

TRAINING: Data Science and AI for Medicine Training School 2026
Day 1: Python and Tools – AI Assistants in JupyterLab

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Using materials from Robert Haase (DSC ScaDS.AI / Leipzig University)

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GEFÖRDERT VOM



Bundesministerium
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LLM Services and Their Use

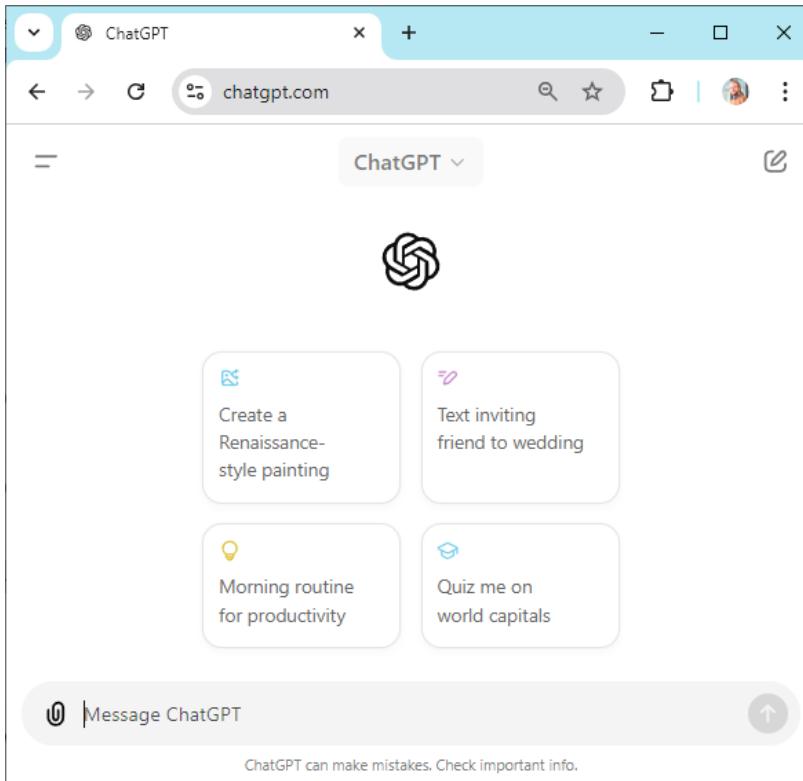
What is an LLM?

- Advanced AI models (neural networks/deep learning), which are trained on large amounts of text
- Designed to “understand” and generate human language
- Capable of incorporating context and interacting with users
- Can perform a variety of tasks depending on their specialization:
 - Answering questions
 - Summarizing texts
 - Translating
 - Generating code
 - Other functions, e.g., web search

LLM Services and Their Use

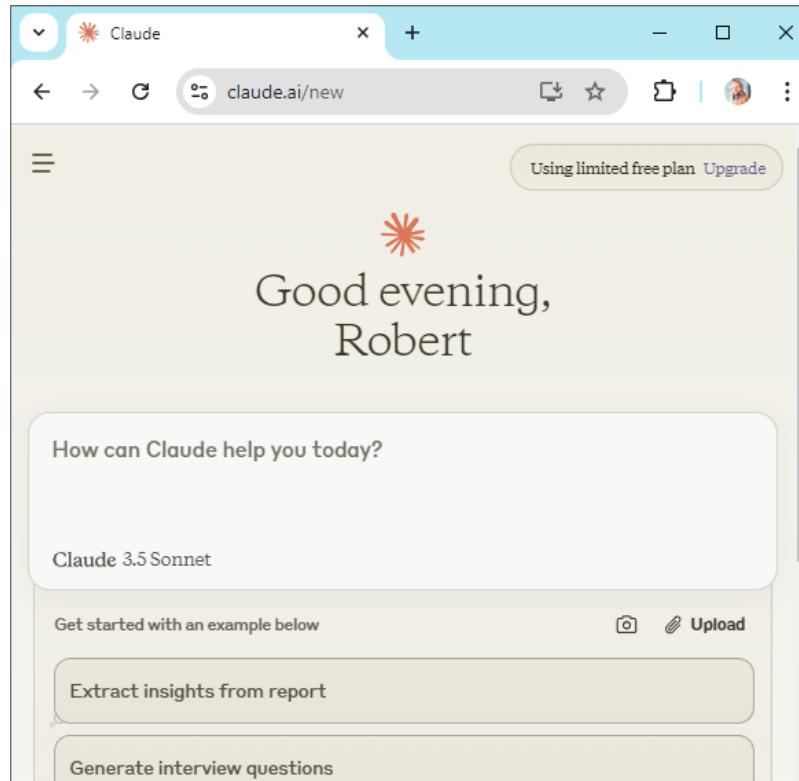
What is an LLM?

ChatGPT



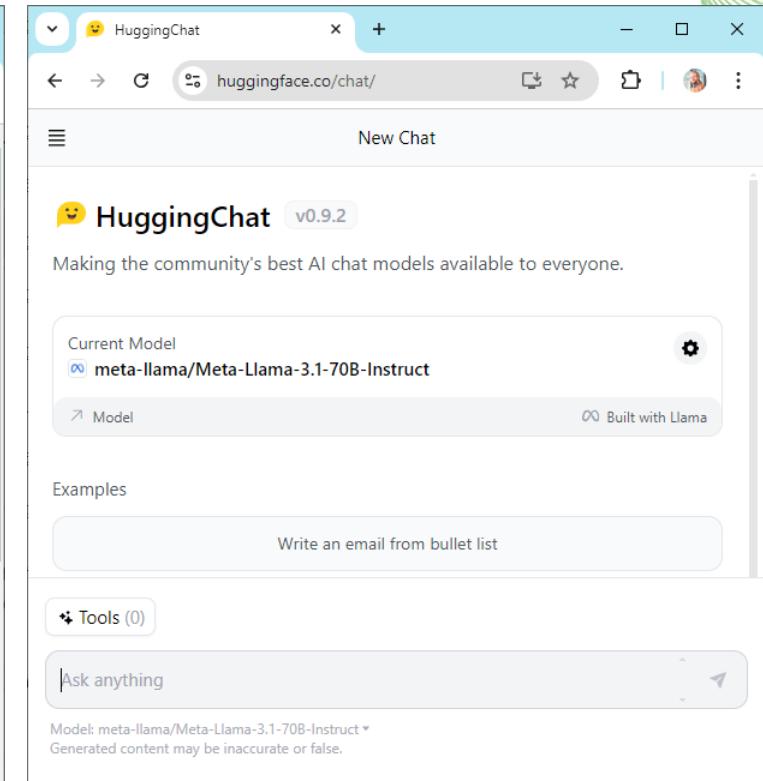
<https://chatgpt.com/>

Claude



<https://claude.ai/>

Open models

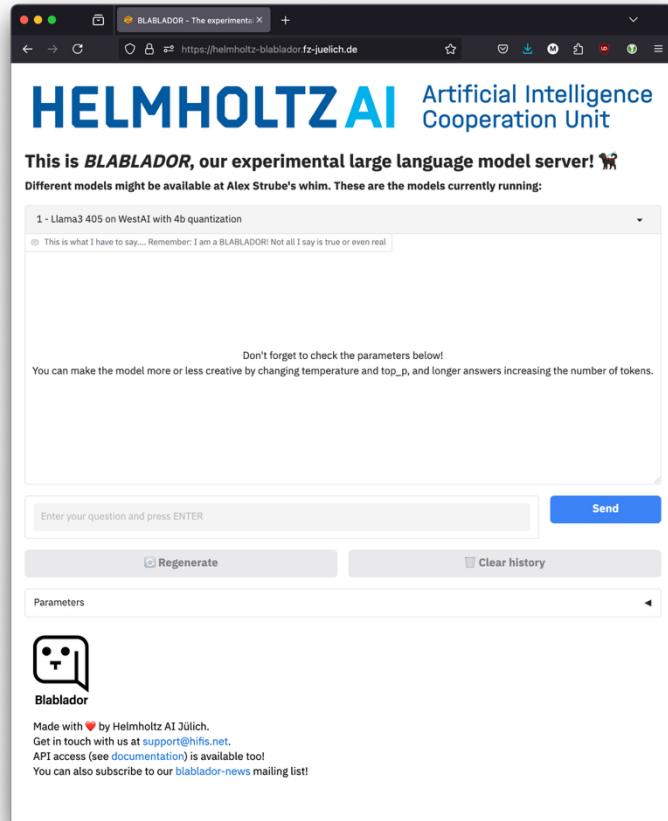


<https://huggingface.co/chat/>

LLM Services and Their Use

What is an LLM?

Helmholtz Blablador

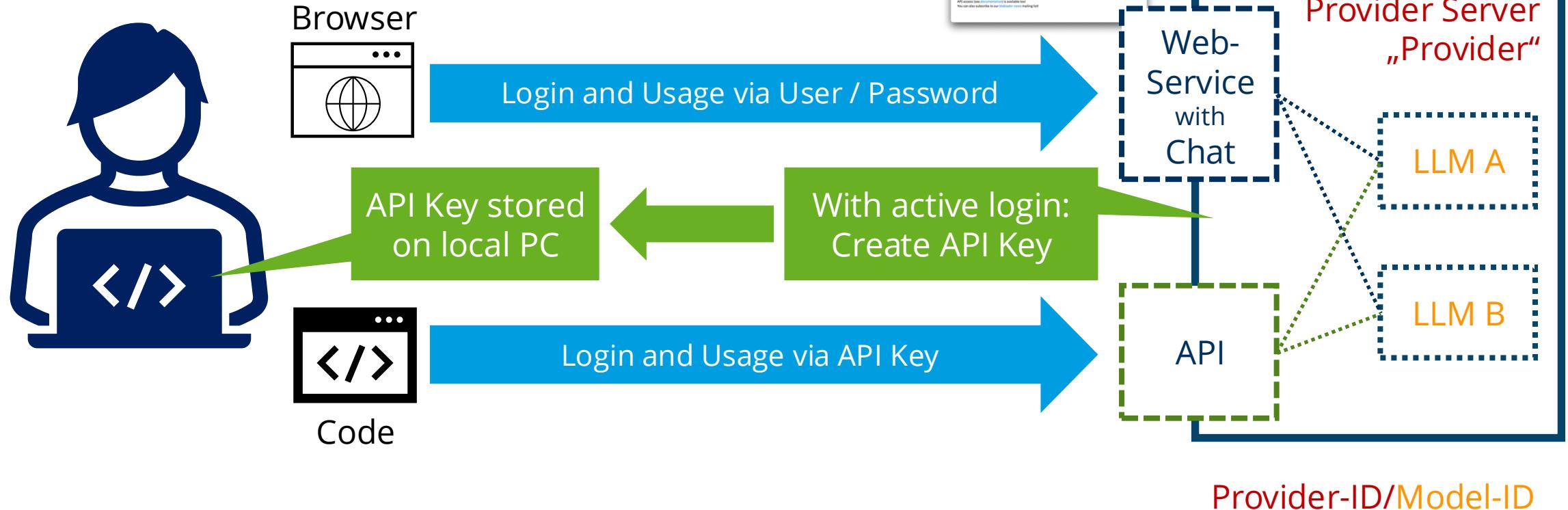


- Various providers with their own services and LLMs
- Proprietary to open source
- Paid to free of charge
- Server locations worldwide, in Europe, in Germany
- Basic technical structure and concepts are mostly similar

<https://helmholtz-blablador.fz-juelich.de/>

LLM Services and Their Use

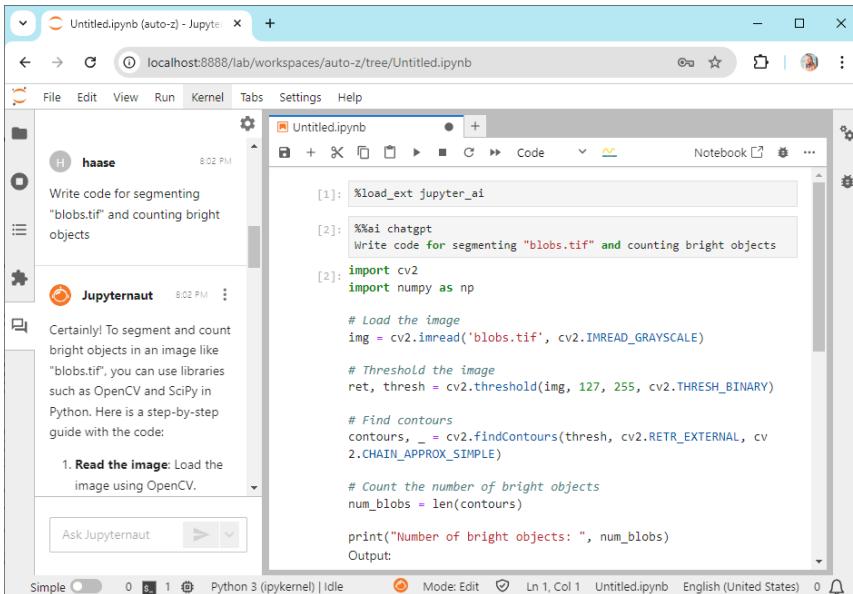
Setup and Usage



LLM Services and Their Use

AI Assistants

- Integration of LLM capabilities into existing tools and services
 - ChatBots on websites
 - AI assistant in MS365, Adobe Cloud, ...
 - AI assistant in programming environments (IDE, etc.)
- or Jupyter Lab, e.g., via "jupyter-ai" or "bia-bob"



A screenshot of a Jupyter Lab interface. On the left, a sidebar shows a file tree with a file named 'blobs.tif'. The main notebook area has a code cell with the following Python code:

```
[1]: %load_ext jupyter_ai
[2]: %%ai chatgpt
Write code for segmenting "blobs.tif" and counting bright objects
[3]: import cv2
import numpy as np

# Load the image
img = cv2.imread('blobs.tif', cv2.IMREAD_GRAYSCALE)

# Threshold the image
ret, thresh = cv2.threshold(img, 127, 255, cv2.THRESH_BINARY)

# Find contours
contours, _ = cv2.findContours(thresh, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE)

# Count the number of bright objects
num_blobs = len(contours)

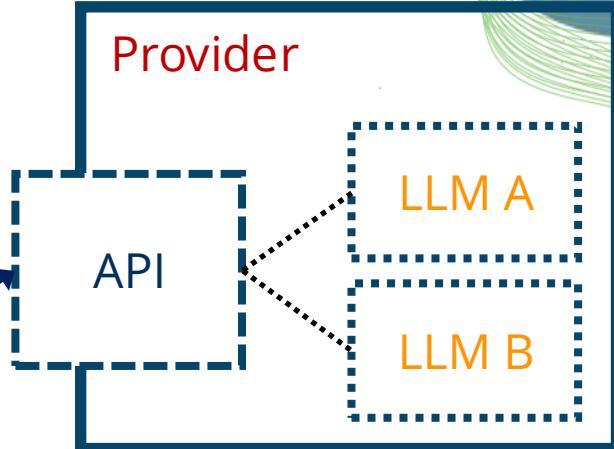
print("Number of bright objects: ", num_blobs)
Output:
```

Software package or plugin for chat function, text/code generation, etc. with connection to ...

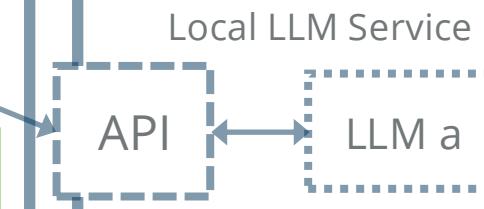
blablador/alias-fast

Alternatively:
local access, requires
appropriately powerful
hardware

Login with API Key



Local computer



LLM Services and Their Use

AI Assistants

Prompt Engineering

- Prompt: Instruction to the AI assistant/LLM to perform a task.
- Formulate as precisely as possible and provide context.
- Iterative modification of the prompt until the desired result is achieved.

Restrictions and limitations

- Prompts and context are transferred to LLM – when using an external LLM service provider, this means to external servers → observe data protection regulations!
- AI assistant is only as good as the LLM used – variation in quality of responses, available languages, knowledge level, code generation capability, etc.
- The context window (number of tokens) has limits and varies depending on the LLM

As part of this training, we use

- “bia-bob” (AI assistant for Jupyter) [<https://github.com/haesleinhuepf/bia-bob>]
- LLM cluster of Leipzig University