

Innovation Day



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Content

- Intro
 - Intro to me
 - What is the status of AI
- AI in 2025
 - Define AI
 - AI landscape
- AI into the real work
 - Use cases: IOT and LCA



Who am I?



UNIVERSITY OF
CAMBRIDGE

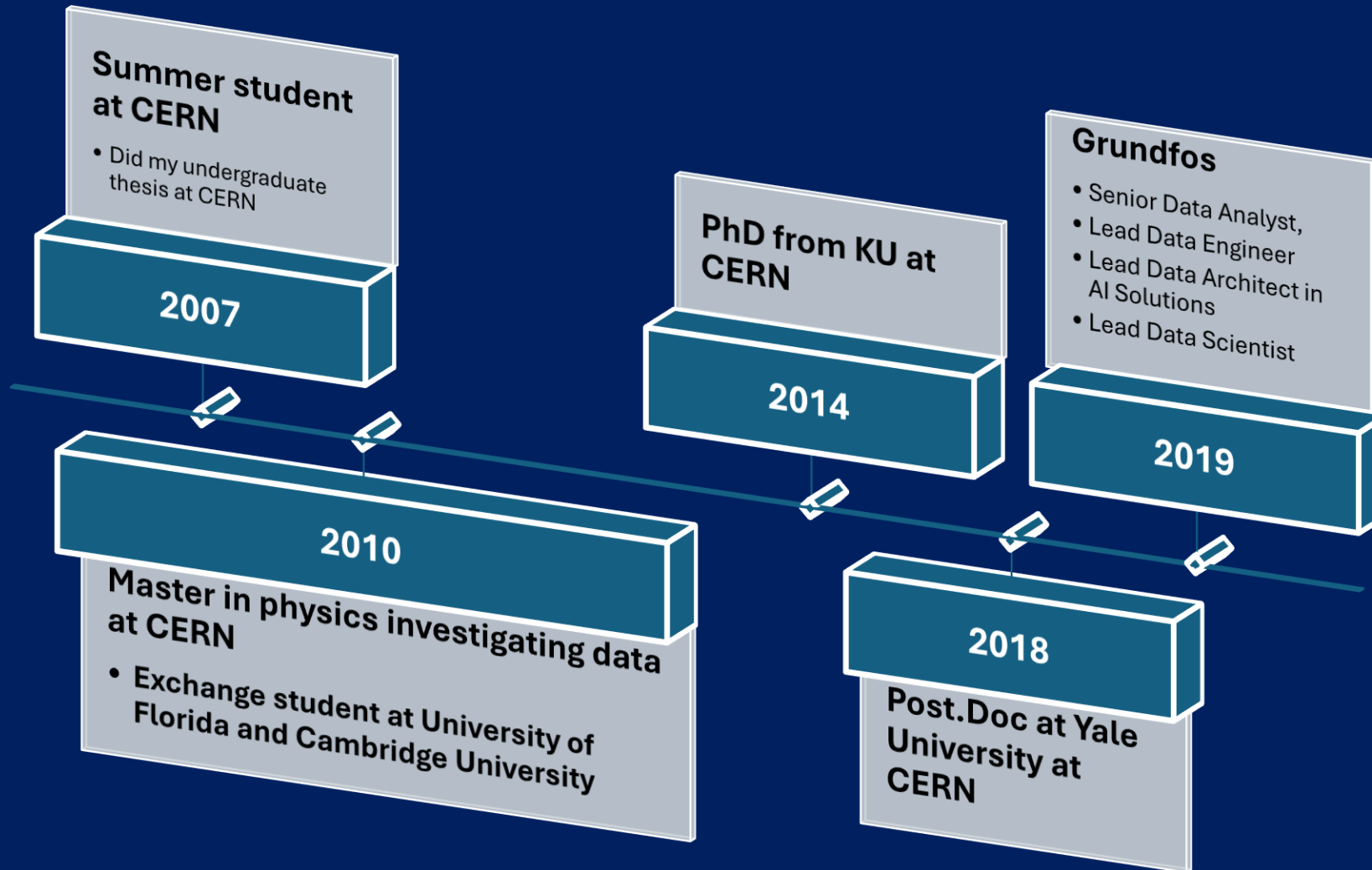
Yale

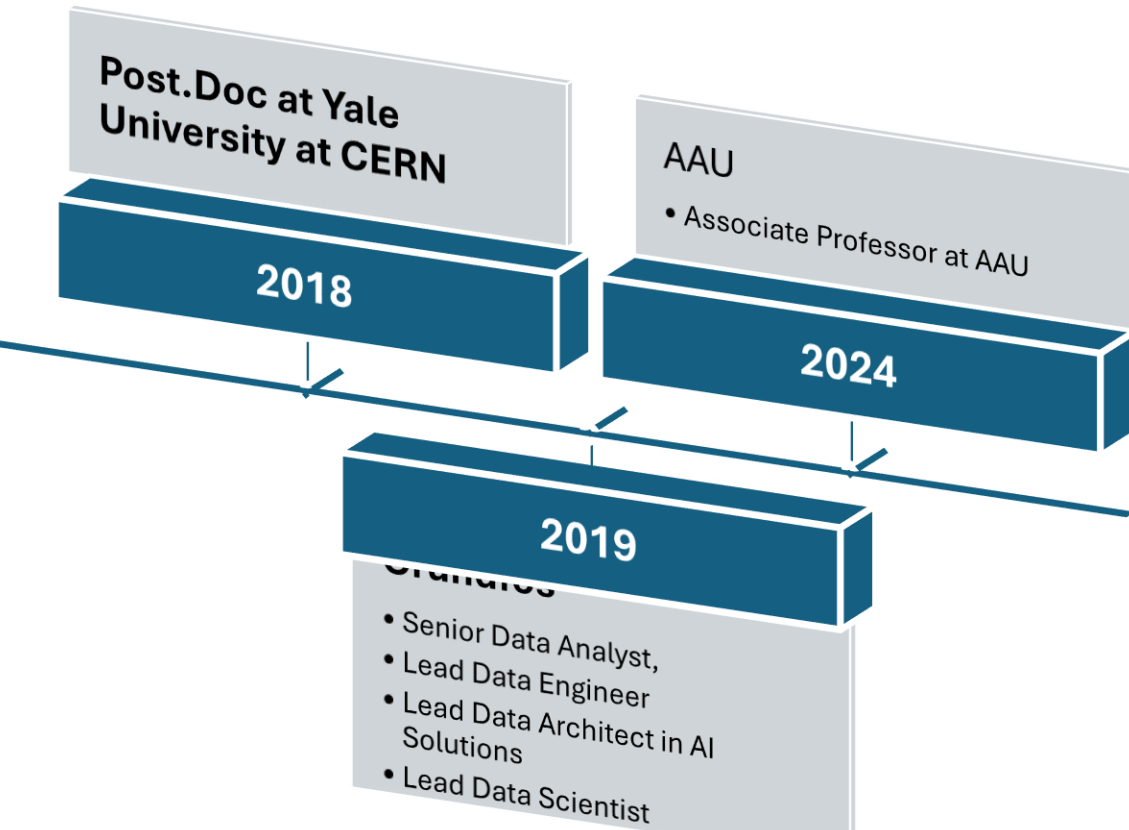


GRUNDFOS



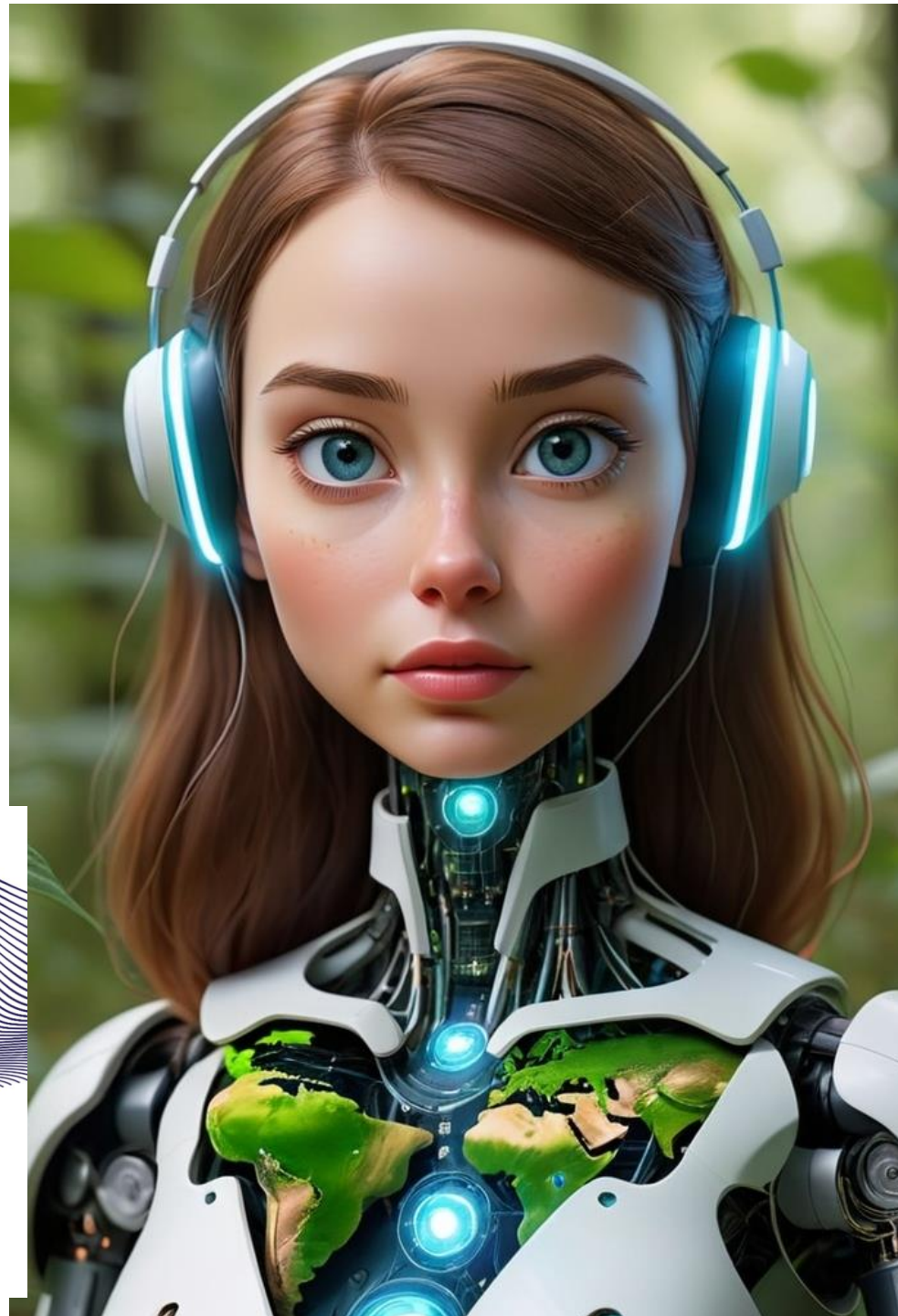
UNIVERSITY OF
COPENHAGEN





DEPARTMENT OF SUSTAINABILITY AND PLANNING

We work with planning, technology and society to create a more sustainable future. Our research and education represent a unique combination of social and technological understanding.

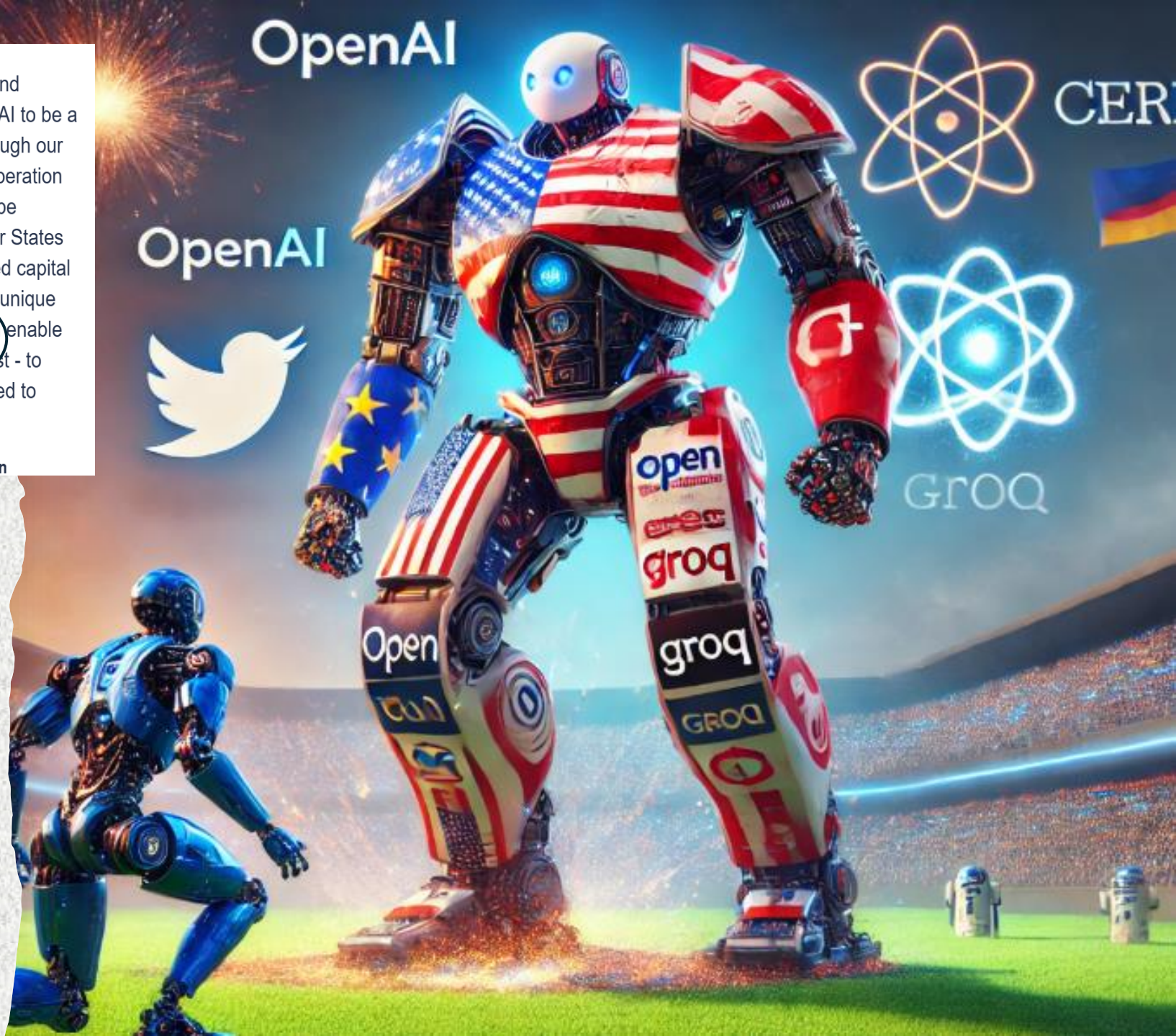




» AI will improve our healthcare, spur our research and innovation and boost our competitiveness. We want AI to be a force for good and for growth. We are doing this through our own European approach – based on openness, cooperation and excellent talent. But our approach still needs to be supercharged. This is why, together with our Member States and with our partners, we will mobilise unprecedented capital through InvestAI for European AI gigafactories. This unique public-private partnership, akin to a CERN for AI, will enable all our scientists and companies – not just the biggest - to develop the most advanced very large models needed to make Europe an AI continent. «

Ursula von der Leyen, President of the European Commission

CERN
Unified Minds:
One Unified Language,
One Business Goal



Definitions: AI before

- **AI:**

- Simulation human intelligence in machines
- Recommendation systems

- **ML:**

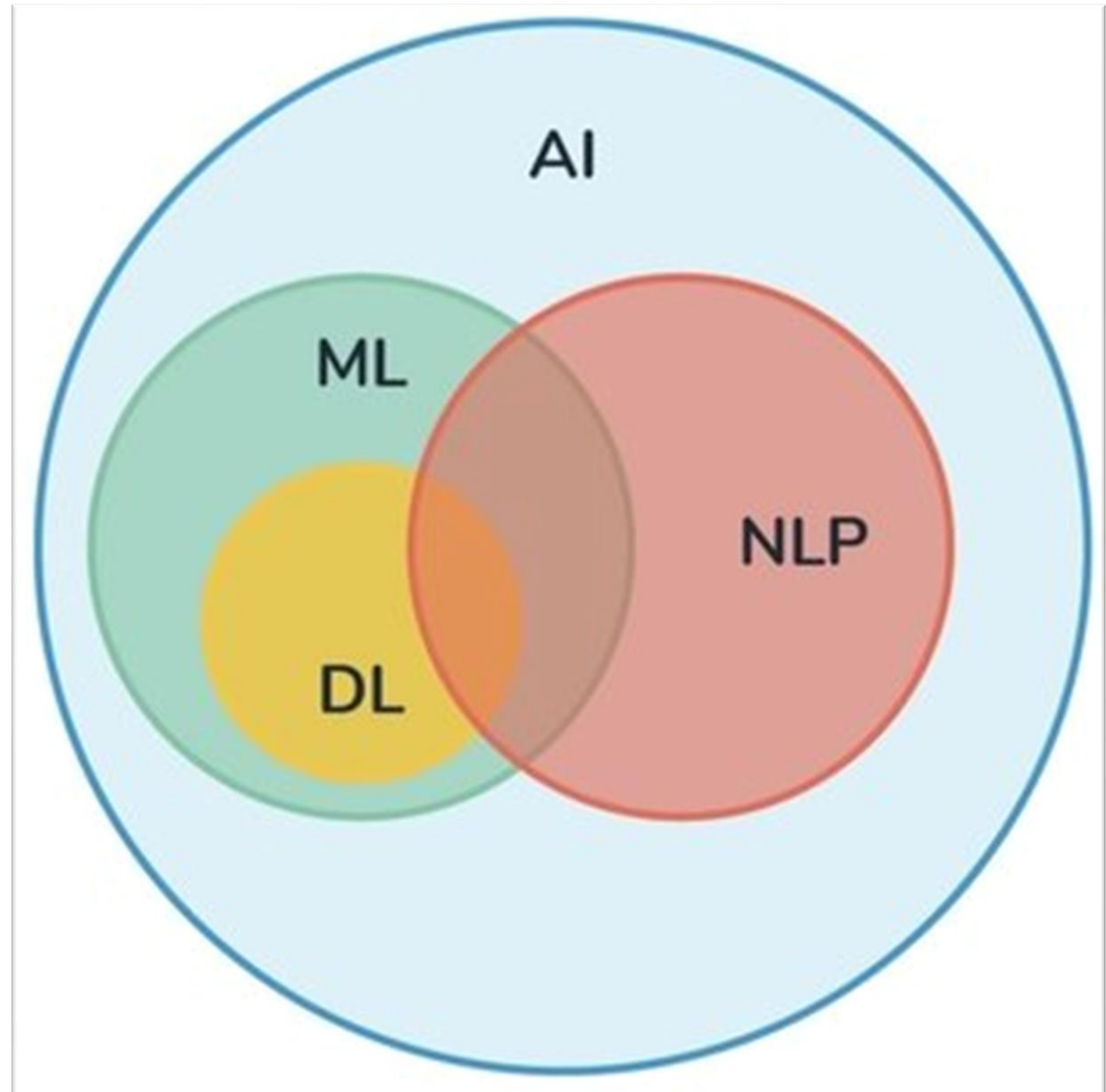
- Training machines to learn from data
- Stock predictions,

- **NLP:**

- Teaching machines to understand and use language
- Voice assistant, translation

- **DL:**

- Using deep neural networks for complex tasks
- Speech synthesis, images

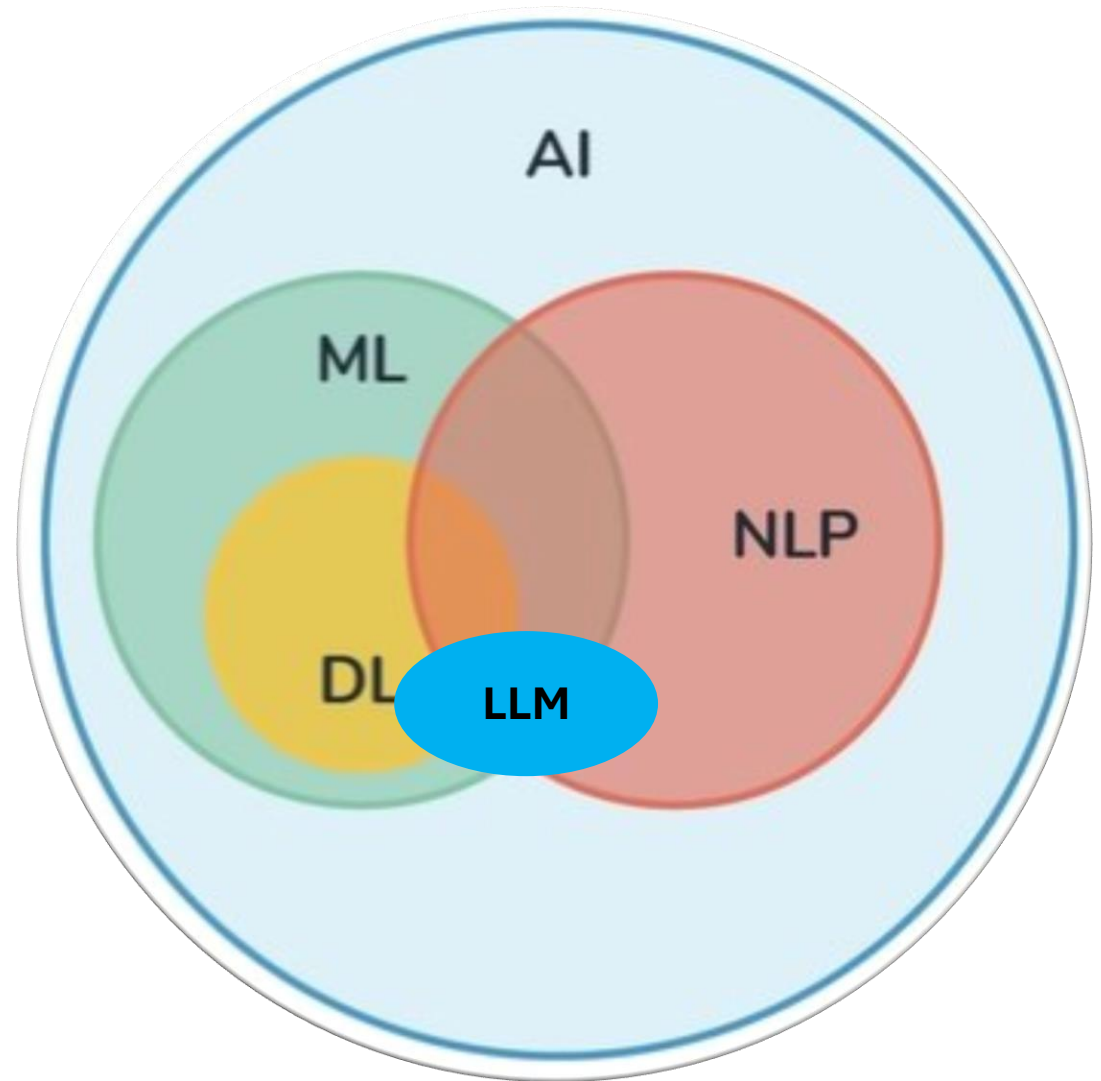


AI: Classical workflow for development



Definitions:

- **Game changer: :**
 - The paper “Attention is all you need”



Definitions: AI

2017-2018:

- The paper “Attention is all you need”
- BERT sets new benchmarks for language understanding.

2019-2020:

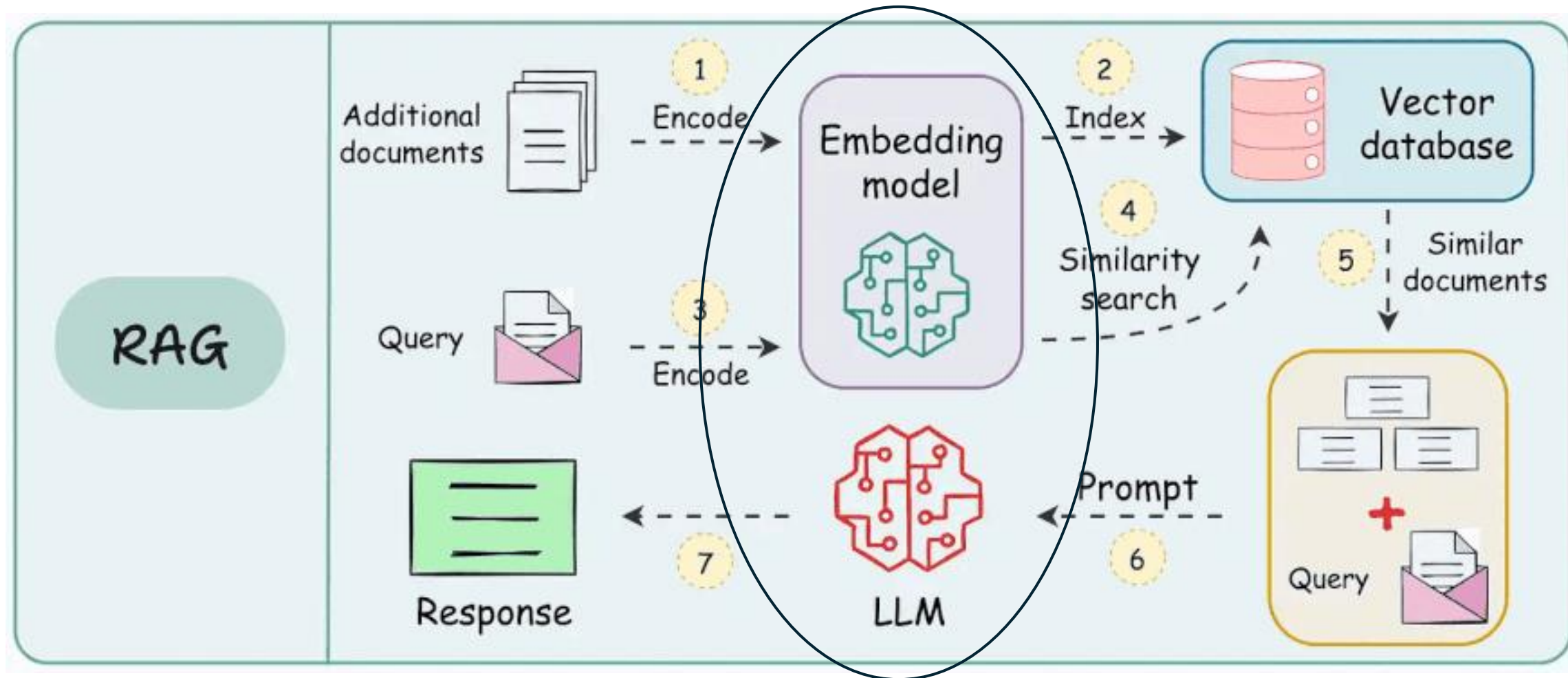
- OpenAI release GPT-2, GPT-3
- The paper “Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks”

2021-2022:

- Model T5: unifies NLP tasks
- Meta release Open Pretrained Transformer model
- Launch ChatGPT + Langchain

2023-2024:

- Meta’s LLaMA,
- Grow of tools to get pre-trained models (Ollama & Huggingface)
- Many tools using AI arise (Perplexity, Midjourney, copilots)
- Multimodal and real-time AI start showing up.



RAG

LLM

Prompts



Answers

LLM + RAG

Prompts ----- Context



Answers



AGENTS

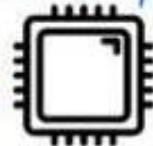
Prompts ----- Context



Reasoning



Memory



Answers



Actions

Tools



AI AGENTS are starting to appear

OpenAI



Log in

January 23, 2025 Product

Introducing Operator

A research preview of an agent that can use its own browser to perform tasks for you. Available to Pro users in the U.S.

Go to Operator ↗

Research

Safety

ChatGPT

Sora

API Platform

Today we're releasing Operator, an agent that can go to the web to perform tasks for you. Using its own browser, it can look at a webpage and interact with it by typing, clicking, and scrolling. **It is currently a research preview,** meaning it has limitations and will evolve based on user feedback. Operator is one of our first agents, which are AIs capable of doing work for you independently—you give it a task and it will execute it.

Find and book me the highest rated one-day tour of Rome on Tripadvisor.

I'll search for the highest-rated tour of historic Rome on TripAdvisor. Once I find a suitable option, I'll provide you with the details. Let's begin.

Worked for 2 minutes ^

Navigating to TripAdvisor website
Selecting "Things to Do" category
Searching for historic Rome tours
Closing pop-up, continuing tour search
Searching for Historic Rome tours
Exploring all historic Rome tour options
Closing Colosseum tab, resuming tour search
Closing tour pop-up, tab afterward
Exploring options for top-rated tours
Sorting results by tour ratings
Exploring filters for top-rated tours

Tripadvisor

Rome Hotels Things to Do

Europe > Italy > Lazio > Rome > Things to Do

BEST SELLER

Rome: Colosseum

By City Wonders

5.220 reviews

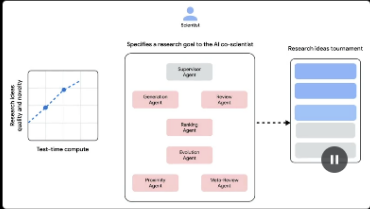


AI AGENTS are starting to appear

[Home](#) > [Blog](#) >

Accelerating scientific breakthroughs with an AI co-scientist

February 19, 2025 · Juraj Gottweis, Google Fellow, and Vivek Natarajan, Research Lead



We introduce AI co-scientist, a multi-agent AI system built with Gemini 2.0 as a virtual scientific collaborator to help scientists generate novel hypotheses and research proposals, and to accelerate the clock speed of scientific and biomedical discoveries.

QUICK LINKS

- [AI co-scientist paper](#)
- [Gene transfer discovery paper](#)
- [Transfer re-discovery paper](#)

February 2, 2025 Release

Introducing deep research

An agent that uses reasoning to synthesize large amounts of online information and complete multi-step research tasks for you. Available to Pro users today, Plus and Team next.

Team

Published on
Feb 14, 2025

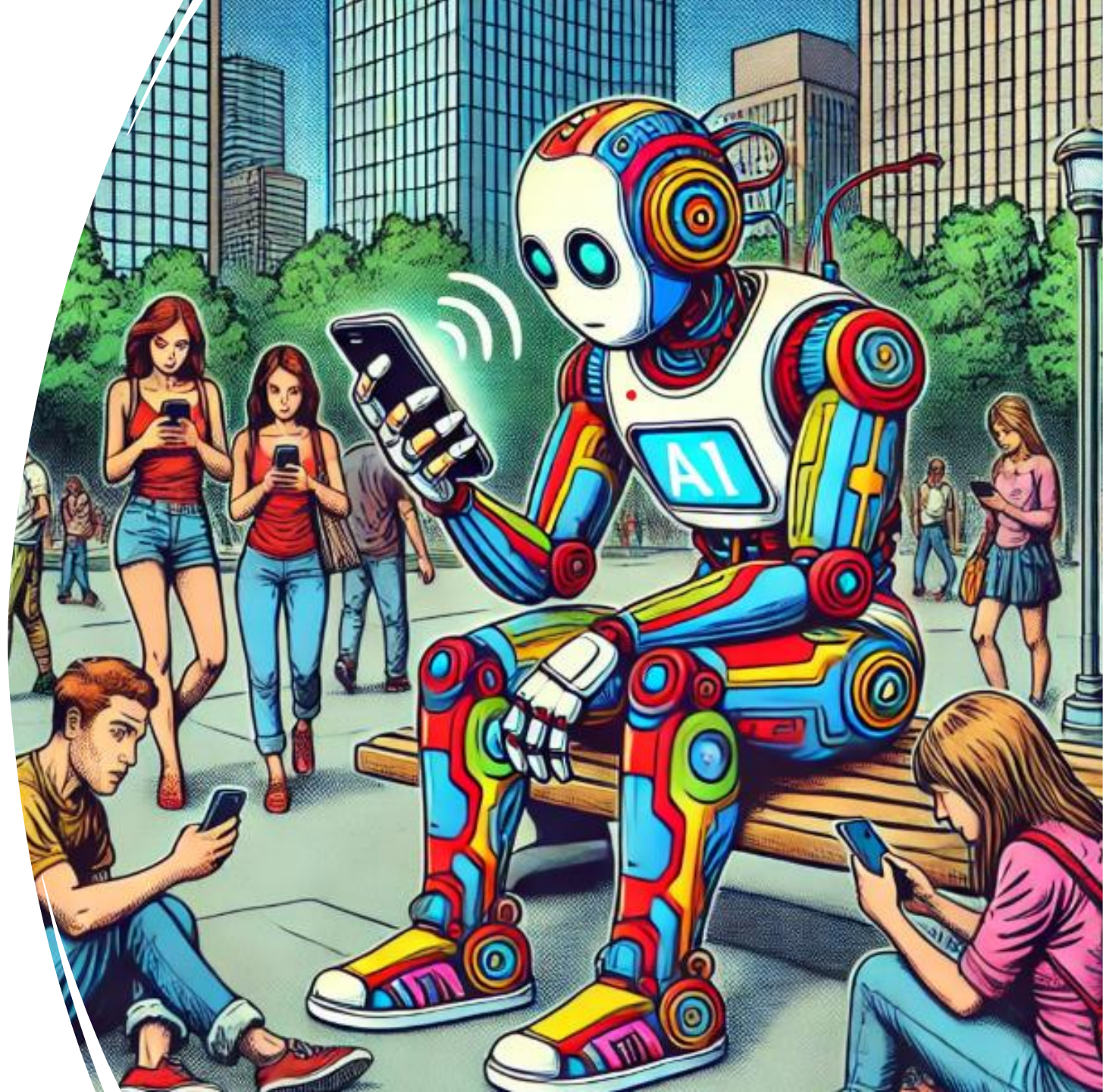


Introducing Perplexity Deep Research

Today we're launching **Deep Research** to save you hours of time by conducting in-depth research and analysis on your behalf. When you ask a Deep Research question, Perplexity performs dozens of searches, reads hundreds of sources, and reasons through the material to autonomously deliver a comprehensive report. It excels at a range of expert-level tasks—from finance and marketing to product research—and attains high benchmarks on Humanity's Last Exam.

We believe everyone should have access to powerful research tools. That's why we're

AI LANDSCAPE HOW TO GET AI TO FIT IN



AI 2025



Papers With Code



OLLAMA



HUGGING FACE



LangChain



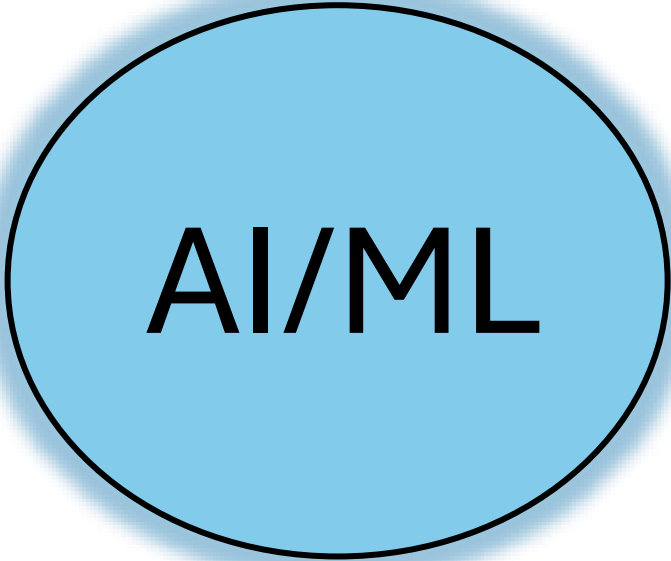
ResearchRabbit



AHREF



Copilot



AI/ML



TensorFlow



KERAS

PyTorch



GitHub
Copilot



DALL-E 3



ChatGPT



perplexity



Bard

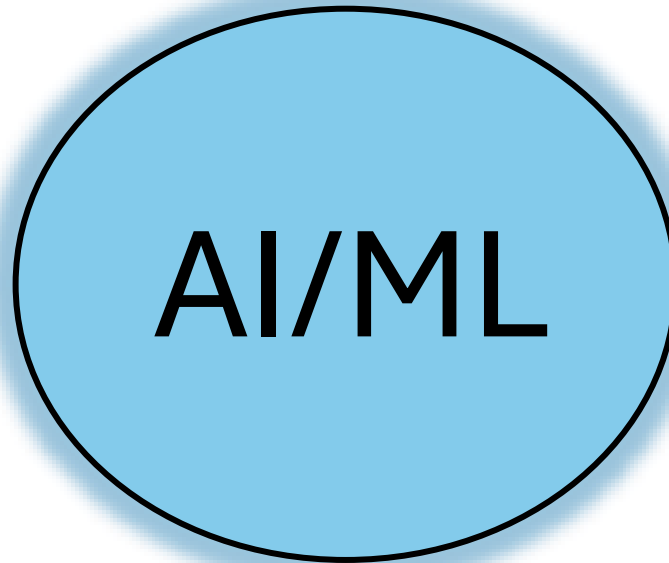
GENERAL USE

DOMAIN SPECIFIC

AI 2025

ADJUST THE TOOLS INTO RELEVANT DOMAIN
(AGENTS – might shape the future)
(Using pre-trained models)

TO ENSURE SPEED
(Using solutions)



USING BASIC AI TO TRAIN
(Must win battles for europe)
(ML & AI)

GENEREL USE

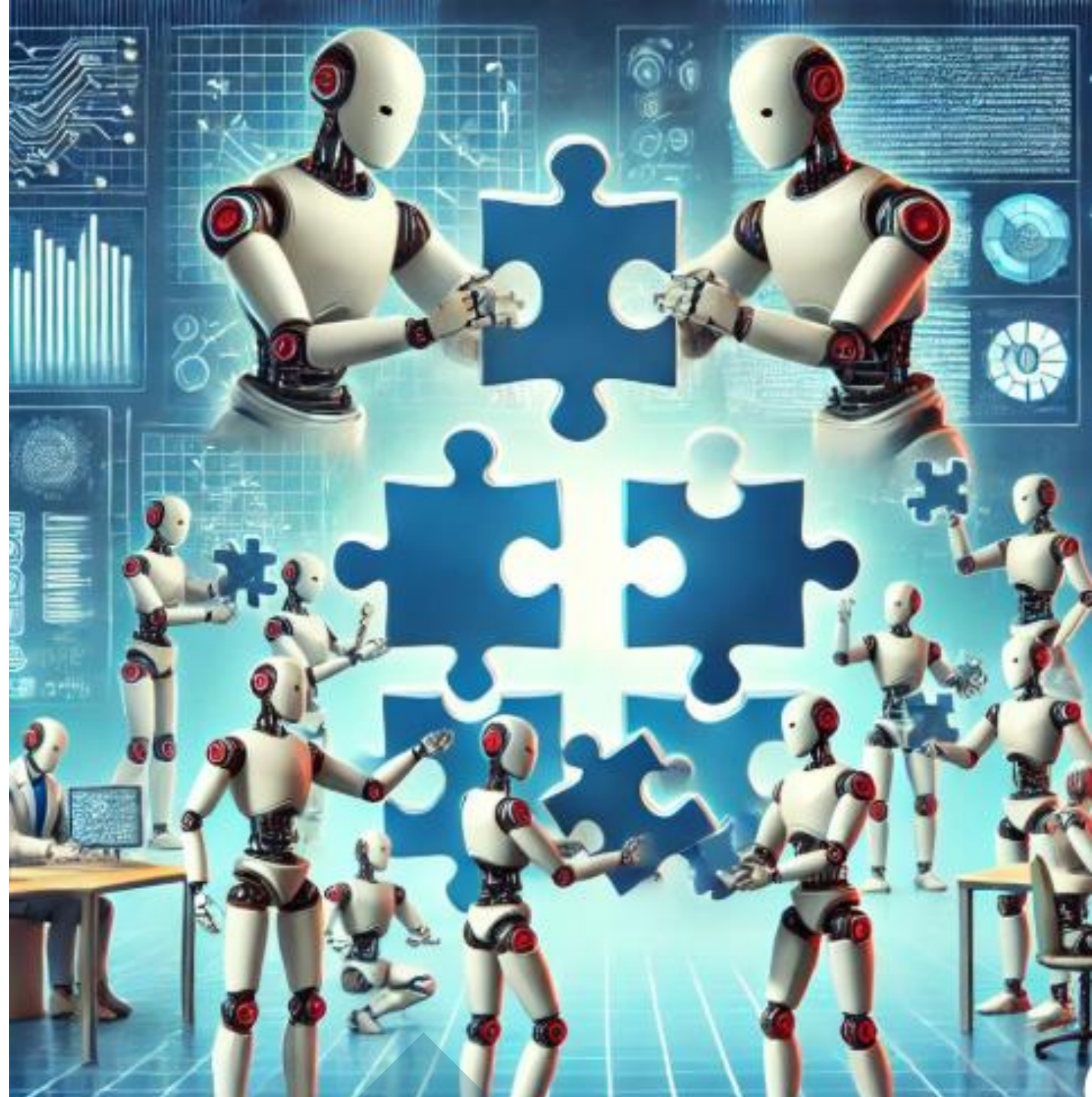
DOMAIN SPECIFIC

Internal
processes

Customer
facing AI

One Business Goal

USE CASES



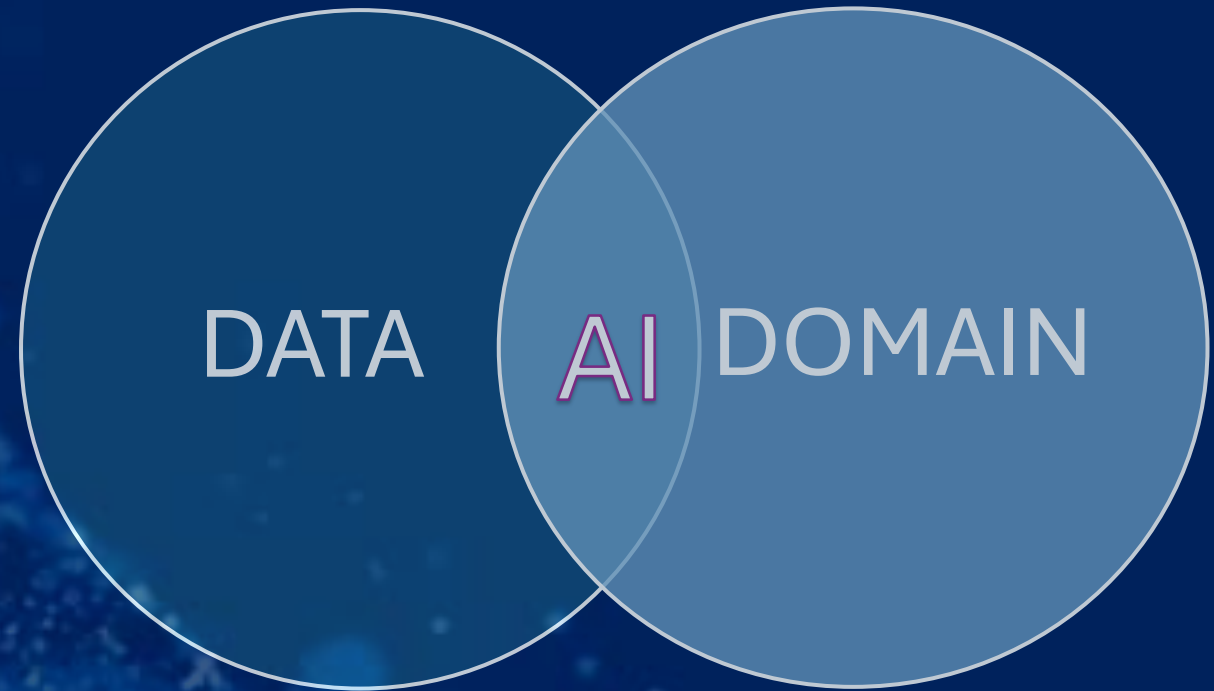
Edge AI capability

Important for the AI on edge?

- Footprint consideration
 - AI on the edge device
- Precession:
 - Monitor of the AI model on the edge

Examples of use cases

- AI for main quantaties: flow estimation
- AI for condition monitoring
- AI for control settings



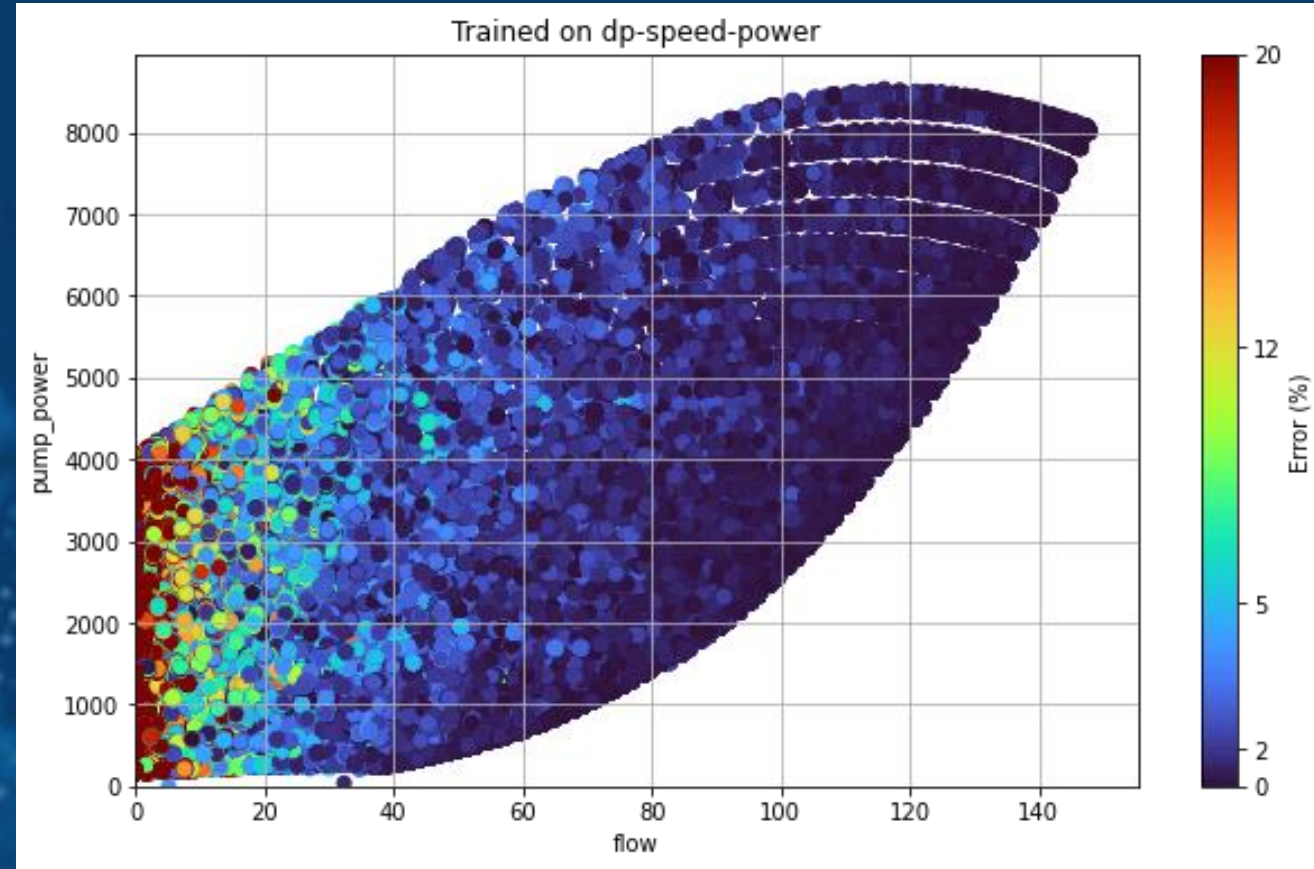
AI in Grundfos:

- External flow meter commonly added to system with pump
- Virtual flow meter integrated within pump would benefit customers
- Complicated since a pump is used in numerous systems and situations



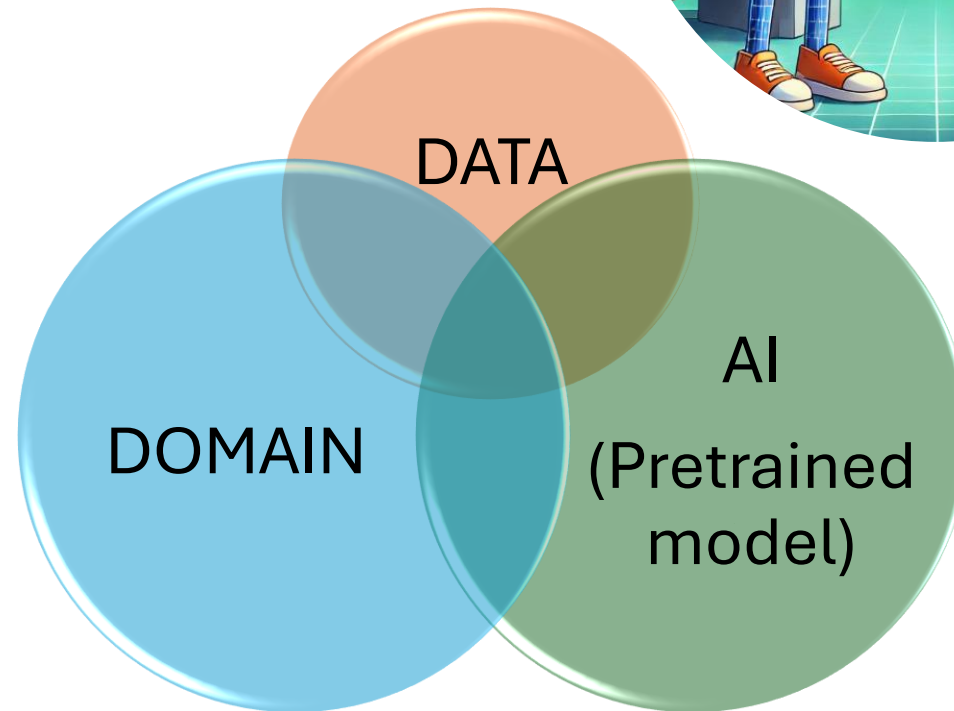
AI in Grundfos:

- - Flow estimation traditionally done through physical equations.
- - Creating a model that describes all situations can be challenging.-
- AI models that use data are shown promising results



AI for LCA

- Manual, repetitive tasks:
- Deep domain expertise required
- Specialized tool knowledge
- Data gaps and inconsistencies .
- Often error-prune



Convert LCA
databases to
graph
and use
grapRAg

LLM + RAG

Prompts-Context



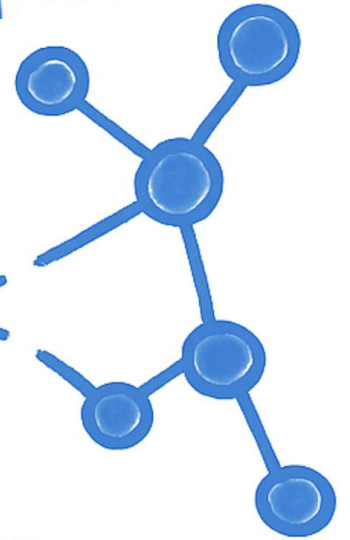
Answers

LLM +
GraphRAG

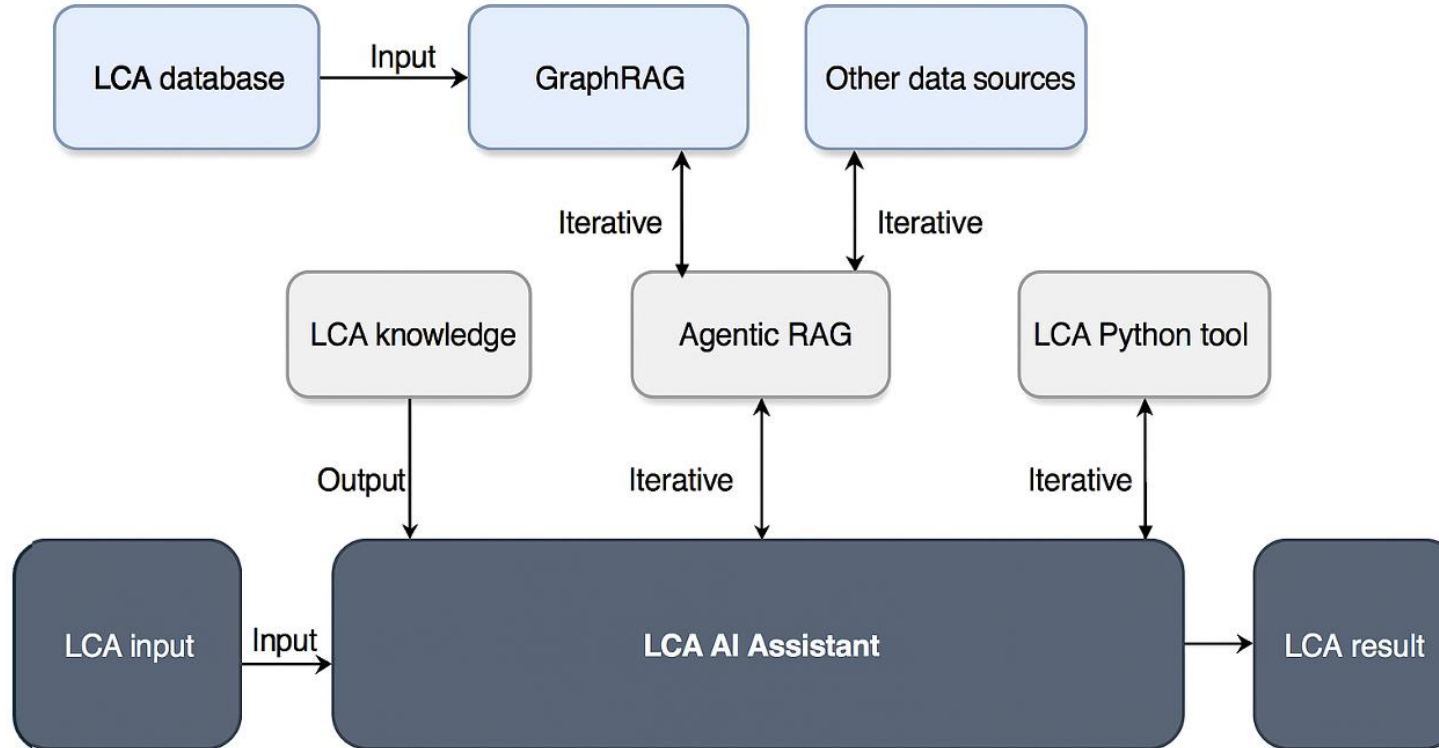
Prompts



Answers Context



LCA AI ASSISTANT



First result

Retrival part of the graph rag shows high performance compare to state of the art

Baseline for more abstract use cases

Table 1: Retrieval Performance

Query Type	Top 1 (%)	Top 10 (%)
Exact Search	88%	97%
<i>Prompt 1</i>	83%	89%
<i>Prompt 2</i>	72%	90%

Table 2: Performance Difference compared to Ecoinvent basic search

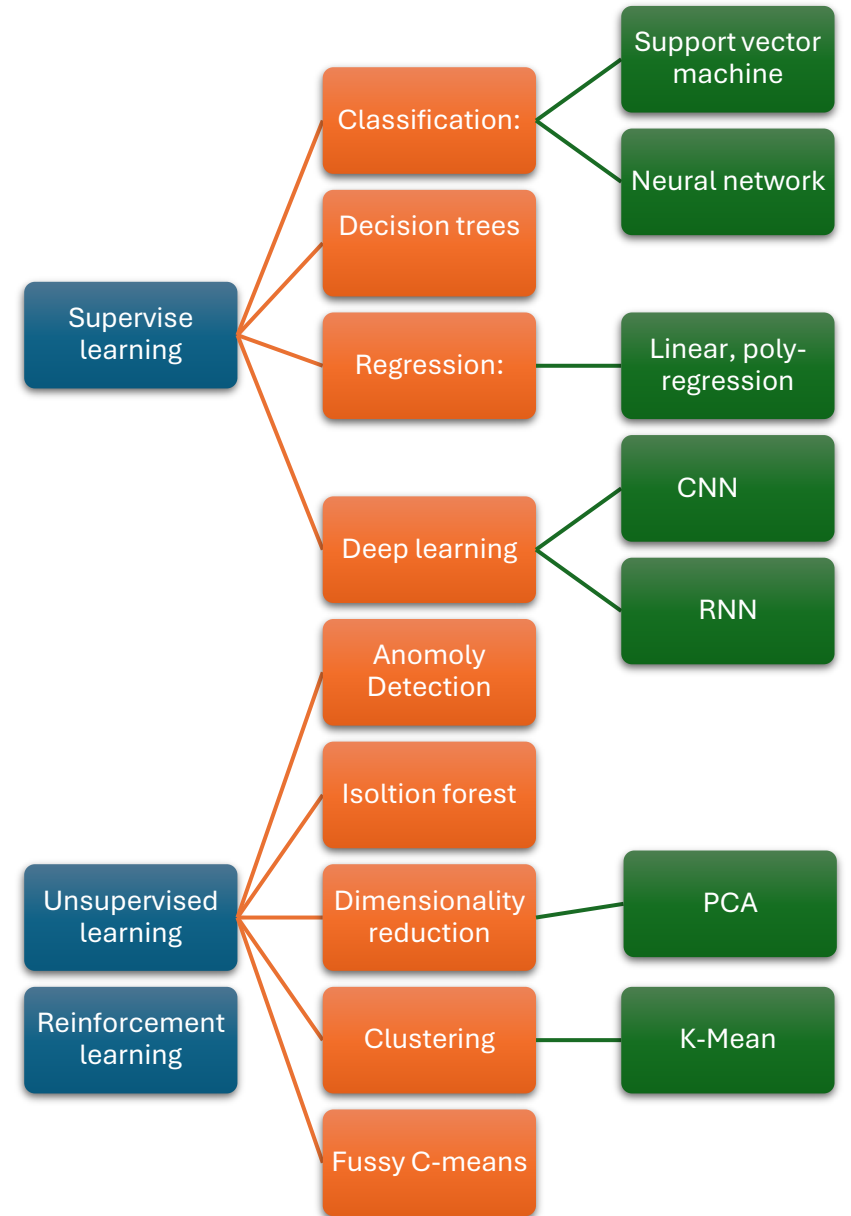
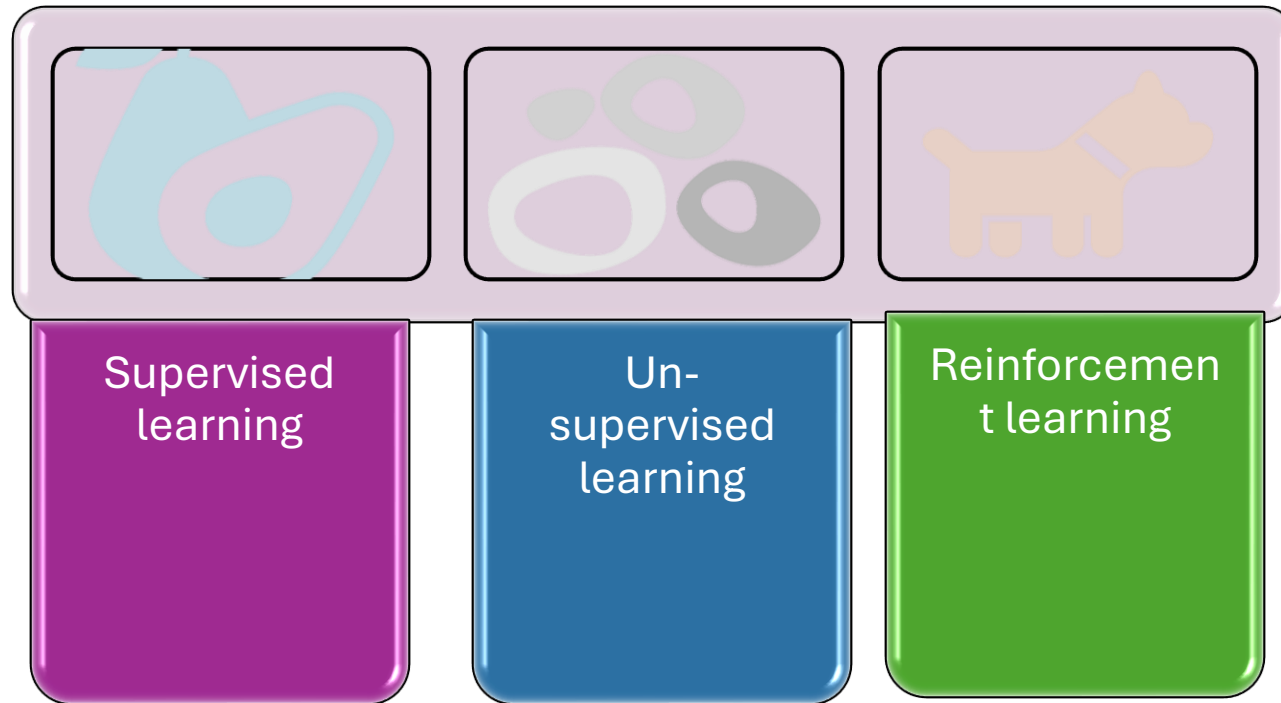
Query Type	Top 1 Difference (%)	Top 10 Difference (%)
Exact Search	-13%	-3%
<i>Prompt 1</i>	8%	-3%
<i>Prompt 2</i>	25%	2%

Take a-way

- Get a common language
- Ensure to stay focus
- Get started
- Ensure to shape the future you want

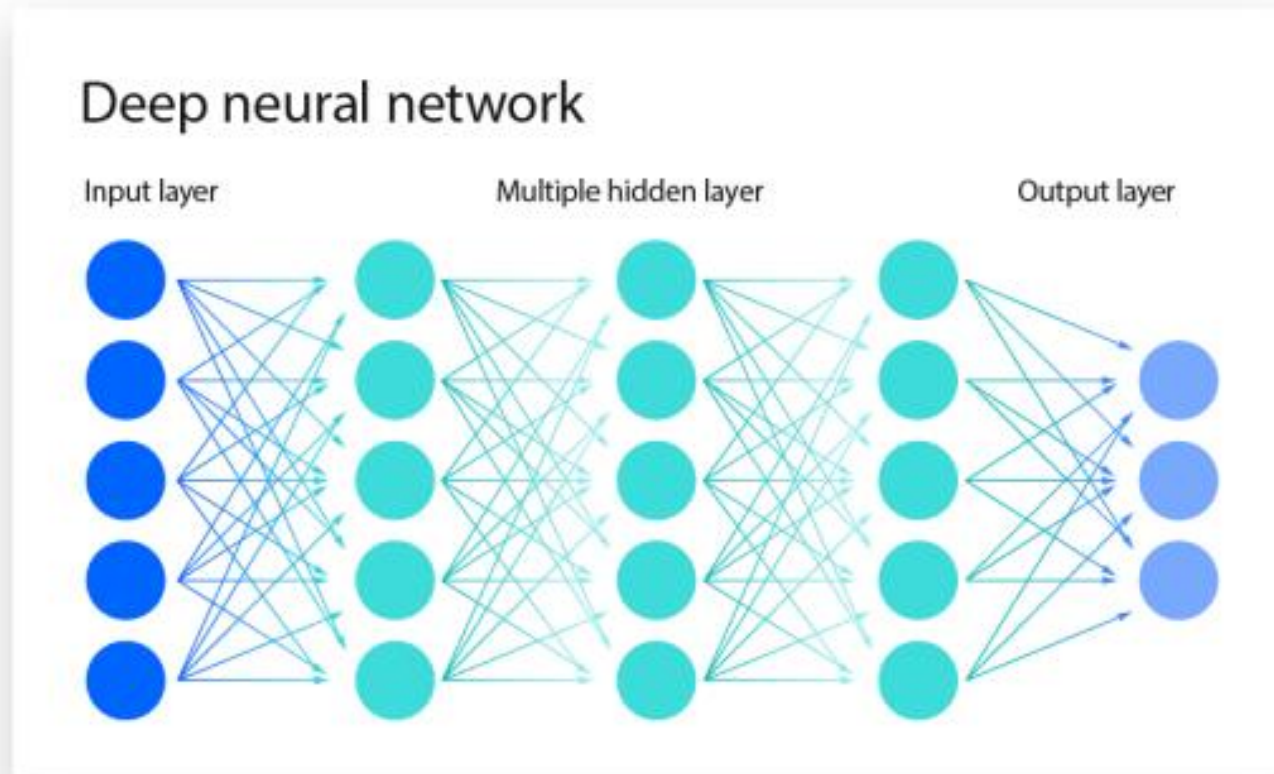


Definitions: ML



Definitions: Deep learning

E.G using **neural networks** with many layers (hence "deep") to model and solve complex patterns in data.



Definitions: NLP

- Definition:**

- NLP focus on enabling computers to understand, interpret, and generate human language.

- Key Tasks in NLP:**

- Sentiment analysen
- language translation
- speech recognition
- chatbots

PART OF NLP

