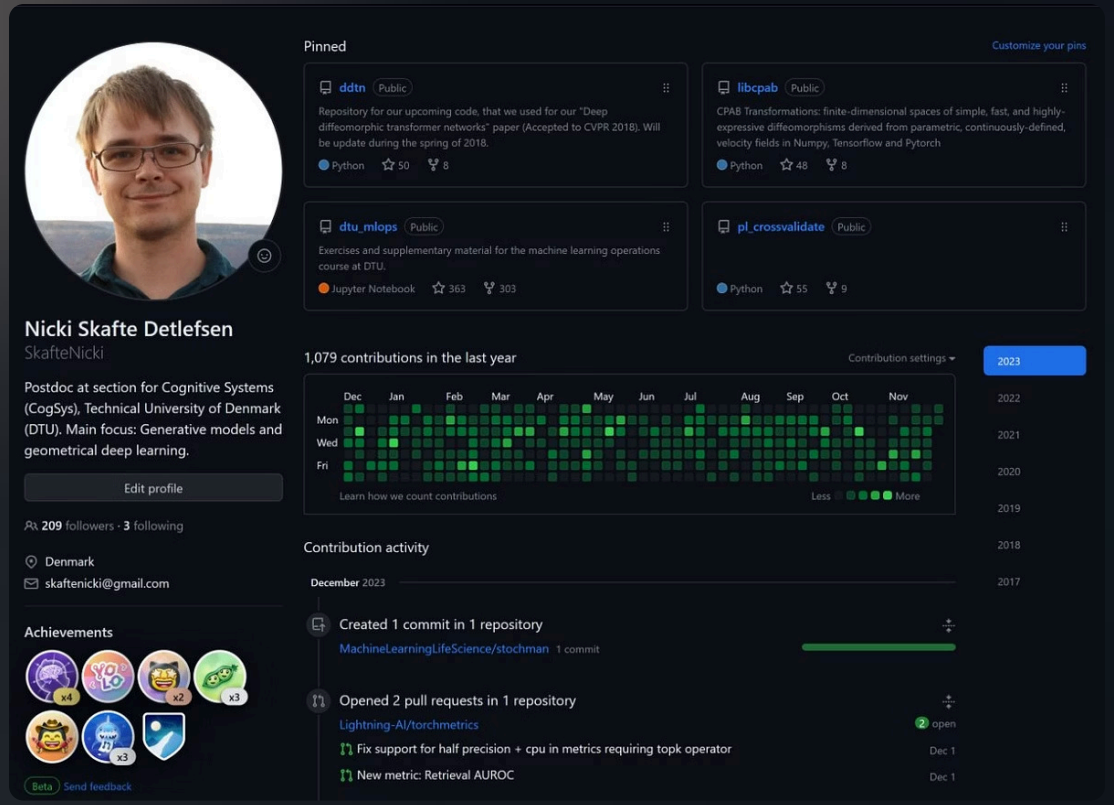
My secret identity

💻Eager open-source contributor

- Numpy
- Scikit-learn
- Pytorch

⚡Part time ML Engineer at https://lightning.ai/

- Pytorch-lightning
- Torchmetrics
- Litdata
- Litserve



Who else to know about?

We have 13 lovely TAs in the course:

1. Dimitris Papantzikos
2. Victor Winther Larsen-Saldeen
3. Silja Marie Patursson Vange
4. Christian Kento Rasmussen
5. Astrid Louise Harsaae
6. Rasmus Ørtoft Aagaard
7. Qiwen Huang
8. Javier Yanes Pulido
9. Mads Sverker Nilsson
10. Konstantinos Tzimoulias
11. Oscar Bach Østdahl Pedersen
12. Gokul Desu
13. Oriol Baldris Vendrell

TAs are available from 10:00-16:30 every day

In general there is 1-4 on duty, either online or physical on campus

On slack, there names contain (TA).

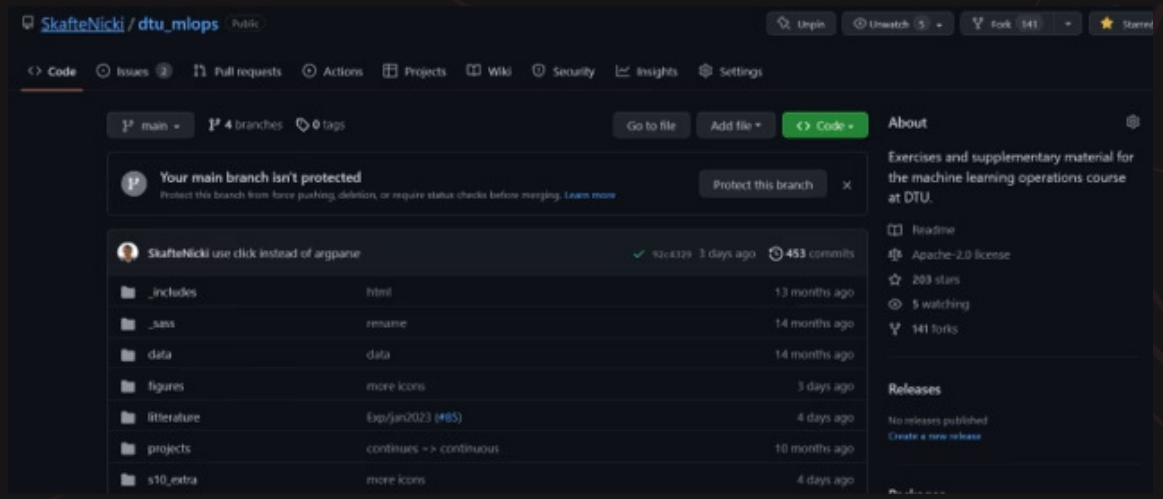
Course setting

- 5 ECTS
- 3 weeks period
- Level: Master
- Grade: Pass/not passed
- Type of assessment: Project report

Recommended prerequisite

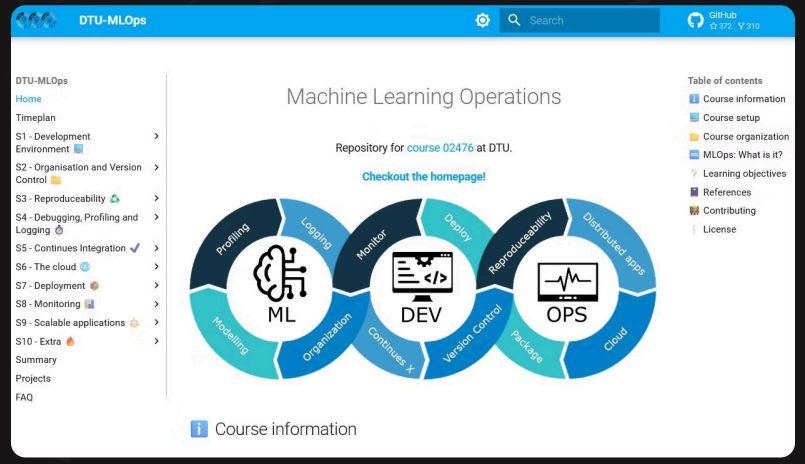
- General understanding of machine learning (datasets, probability, classifiers, overfitting etc.)
- Basic knowledge about deep learning (backpropagation, convolutional neural network, auto-encoders etc.)
- Coding in Pytorch

Course webpage



Github:

https://github.com/SkafteNicki/dtu_mlops



Rendered page:

https://skaftenicki.github.io/dtu_mlops/

Join the slack channel

join.slack.com

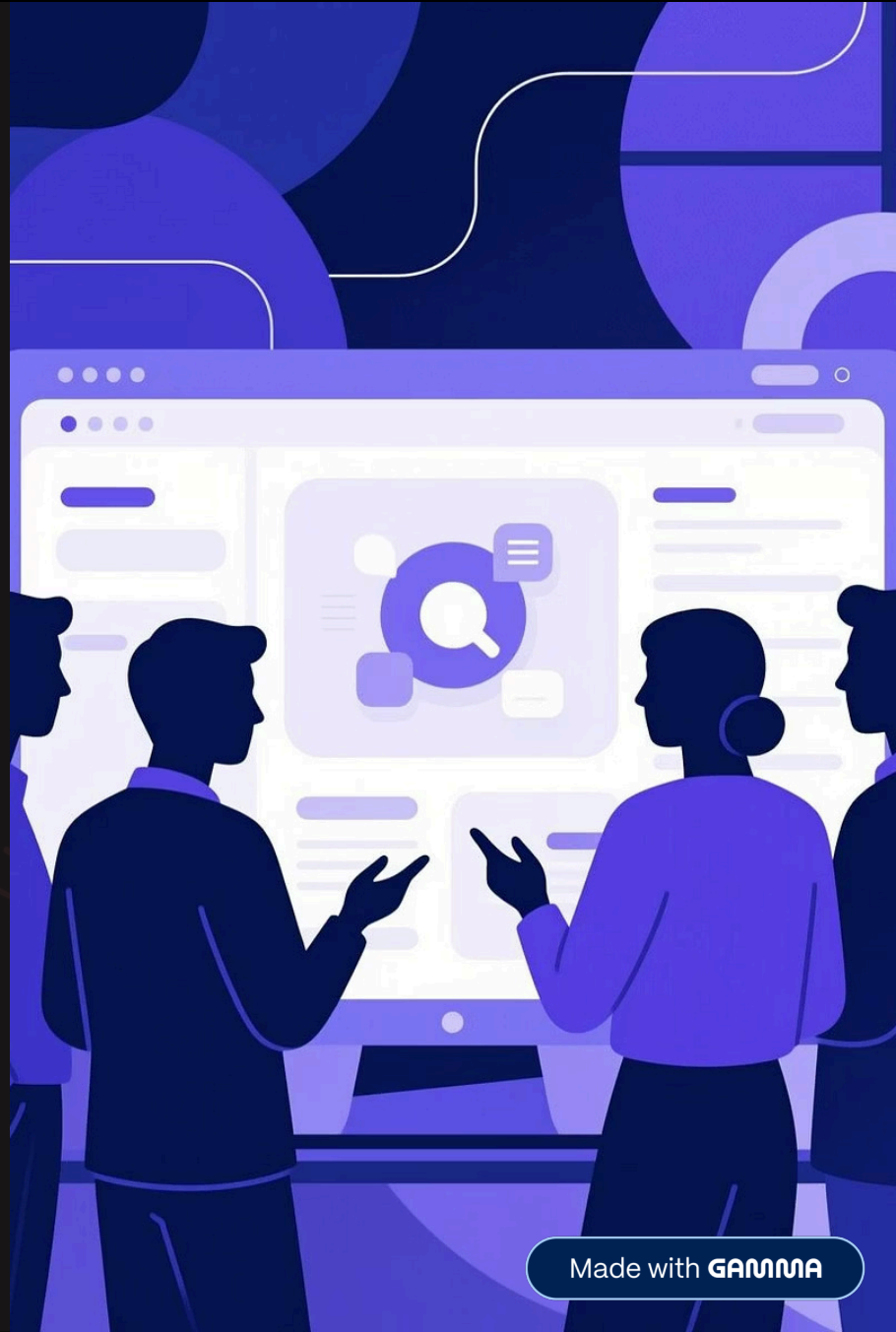
Slack

General announcements

- Asking questions
- Communication with team members
- Check the #general channel every day

For non-public info we use DTU learn

https://learn.inside.dtu.dk



What is this course

Introduce the student to several tools and software development practices that will help them organize, scale, deploy and monitor machine learning models either in a research or production setting. To provide hands-on experience with a number of frameworks, both local and in the cloud, for working with large scale machine learning pipelines.

⭐ Organization

⭐ Scalability

⭐ Reproducibility

⭐ Hands-on experience

What this course is not

⚠️How different machine learning models works

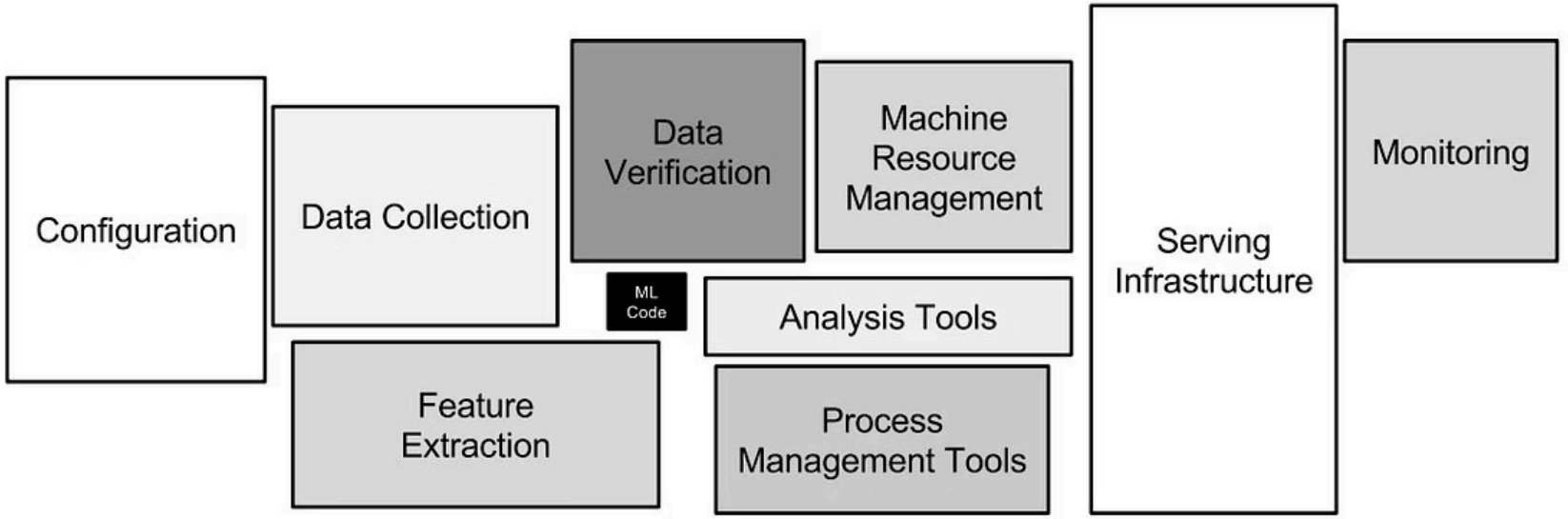


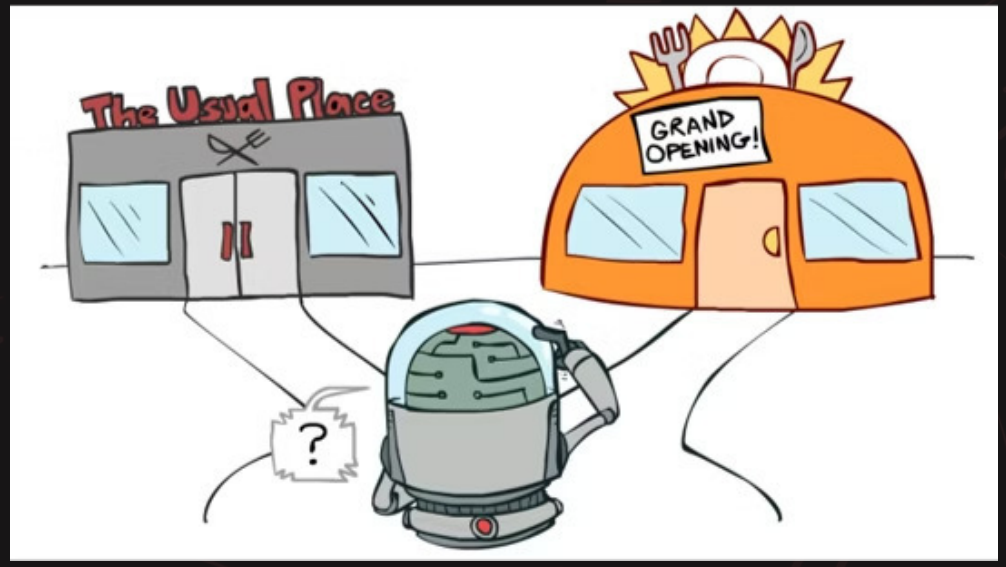
Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.

The teaching method of this course

The course is centered around two principals:

- 💡 *Learning by doing*
- 💡 *Hybrid learning*

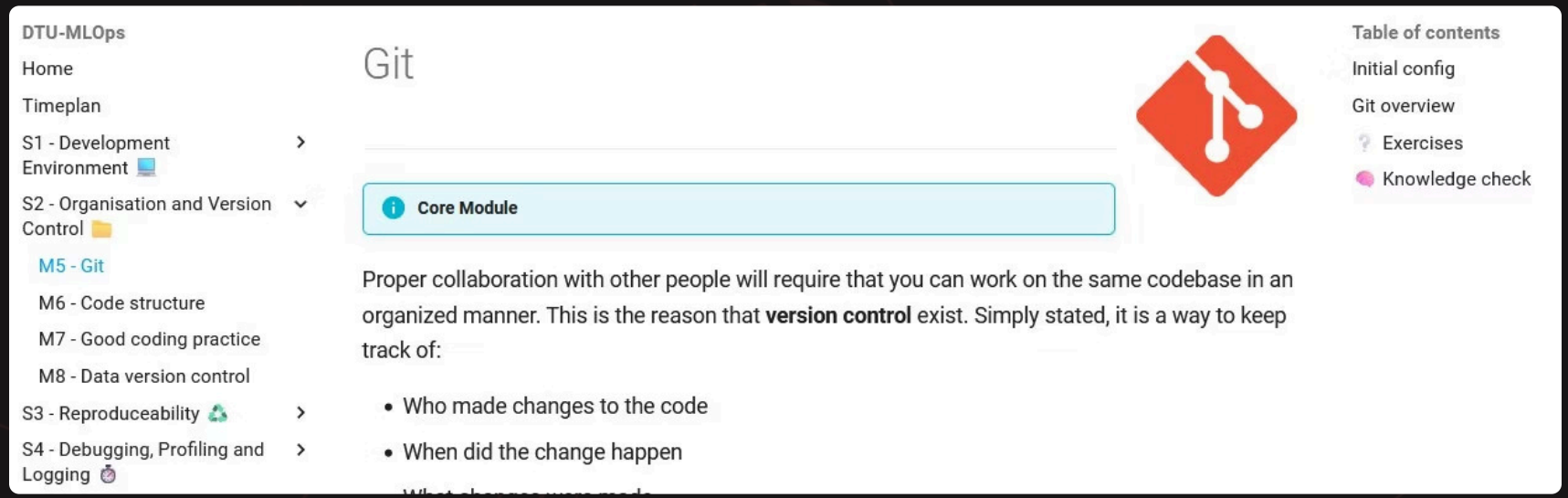
We provide lectures, exercises and guidance but encourage self study.



Exploration vs. exploitation dilemma

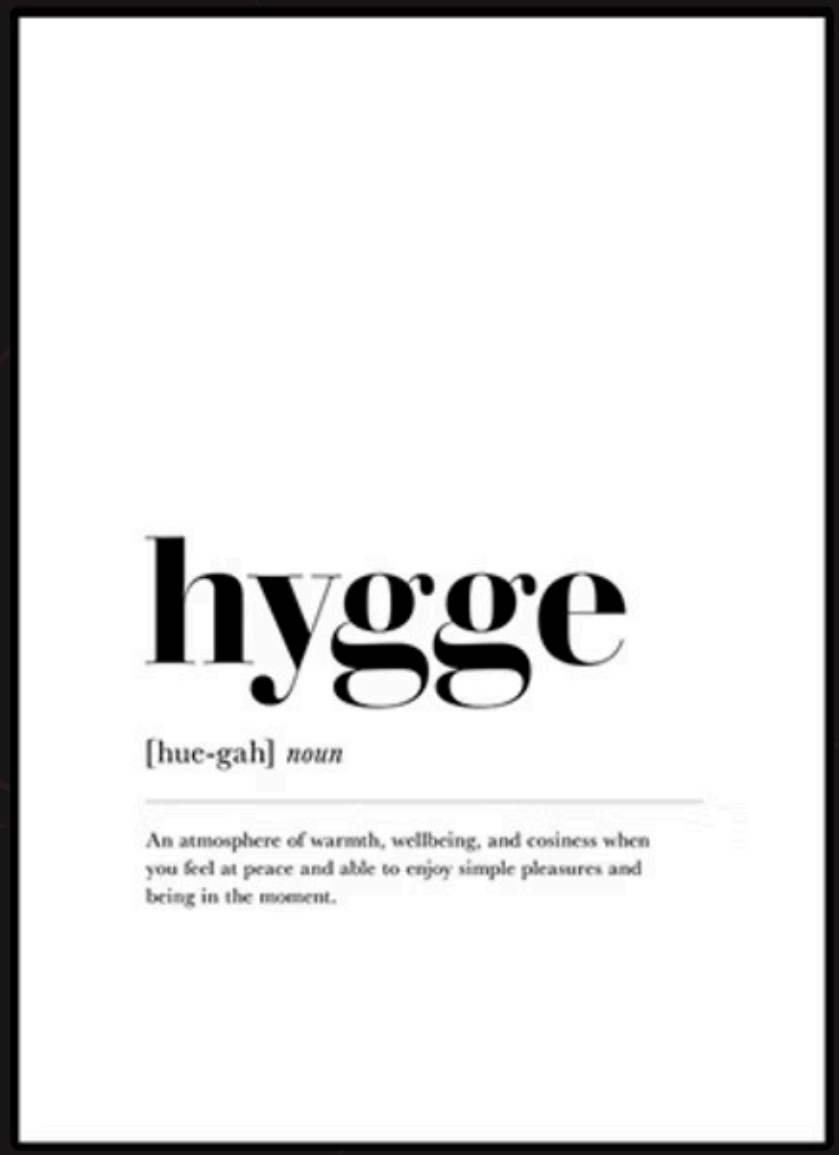
Organization of material

- 9 exercise days
- 1 day = 1 session (S)
- 1 session = multiple modules (M)
- Two types of modules
  - Core modules: essentially to do
  - Optional modules: still recommended to do
- Note: S10 is just a bunch of extra modules



What I hope from this course

- Have fun!
- That you get to fill your toolbox with useful frameworks
- (Maybe) Learn something along the way



A typical day in this course

⚡Exercise days:

- Meet in at 9:00
- Lecture for 30-45 mins
- I am still learning how to do lectures
- Lectures are not meant to give teach you anything, but provide some context to the topic of the day
- Exercises until 14:00-17:00
- Remember to take a lunch break
- Workload will depend on you

🔥Project days

- Sometimes a small lecture or company presentation
- Rest of the day you work on projects
- Office hour (may be virtual)

The overall structure of the course

skaftenicki.github.io

Time plan – DTU-MLOps

The course is organized into exercise (2/3 of the course) days and project days (1/3 of the course).

Week1	Week2	Week3
Monday=Exercise day	Monday=Exercise day	Monday=Exercise day
Tuesday=Exercise day	Tuesday=Exercise day	Tuesday=Exercise day
Wednesday=Exercise day	Wednesday=Exercise day	Wednesday=Project day
Thursday=Exercise day	Thursday=Project day	Thursday=Project day
Friday=Project day	Friday=Project day	Friday=Project day

Projects 🔥

Approximately 1/3 of the course time is spend on project work

More info here:
https://skaftenicki.github.io/dtu_mlops/pages/projects

Already now you are recommended to think about forming groups

- Group size: 3 to 5
- Also feel free to write in the #find-a-group slack channel
- If you Thursday still does not have a group, please let me know and I try to do something about it

How to pass

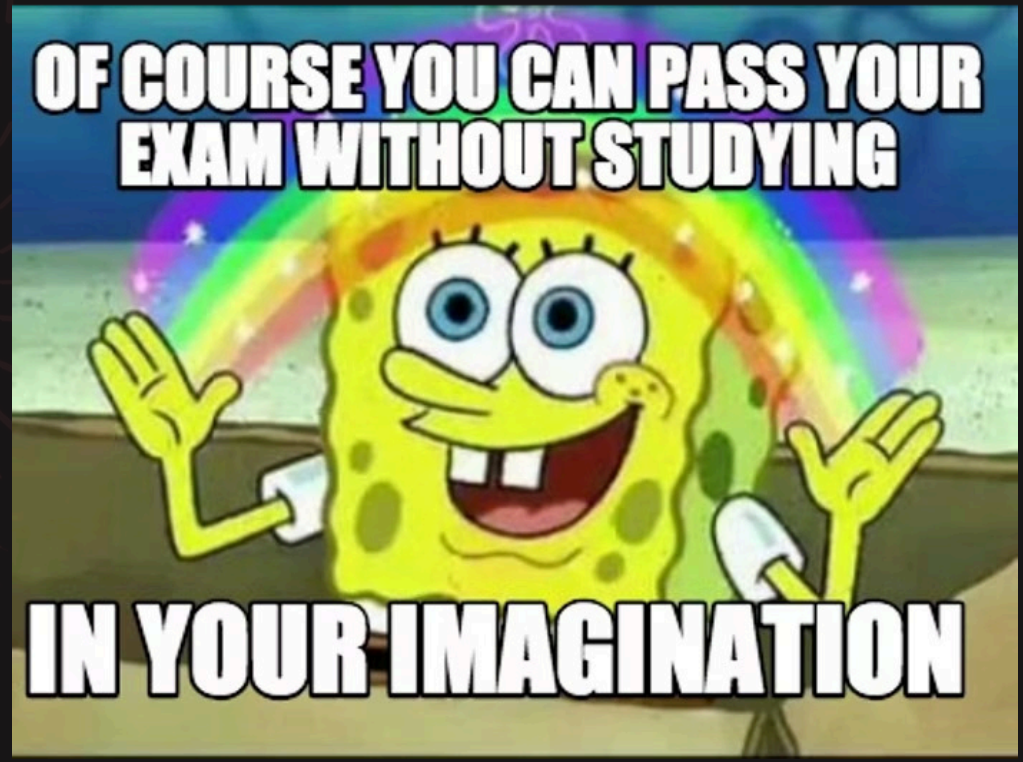
💡 Do the exercises

💡 In the final project:

Show that you can use the tools you learn about throughout the course

The course have a pass rate at around 99.7%

There has been one failure mode: group dynamics!



Exam

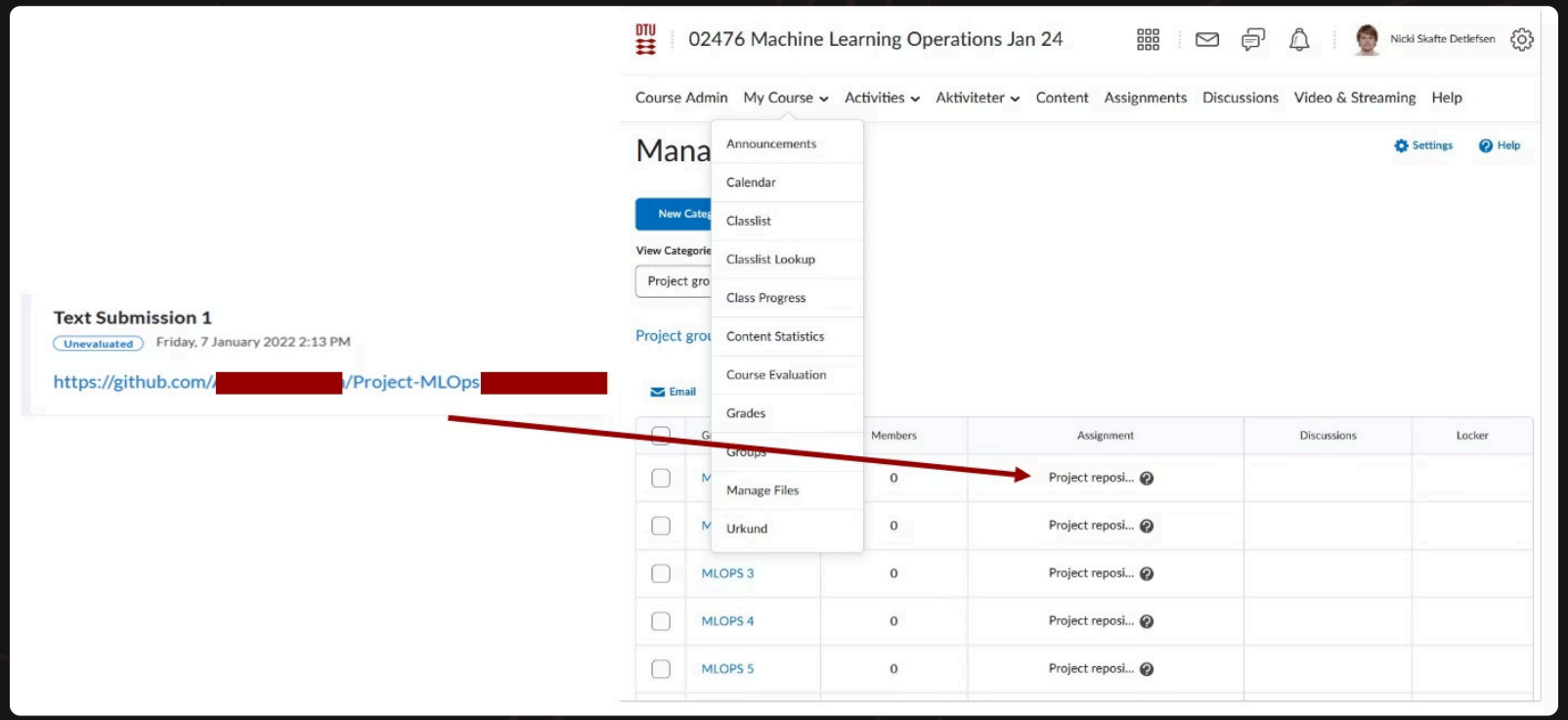
The exam only consist of a written part: A **template** with ~30 questions that you can fill out as you work on your projects. It will be part of your project Github repository.

More on this on Friday ⚠️.

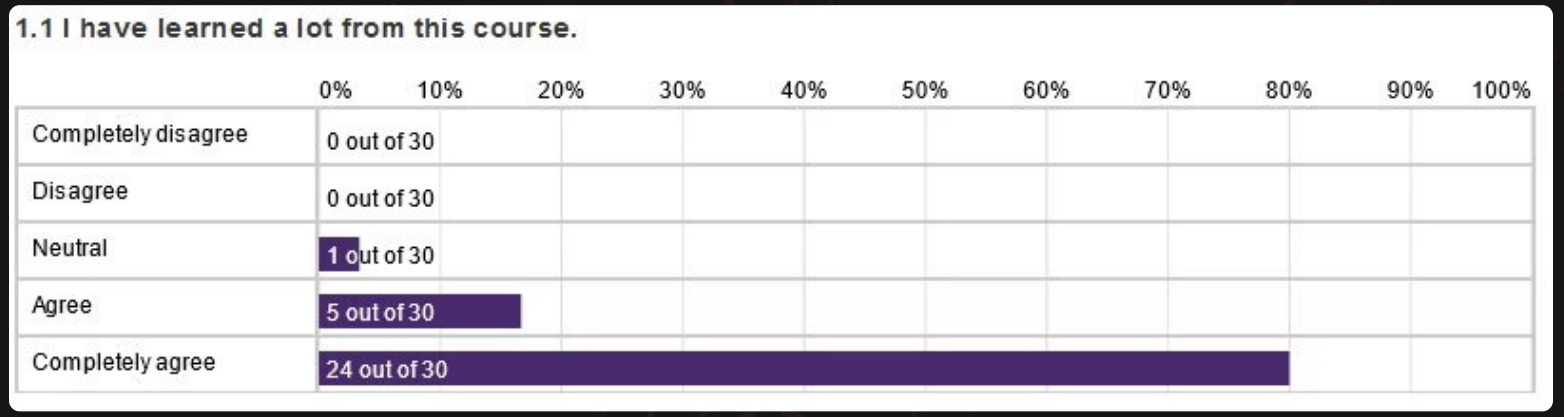
One hand-in during the course

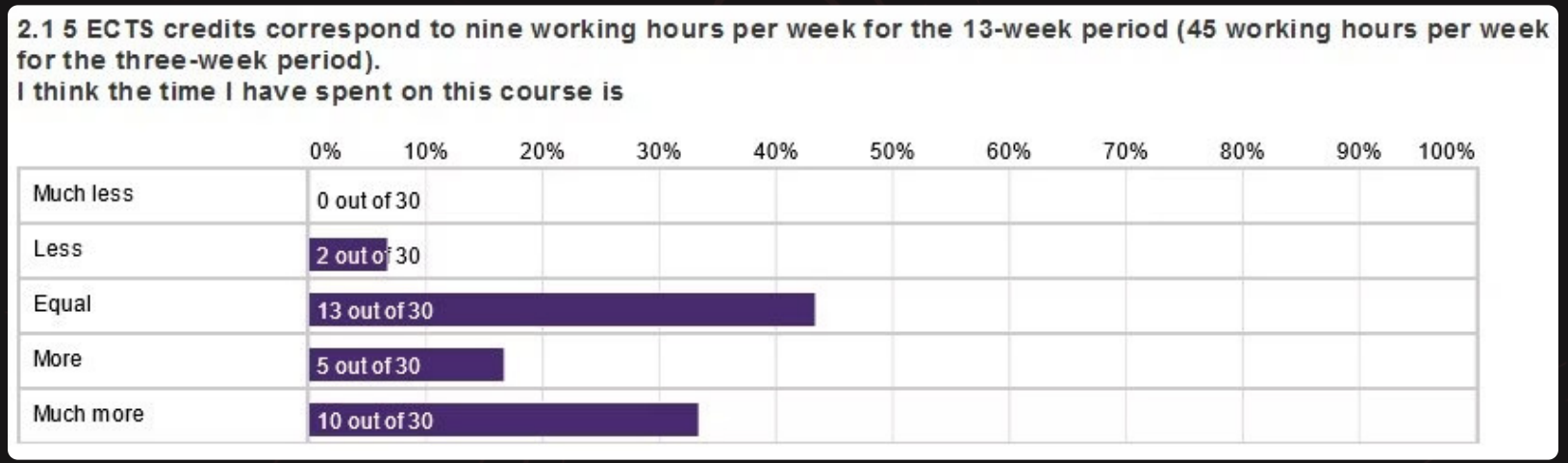
💡 Signup as a group

💡 Hand-in the link to your Github project repository



The course in 2 statistics

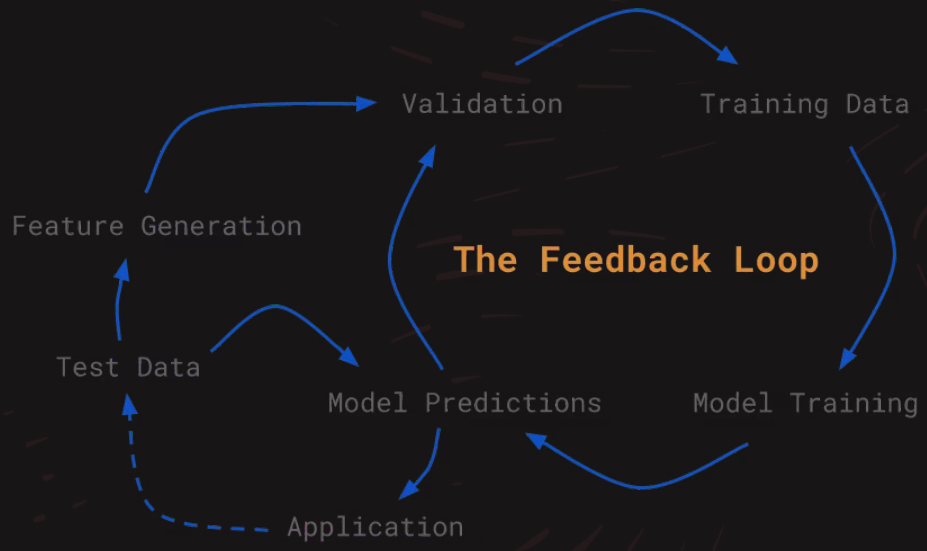


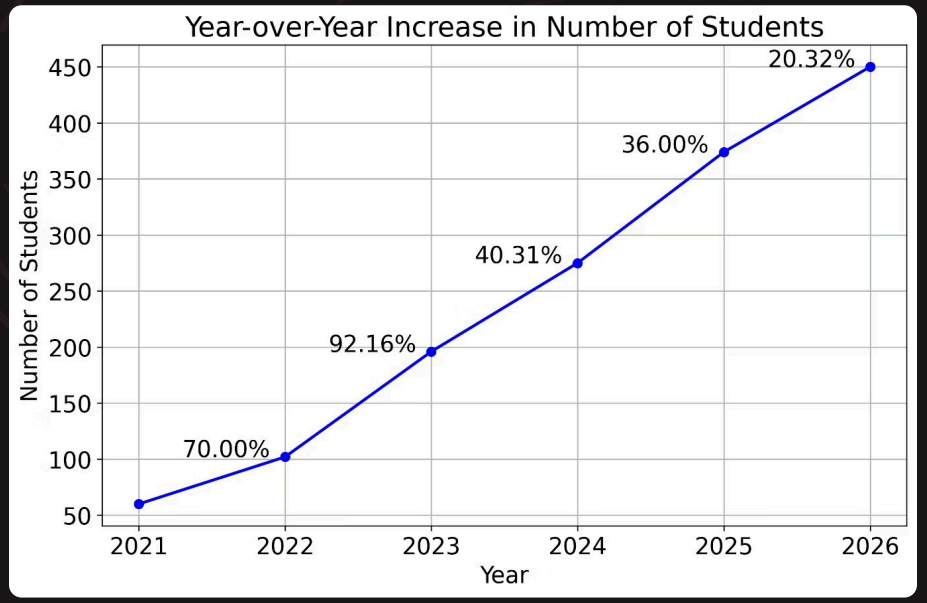


It is not a perfect course

Some would say we are on v5.0 of the course; I would argue that we are on v0.0.5.

Please come talk to me if you have suggestions for improvements.





FAQ

❓ Can I work from home

💡 Yes, but note that

- for the project days you need to agree with your group on this
- we have limited TA resources and will priorities students on campus

❓ Can I use ChatGPT or similar

💡 Yes all you want, but make sure you still learn something. Remember the I in LLM is for intelligence.

❓ What if I become sick during the course

💡 If you can work from home, then that is the best option. Second best option, is to make sure you still contribute to the final project but skip doing some of the exercises

Can this course be vibe coded?

> **To Vibe (verb):** To build software by articulating high-level vision and logic to an AI agent, treating code not as a manual craft to be written, but as a fluid byproduct of a conversational loop.

Vibe coding is allowed, mimicking real-world practices. While it can handle boilerplate, complex integrations may be challenging to prompt your way through. Remember, you remain fully responsible for all code and the final project.

How to get help on campus?

⚡We have auditorium 72, group area mid, group area west, but use whatever space you can find in the building

⚡Nicki will be in the auditorium from 8:30-14

⚡TAs will be around from 10-16:30 in auditorium + group areas

How to get help on slack?

⚡For each exercise day, there is a dedicated slack channel: #**s1-getting-started** for today, #**s2-organisation-and-version-control** for tomorrow etc. Use those for questions regarding the given days exercises

⚡If you need a face-to-face meeting, write in the #zoom-online-help channel and a TA will be with you as soon as possible

⚡For project related questions ask in the #project channel

Help us by helping each others 😀

Lets get started...

https://skaftenicki.github.io/dtu_mlops/s1_development_environment/