

Day1 - Introduction to the course

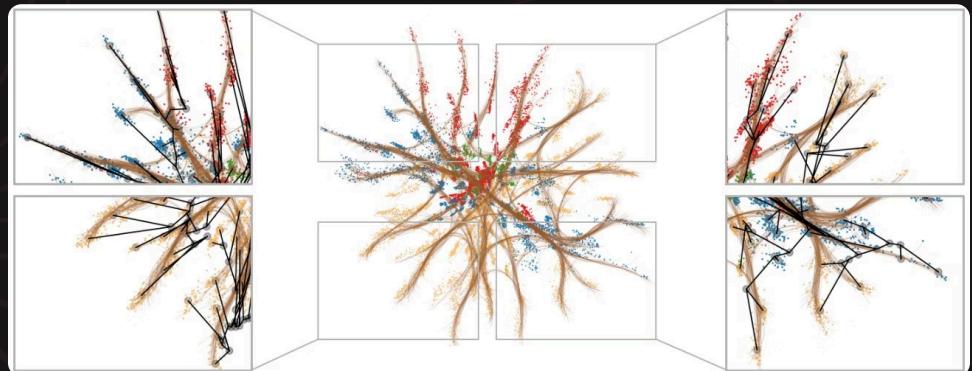
02476 Machine Learning Operations

Nicki Skafte Detlefsen, Associate Professor, DTU Compute

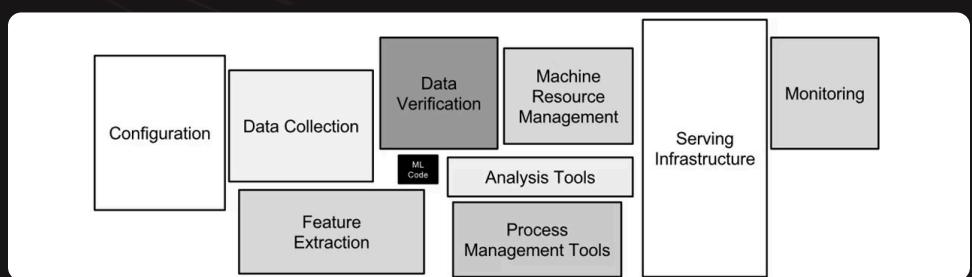
January 2026

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...



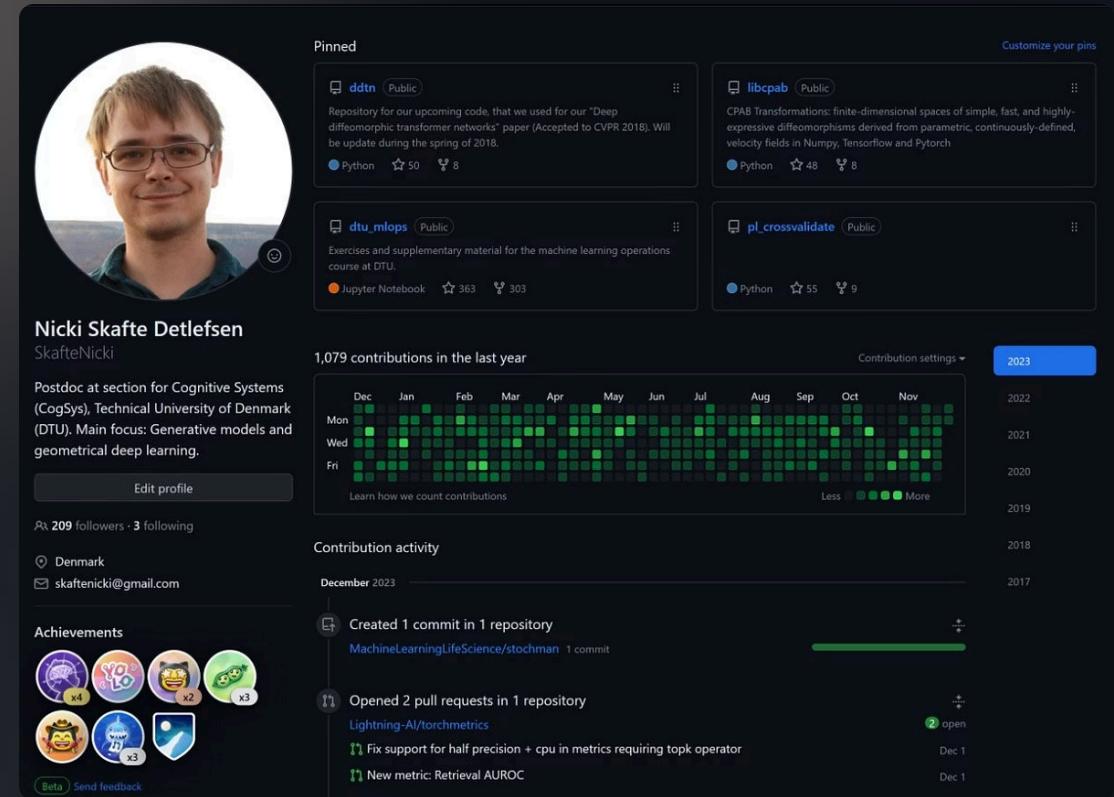
My secret identity

💻 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, their 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

This screenshot shows the GitHub repository page for 'dtu_mlops'. The repository is public and has 4 branches. The main branch is protected. The repository contains files like 'README', 'Apache-2.0 license', and 'LICENSE'. It has 293 stars and 5 watchers. The last commit was 3 days ago.

Github:

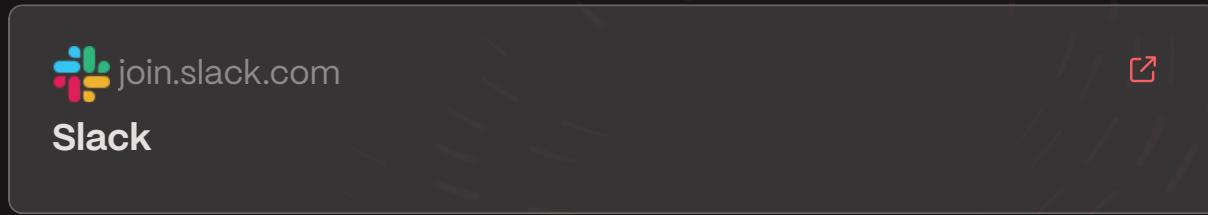
https://github.com/SkafteNicki/dtu_mlops

This screenshot shows the rendered course webpage 'DTU-MLOps'. The page features a navigation menu on the left with sections like 'Home', 'Timeplan', and 'ML'. The main content area is titled 'Machine Learning Operations' and includes a 'Checkout the homepage!' button. Below it is a circular diagram divided into segments for 'ML', 'DEV', and 'OPS', each containing icons and text related to MLOps concepts. A sidebar on the right lists a 'Table of contents' with links to various course sections.

Rendered page:

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

Join the slack channel



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

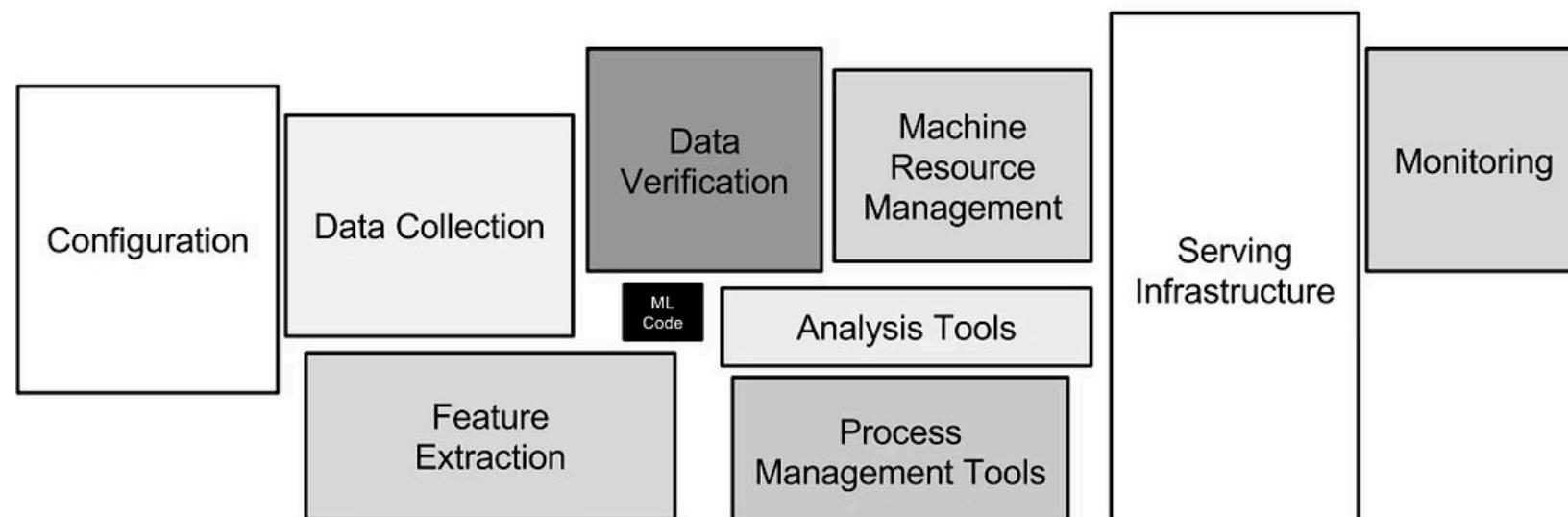


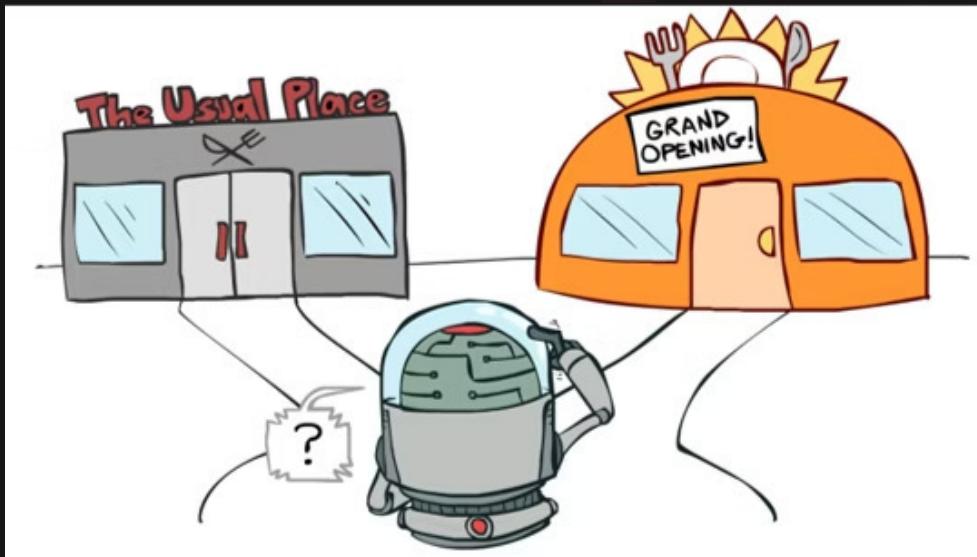
Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.

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

DTU-MLOps

Home

Timeplan

S1 - Development Environment

S2 - Organisation and Version Control

M5 - Git

M6 - Code structure

M7 - Good coding practice

M8 - Data version control

S3 - Reproduceability

S4 - Debugging, Profiling and Logging

Git

 **Core Module**

Proper collaboration with other people will require that you can work on the same codebase in an organized manner. This is the reason that **version control** exist. Simply stated, it is a way to keep track of:

- Who made changes to the code
- When did the change happen

Table of contents

Initial config

Git overview

Exercises

Knowledge check

What I hope from this course

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



hygge

[hue-gah] *noun*

An atmosphere of warmth, wellbeing, and cosiness when you feel at peace and able to enjoy simple pleasures and being in the moment.

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

MLOps 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://skafthenicki.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



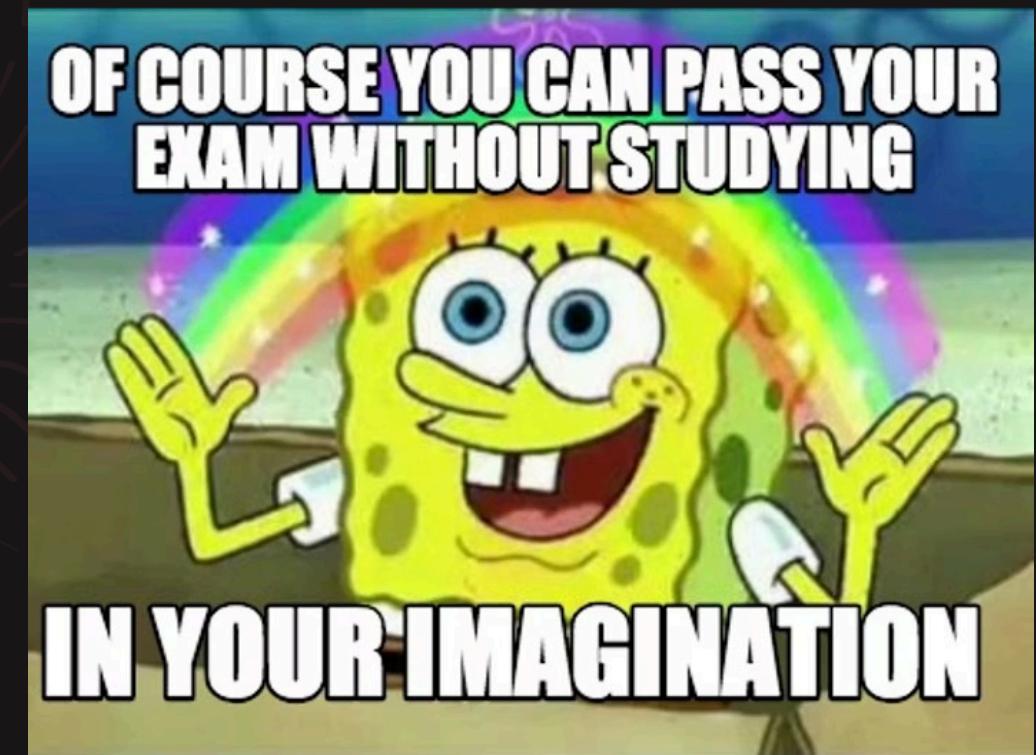
How to pass

- 💡 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 screenshot shows the DTU Mana Learning Management System (LMS) interface. At the top, the course title is "02476 Machine Learning Operations Jan 24". The navigation bar includes links for Course Admin, My Course, Activities, Aktiviteter, Content, Assignments, Discussions, Video & Streaming, and Help. A user profile for "Nicki Skafte Detlefsen" is visible.

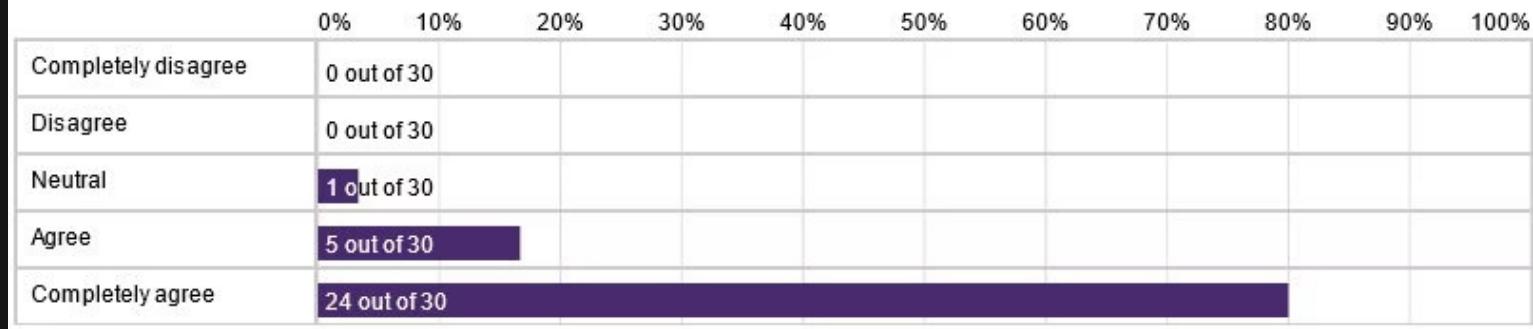
In the main content area, there is a section titled "Text Submission 1" with a status of "Unevaluated" and a timestamp of "Friday, 7 January 2022 2:13 PM". Below this, a link to a GitHub repository is shown: [https://github.com/\[REDACTED\]/Project-MLOps](https://github.com/[REDACTED]/Project-MLOps).

A red arrow points from the GitHub link to a table titled "Project groups" located on the right side of the screen. The table has columns for "Members", "Assignment", "Discussions", and "Locker". It lists five groups:

Groups	Members	Assignment	Discussions	Locker
Manage Files	0	Project reposi... ⓘ		
Urkund	0	Project reposi... ⓘ		
MLOPS 3	0	Project reposi... ⓘ		
MLOPS 4	0	Project reposi... ⓘ		
MLOPS 5	0	Project reposi... ⓘ		

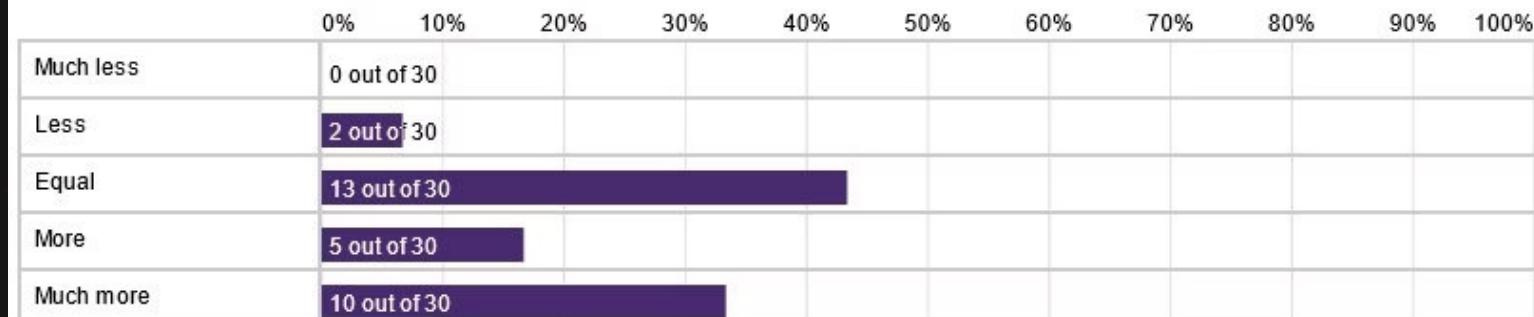
The course in 2 statistics

1.1 I have learned a lot from this course.



2.1 5 ECTS credits correspond to nine working hours per week for the 13-week period (45 working hours per week for the three-week period).

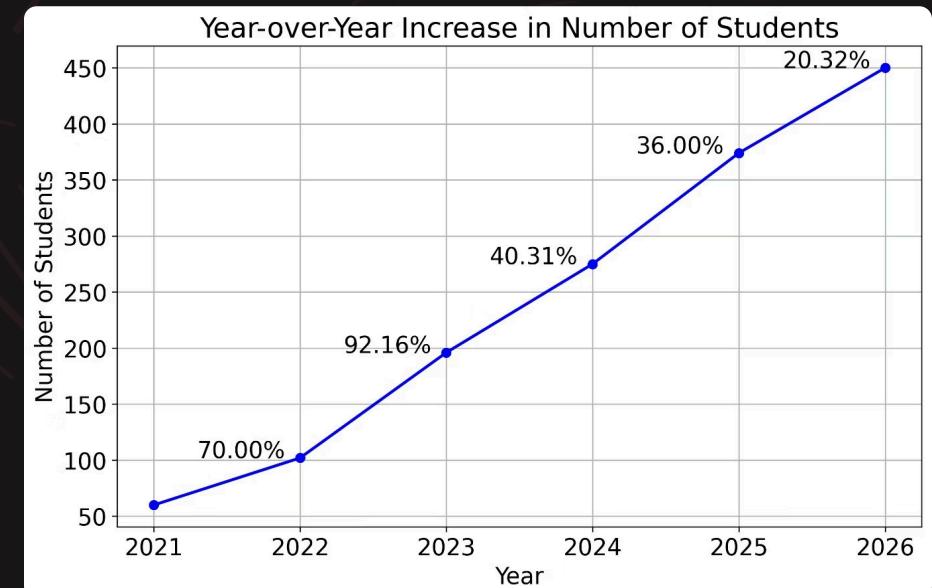
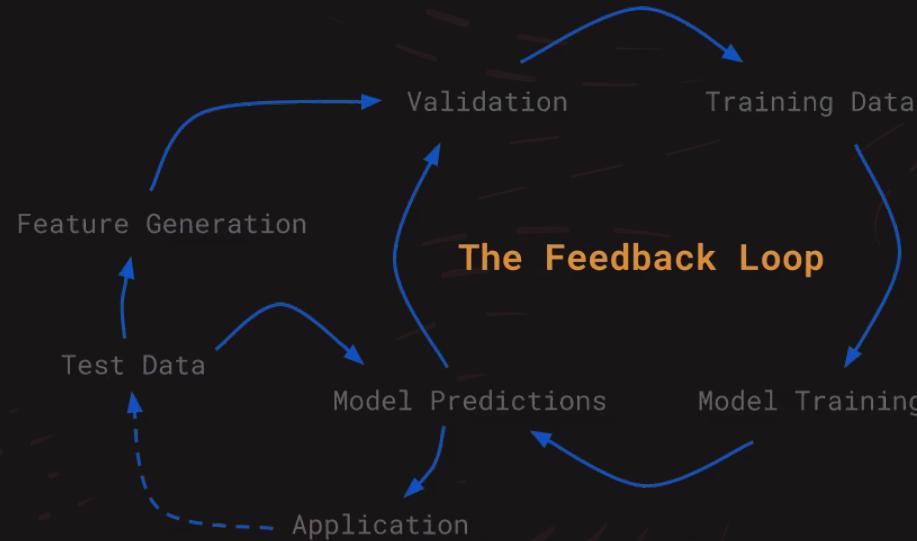
I think the time I have spent on this course is



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

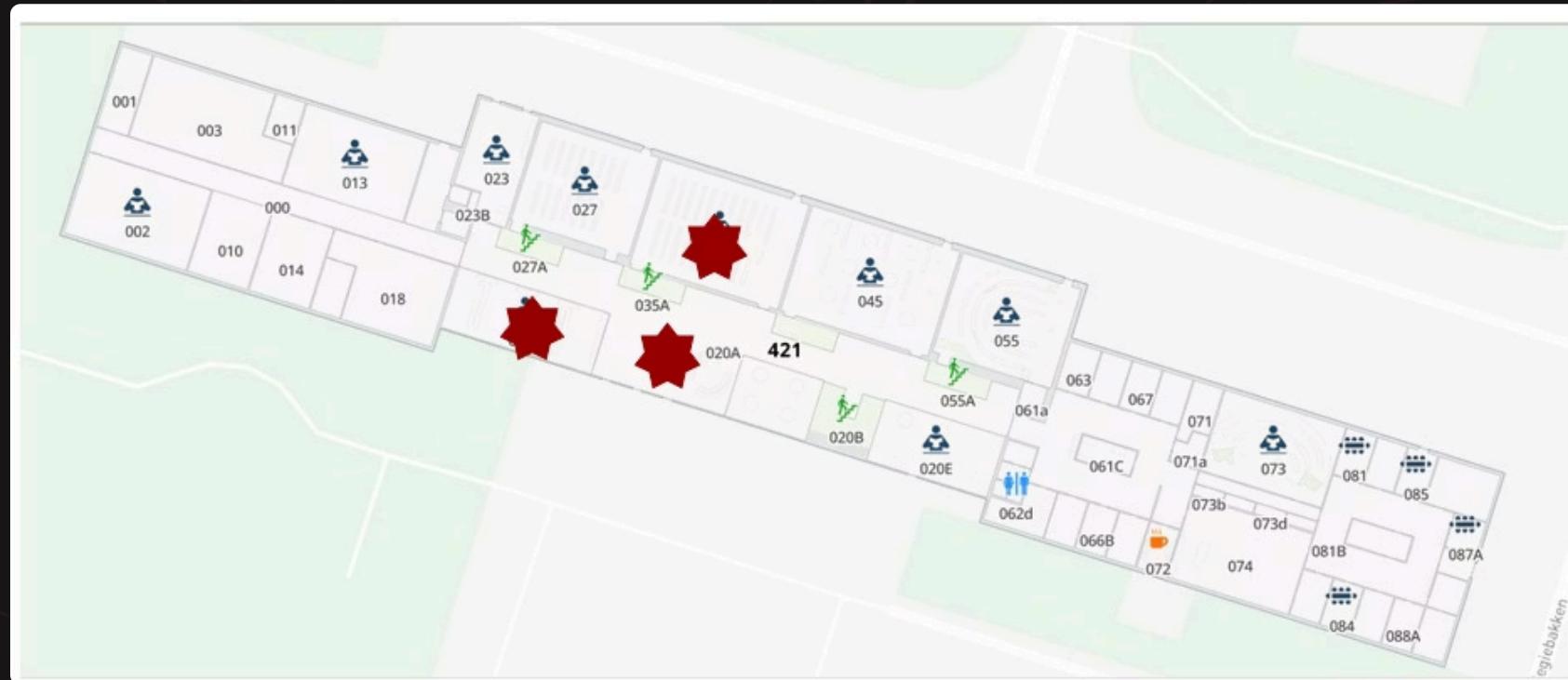
Can this course be vibe coded?

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://skafthenicki.github.io/dtu_mlops/s1_development_environment/

**LEARNING ML,DL
FROM UNIVERSITY**



ONLINE COURSES



FROM YOUTUBE



FROM ARTICLES



FROM MEMES

