Applied Artificial Intelligence Lab

Kick-off Meeting
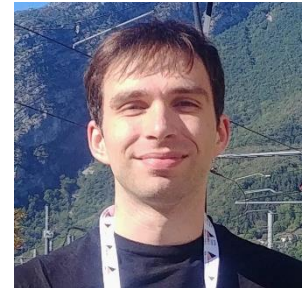
Who is involved?

Professorship for Applied Machine Learning
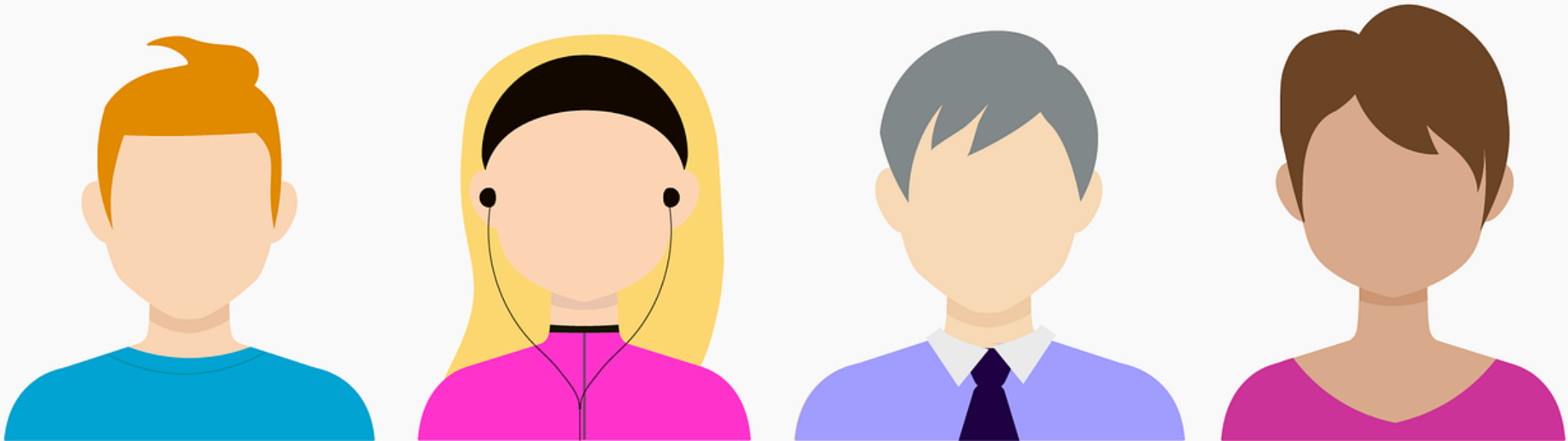
Prof. Dr. Florian Lemmerich
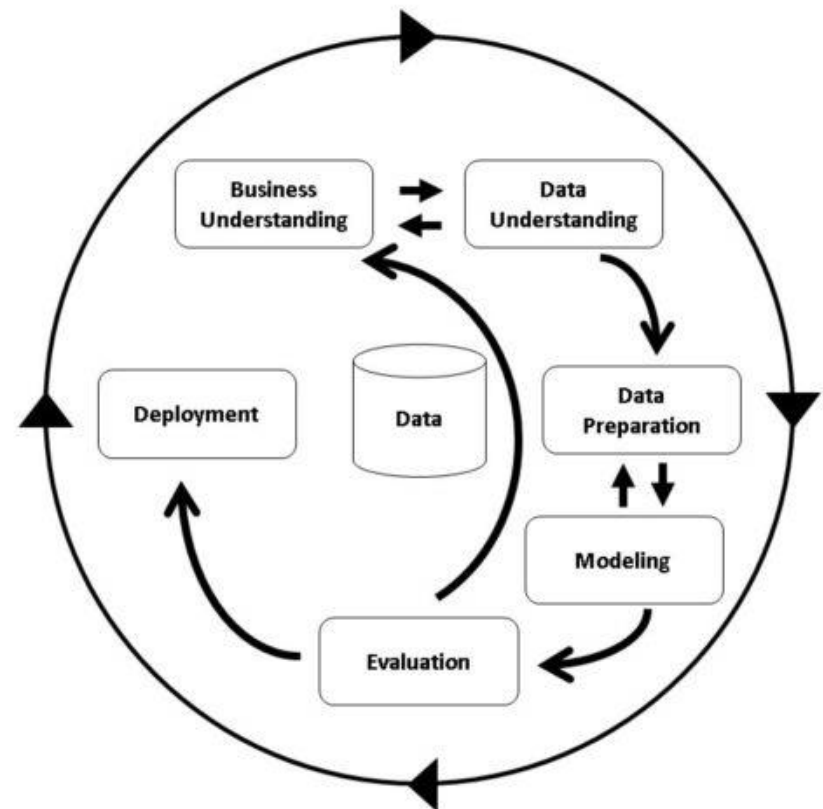
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Who are you?

Goal of this lab

- Bringing AI into action

- „practical problems"

- Pragmatic: Try to make it work

- Very different solution approaches

The goal of this lab

- Apply your skills on an ML/AI problem

  - **Teams of two or three students**
  - One problem per team

- Communication of results

  - Presentation
  - Report

(Tentative) Dates

Date	
13/10/25	Introductory session
20/10/25	Working session
27/10/25	Introductory presentations
03/11/25	Working session
10/11/25	Working session
17/11/25	Working session
24/11/25	Working session
01/12/25	Working session
08/12/25	Working session
15/12/25	Working session
22/12/25	Working session
12/01/26	Working session
19/01/26	Working session
26/01/26	Final presentation
02/02/26	Final presentation
15/02/26	Report deadline

- Working Session = we all meet here
  - We give advice
  - You take turns in giving update presentations
  - In addition to working on your own

- Regular progress expected

- Registration via Campusportal (if selected)

Course grading

- Graded individually

- What is graded?
  - Quality of Solution:
    - NOT model performance
    - Appropriate solution, clean implementation, innovativeness
    - Systematic evaluation
  - Code
  - Presentations
  - Report
  - Final individual discussion

- The documented code and analyzed data will be submitted as well

- Everyone codes, presents, writes!

- Bonus points: short presentation of a useful library/model

Regarding Presentations

- Introductory presentations:
  - 15 minutes presentation
  - 10 minutes discussion
- Short update presentations:
  - Every week, alternating between groups
  - Update: no slide / 1 minute per group
  - **Once**: Present a specific tool / method / algorithm (up to 20 mins)
- Final presentation:
  - 30 minutes presentation
  - 15 minutes questions

- Contents:
  - Overview about your work and results
  - Understandable by everyone!

- Don't underestimate the effort it takes to craft an effective presentation!
  - How to prepare a presentation – YouTube

Attendance

- Expectation: You work in the lab every week

- If you miss one/two weeks: No issue

First presentation

- Give an overview about your task/challenge

  – Data

  – Evaluation

  – First steps

- Outline potential problems and approaches

- Style of a scientific workshop paper

  - Example 1
  - Example 2

- Template will be uploaded in StudIP

- Up to 10 pages (including figures; references and appendix do not count towards page limit)

- One paragraph per student to highlight their personal contribution

- Late submissions by at most two days will be accepted, **but affects grade negatively**

Effort and Time Management

- Course has 6 ETCS

- 180 working hours **per student**

- **12 hours per week and per student**

- Only three hours in class

- Plan a full working day for additional work

- Continuous effort expected (Update presentations)

Course ethics

- Work on your own (as a group)!

- You can (and should!) use code snippets and libraries from others, but cite your sources!

- Plagiarism will result in failing the course without warning.

- Teams of 2 students (3 as an exception)

- Selection of topics

  - We go through the topics one-by-one
  - Today: Do research and form teams
  - Until Wednesday, 14:00h:
    Send an email with your ranked top-3 topics per team

- Later on you can change topics only if you find a partner to switch! →
  Use the forum!

- If you notice that you do not want to participate anymore

  - You can leave in the first week without consequences
  - Consider there are fellow students on the waiting list

Compute Resources

- Kaggle & Google Colab (both have GPU options)

- (Access to university resources based on your project)

- Subsample dataset to work on your own computer

Body Gesture Detection

- Detect Body Gestures with a camera/webcam

- Decode it into discrete actions

- Run a game with it

Picar X

- "self-driving car"

- PiCar X

- Get it to run

- Let it move through given checkpoints

https://docs.sunfounder.com/projects/picar-x/en/latest/
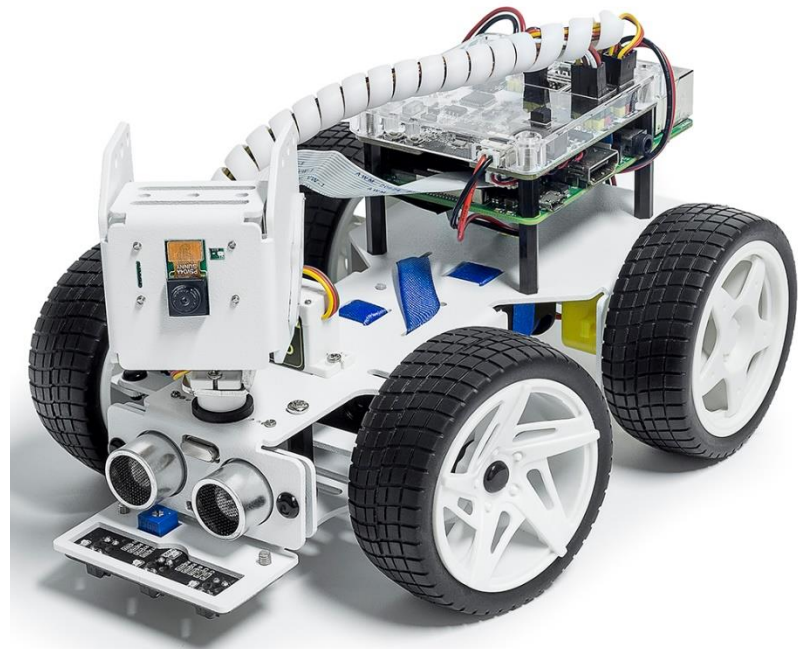
Overleaf-Agent

- Goal:

- Assist in the usage of overleaf

- Be creative with functions

- E.g.: paste an arxiv-link in overleaf, press hotkey

  – Agent looks for a reference, pastes it into the bib file

LLM for Creating OpenScad scripts

- Train an LLM agents to write OpenScad scripts
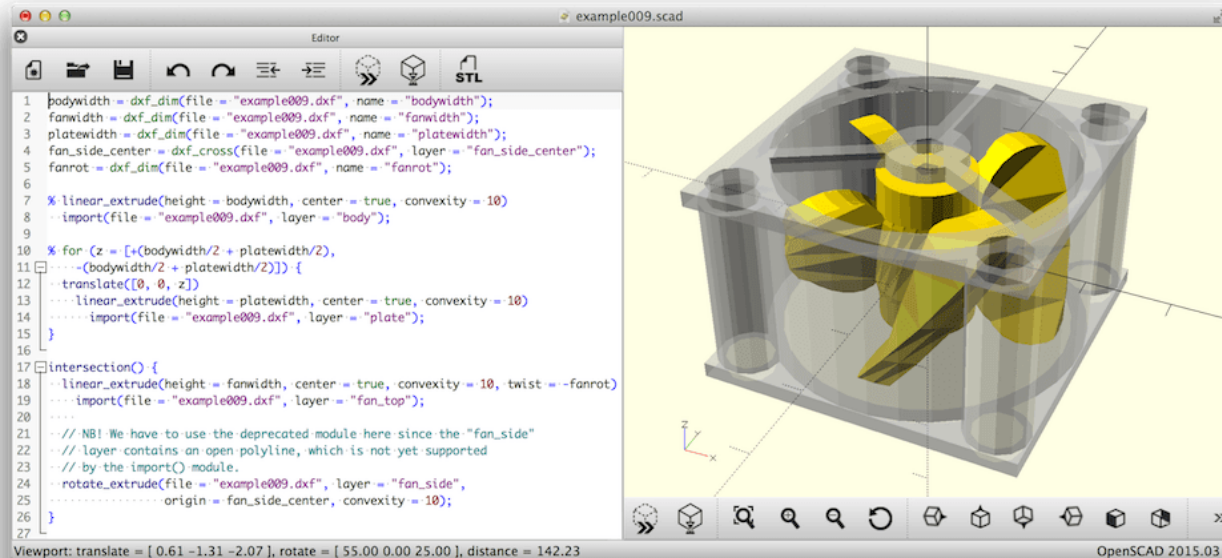
- Get Visual Feedback from results and incorporate

- Create an AI for the game „haxball"

- Simple soccer client

- Multiplayer

Create a (Kalaha) Endgame Database
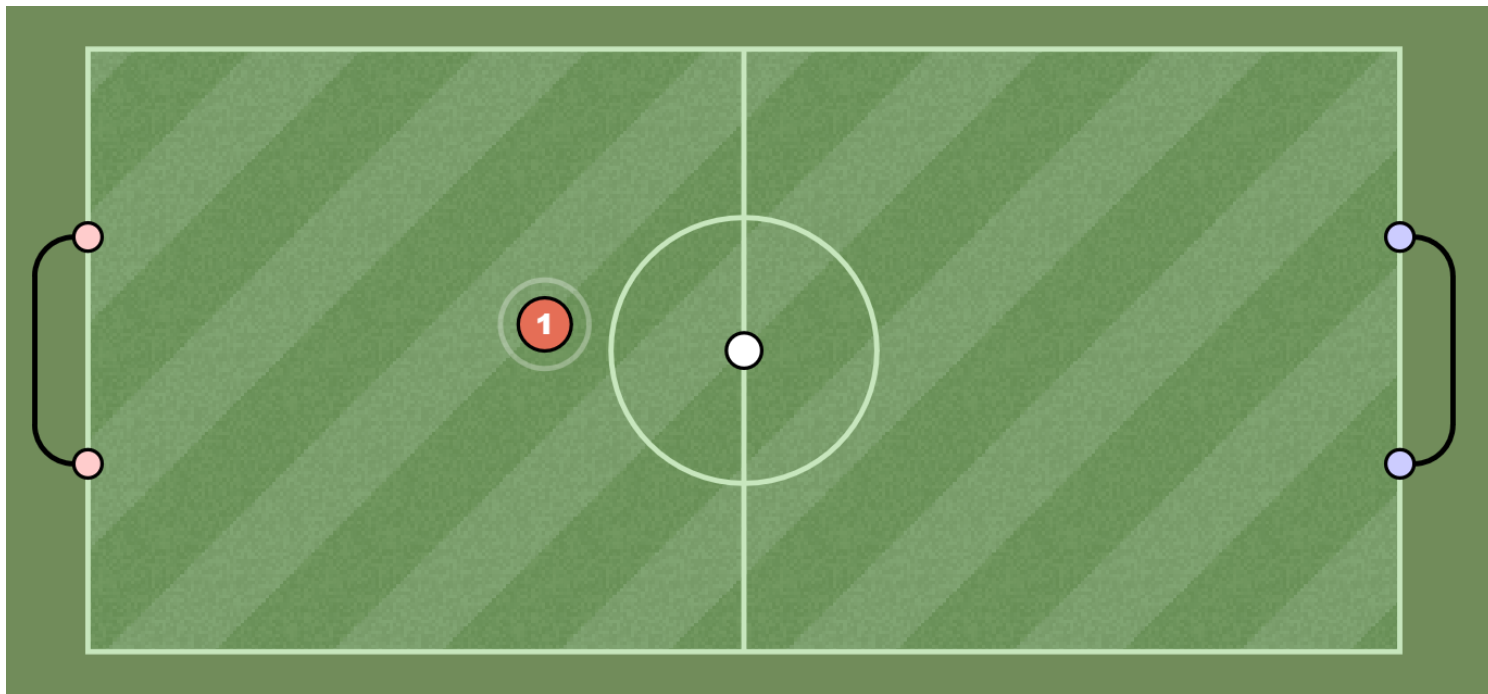
- Create a database for perfect play!

- Pick a game of your choice!

Diplomacy Game AI

- Train an LLM to let it play the game of Diplomacy well

- Negotiation Game

- Plan strategically

- Judge opponents!

- Create environments via commands
- Caption events
- Predict outcomes

Get cooking suggestions based on an image of ingredients
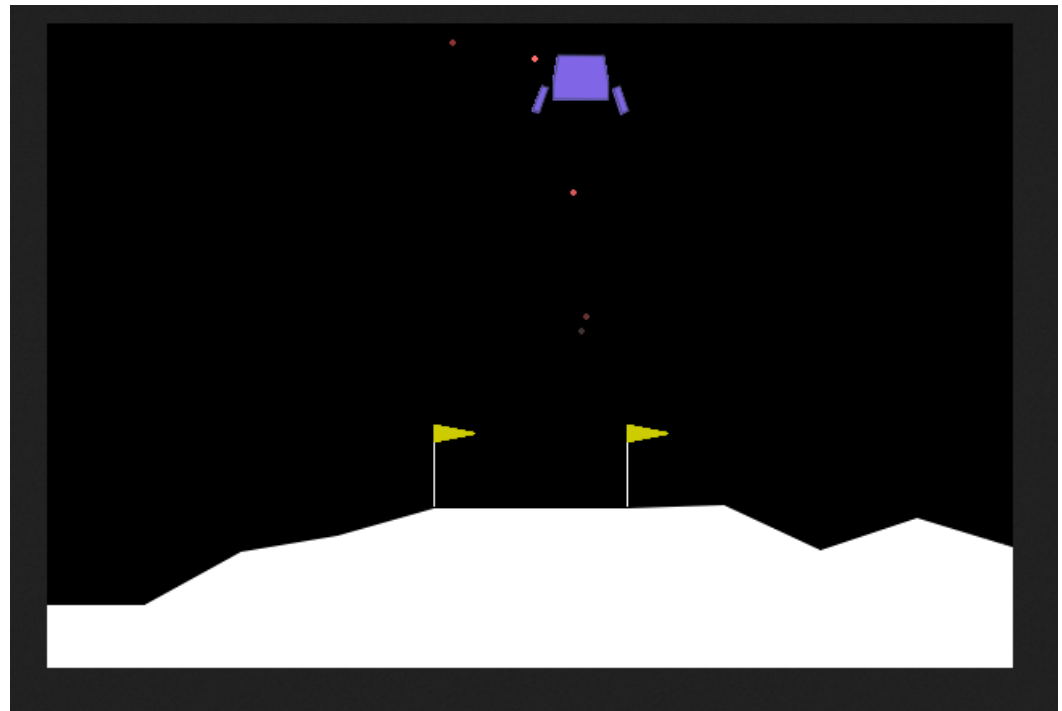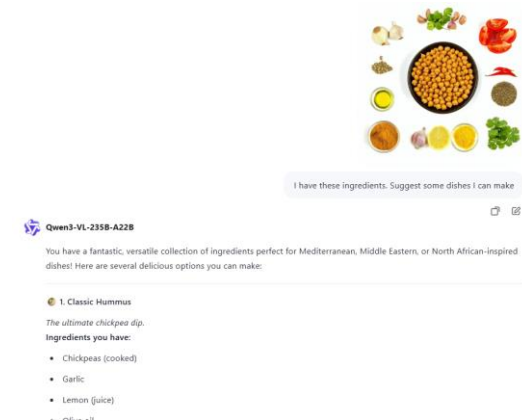
Input

Easy (?)   Hard (?)

Modern vision-language models can identify ingredients pretty well and can make suggestions right away.

Massive collections of recipes on the web on sites like chefkoch.de or seriouseats.com
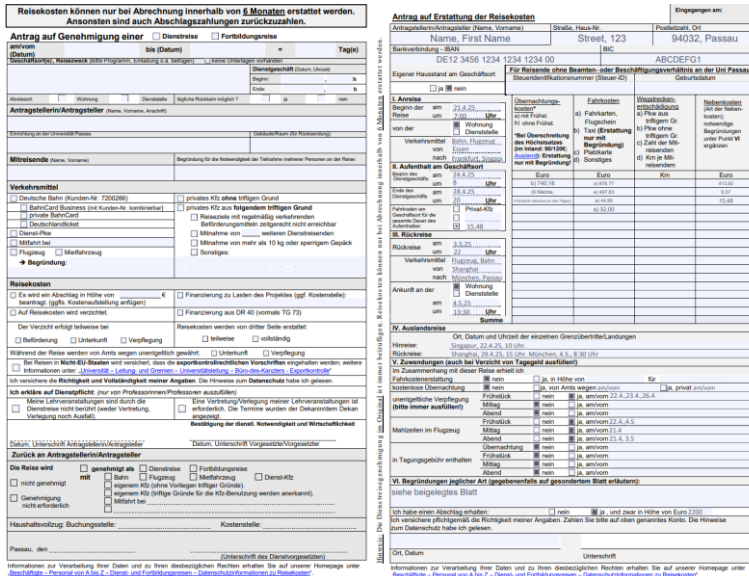
These recipes may be of higher quality than what a model generates (at least can be filtered by rating)

Goal: combine VLM capabilities with information from the web to give good recipe suggestions

Input

Example: business trip expense report


Lots of bureaucracy requires manual checking of forms.

For a business trip: are all fields filled with reasonable values? Does the hotel cost 10000€? Does the travel

Completly digitalized process would be ideal, but may be difficult.

Middle ground: use LLM to read pdf and do a pre-check.

- Detect anomalies

- Do background tasks like web search to check validity of information

Goal: use AI to automate manual checking of reports and forms

AI sentiment analysis on hackernews
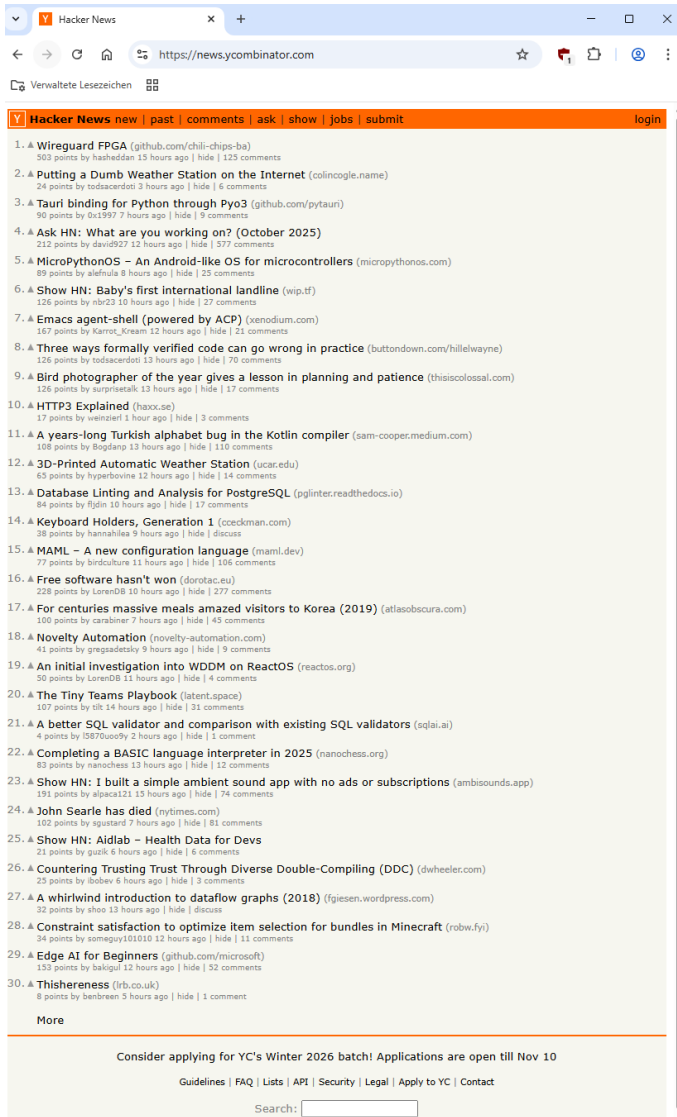
- Forum and news site for a technical audience

- AI often reaches front page

- Track how sentiment of LLMs evolves over time

  – Coding ability, speed, etc. („aspects")
  – Separated by models

- Use their API to get comments

- Build a dashboard to track sentiment

Not sure how to evaluate the projects?

- Take a screenshot of the slide and use the LLM of your choice to give you some more information

- For example, ask it about likely needed technologies, frameworks, libraries, or potential challenges.

Topics

- Body Gestures control of a simple game

- PiCar X -> self-driving car.

- Overleaf-bib-assistant

- Dota 2: bot

- Diplomacy Game AI

- Create a (Kalaha) Endgame Database

- 2D-Physics-Engine

- LLM for Creating OpenScad scripts

- Haxball AI

- AI for form/report validation/prefill

- Get cooking suggestions based on an image of ingredients

- AI sentiment analysis on hackernews

- AI-assisted policy navigator