

Let's discuss AI

Dag Wästlund
Section Manager, Data
Science & AI



What is AI?



AI, or Artificial Intelligence, refers to the field of computer science and technology that aims to create systems and machines that can perform tasks that typically require human intelligence. These tasks include things like problem-solving, learning, understanding natural language, recognizing patterns, and making decisions.



AI systems are designed to simulate human intelligence by using algorithms and computational power to analyze large amounts of data, extract meaningful insights, and make predictions or decisions based on that data. AI can be broadly categorized into two main types:

1. **Narrow or Weak AI** (ANarrow or Weak AI (also known as Narrow AI or Weak AI): This type of AI is designed for a specific task or a narrow range of tasks. It excels in performing these tasks but lacks the general intelligence and adaptability of a human being. Examples of narrow AI include voice assistants like Siri, image recognition systems, and recommendation algorithms used by streaming platforms like Netflix. Narrow AI is also

But also...

Can machines think?

A. M. Turing (1950) *Computing Machinery and Intelligence*. *Mind* 49: 433-460.

COMPUTING MACHINERY AND INTELLIGENCE

By A. M. Turing

1. The Imitation Game

I propose to consider the question, "Can machines think?" This should begin with definitions of the meaning of the terms "machine" and "think." The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words "machine" and "think" are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, "Can machines think?" is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

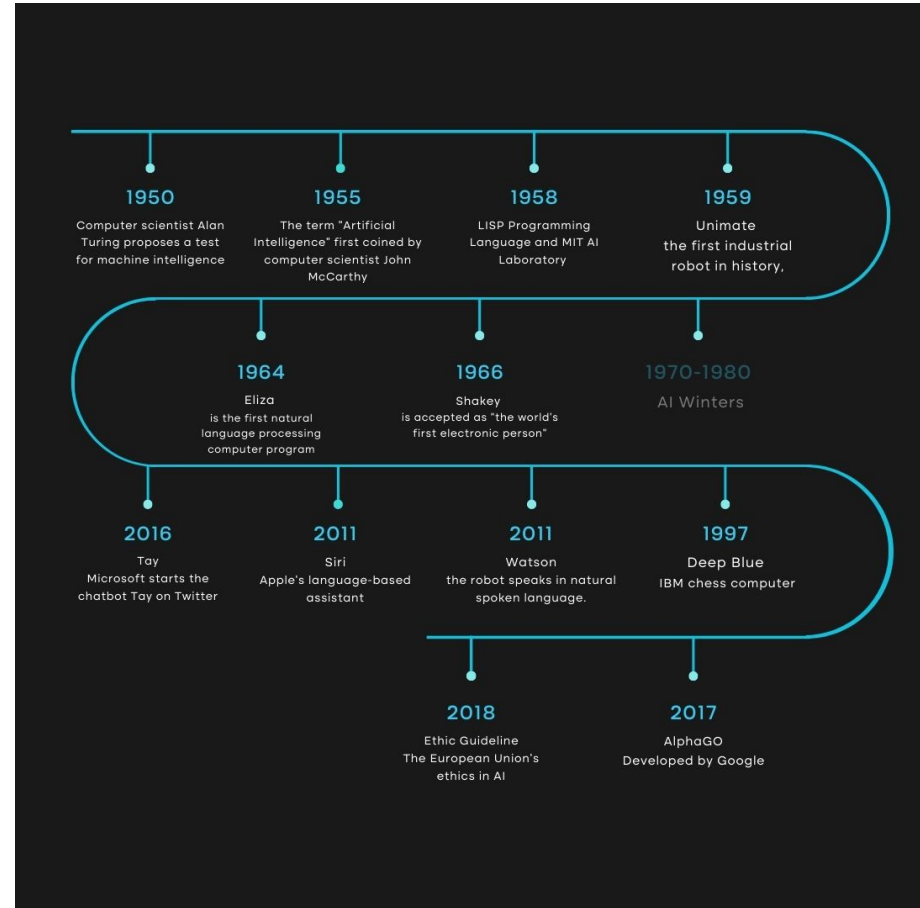
[Read the article](#)



What is AI

Brief history of AI

- 1950 The Turing test is introduced
- 1960-70 Rule based systems are introduced within medicine and industry
- 1980-90 AI Winter caused by funding challenges
- 2000 Revival of AI. Large dataset and increased computational power
- 2010 Deep learning emerge
- 2020 AI became an integral part in our everyday life



Generative AI

Generative AI

Generative AI is a type of artificial intelligence technology that uses machine learning systems to generate text, images, code or other types of content.

Examples of tools:

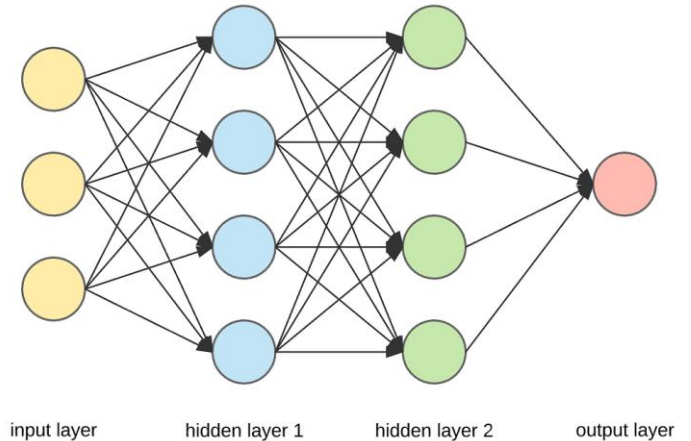
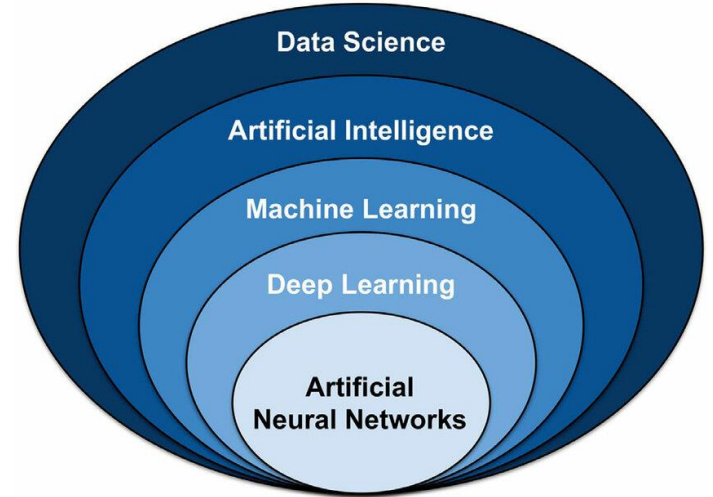
ChatGPT – Text Generator

MidJourney – Image generator

SORA – Video Generator

HeyGen – Personal Avatar creation

Devin – Ai software developer



Video Generator (SORA)

More SORA demos by OpenAI

Video generator (avatar)



AI at Vattenfall

Dag Wästlund

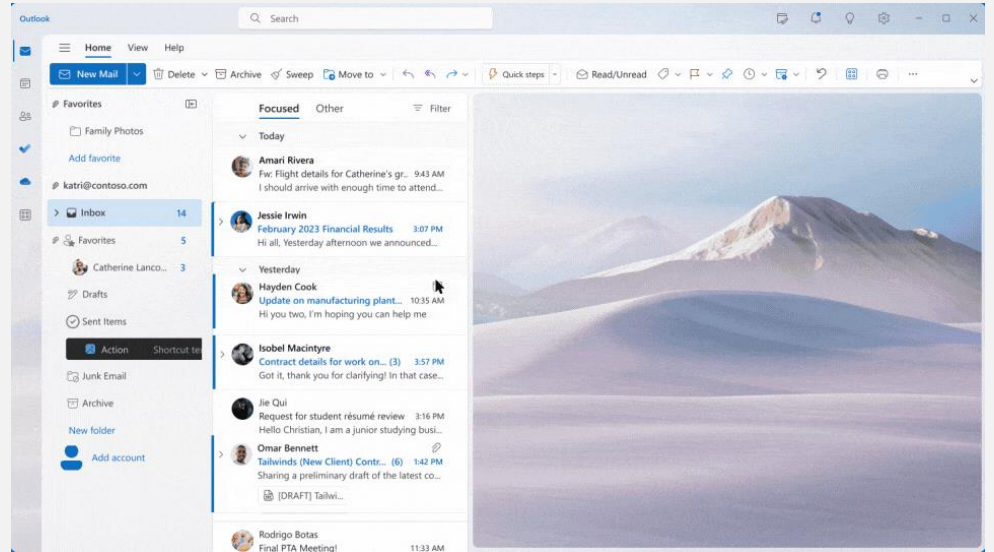
M365 Copilot @ Vattenfall

- ▶ Microsoft is currently performing tests of Copilot together with 20 customers – including eight companies from US top500 with the highest turnover.
- ▶ Vattenfall joins European Test group.
- ▶ Vattenfall to run with dedicated Test user Team a pilot:
 - ▶ checking for functionalities
 - ▶ benefits for daily work and
 - ▶ risk potentials (incl. GDPR and data privacy compliance)
- ▶ Also, negotiations with works council representatives is ongoing



Examples from Microsoft on Copilot

- Write emails in Outlook
- Summarize text insights from data sheets in excel
- Autogenerate text in Word
- Summarize meetings you missed in teams (notes, tasks, summaries, document)
<https://www.youtube.com/watch?v=rLC2frnUasw>

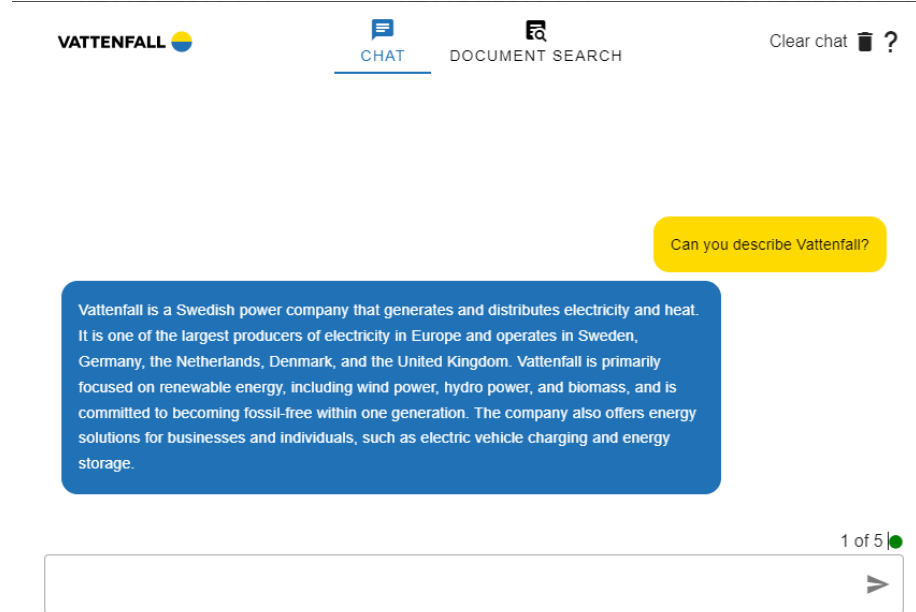


Current Initiatives

- **Microsoft 365 Copilot**
 - Aims to enhance the daily work experience with Teams and Office 365 by serving as a reliable assistant.
- **GitHub Copilot**
 - For developers only. Ongoing discussions with GitHub about licensing

Vattenfall Development

- **Enterprise Search** ("Chat with your documents") is being developed
- **“Playground for Vattenfall developers”** available via Central IT



The screenshot shows the Vattenfall chat interface. At the top left is the VATTENFALL logo. In the center, there are two tabs: 'CHAT' (which is active and underlined) and 'DOCUMENT SEARCH'. To the right of the tabs is a 'Clear chat' button with a trash icon and a question mark. Below the tabs, a yellow input box contains the question 'Can you describe Vattenfall?'. A blue response box contains the following text: 'Vattenfall is a Swedish power company that generates and distributes electricity and heat. It is one of the largest producers of electricity in Europe and operates in Sweden, Germany, the Netherlands, Denmark, and the United Kingdom. Vattenfall is primarily focused on renewable energy, including wind power, hydro power, and biomass, and is committed to becoming fossil-free within one generation. The company also offers energy solutions for businesses and individuals, such as electric vehicle charging and energy storage.' At the bottom right of the chat area, it says '1 of 5' with a green dot. Below the chat area is a white input box with a right-pointing arrow.

[Enterprise Search \(test release\)](#)

Azure OpenAI Service

Build your own copilot and generative AI applications



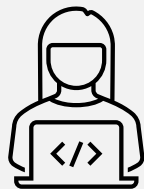
Connect your own data, call functions, and improve workflow with language and image models

[Try Azure for free](#)

[Apply for access](#)



Chat GPT can benefit our business in three key areas:



Coding productivity

Chat GPT can generate high-quality code snippets, reduce errors, and save time.



Document insights

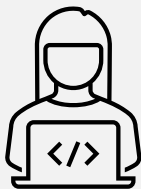
Chat GPT can access and analyze internal documents and provide relevant insights and recommendations.



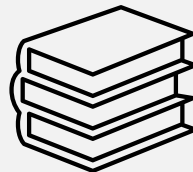
Employee learning

Chat GPT enables natural language conversations on various topics, and help employees learn new skills or concepts.

We need to mitigate the risks of leaking secret information and introducing bugs in our code.



Coding productivity



Document insights



Employee learning

RISKS

RISK: may **introduce bugs** in our code if we copy-paste code snippets without verifying their correctness and compatibility. **Can also lead to copyrights issues.** *We need to test and review the code before deploying it.*

RISK: may **leak confidential information** if we use the public model or share our dialogue with third parties. *We need to use the API version and ensure data privacy and security.*

RISK: poses a **risk of hallucinating false or misleading information** when generating text or explaining concepts. It may also generate **responses that contain biases** present in training data.

AI at Vattenfall R&D

The journey within R&D

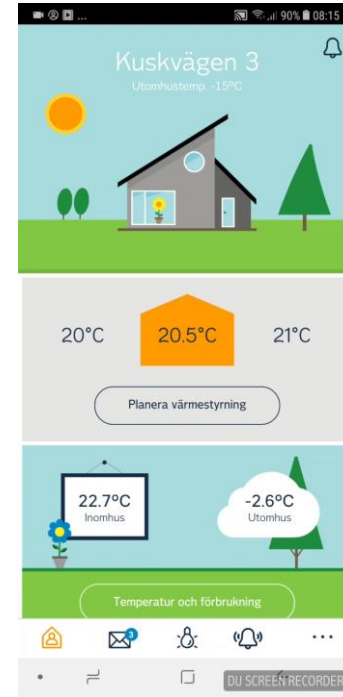
2017 - One agile team

2019 - Data Analytics & ICT solutions department

2020 - Data Science & AI section

2022 – Three agile teams are formed

2024 – Well functioning processes from “proof of concept” to implementation



Three teams

Customer Products & Solutions



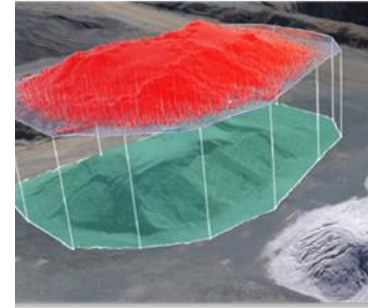
Analytics solutions for customers

Data Driven DSO



Supporting Distribution to become more data driven

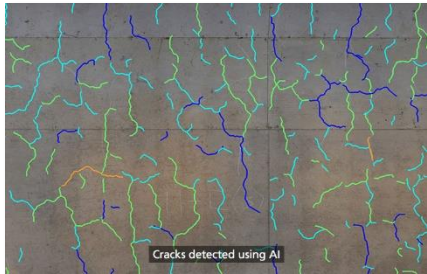
Asset Analytics



Data Science for assets and surrounding areas

Project examples

Crack Detection SKB/Hydro GE



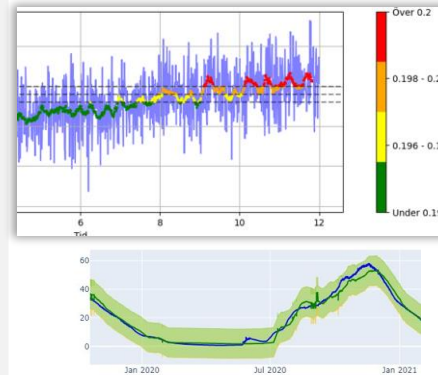
Automate charting of mineral veins in bedrock and concrete

AI assisted search Nuclear



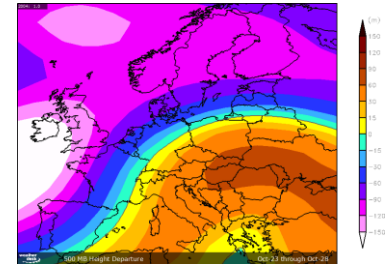
Make use of LLM to bring Structure to unstructured data

Condition based monitoring



Condition based monitoring of hydro power plants through sensor and smart algorithms

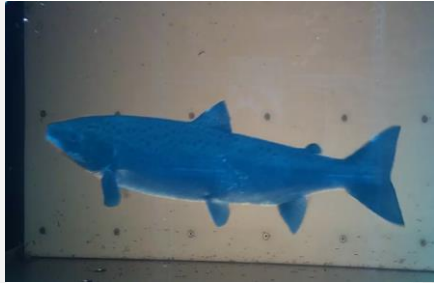
Weather patterns



Find patterns in weather to better predict production from wind power

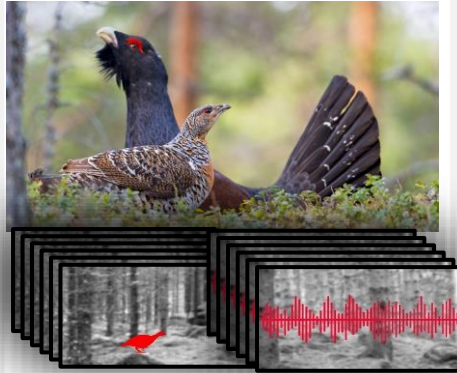
Project examples

Identification of fish
Hydro



*Count and Identify fish species
In our rivers with the help of
Image recognition*

Capercaillies Detection
Wind



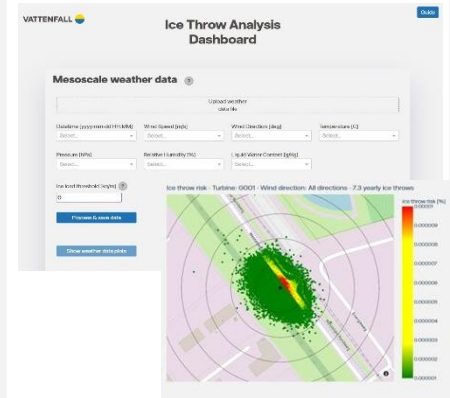
*Monitor capercaillies with
AI on images and audio
recordings*

Satellite data
Hydro



*Automatic identification of
geographical and
environmental segments.
Monitor change over time*

Ice throw simulation
Wind



*Simulating ice throws based
on historical weather data.
Used for planning new
turbines, and new mitigations*

AI at Vattenfall

Älvkarleby laboratory

Digital inspection team

- 3D-printing solutions for different materials
- 3D- Scanning
- Drones & Robotics for inspections and mapping
- Communication technologies



Digital Inspections with UAVs

- Inspection of power lines
 - Power line detection and localisation
 - Component Inspection and health analysis
 - Evaluation of vegetation risk close to the power line
- 3D-models for hydropower optimisation



The future of AI

Dag Wästlund
Section Manager, Data
Science & AI

AI agents

ChatGPT

AI-agenter kan användas på många olika sätt för att hjälpa oss i våra liv. Här är några exempel:

1. **Sökmotorer:** När du letar efter information på internet använder du förmodligen en sökmotor som Google. Dessa sökmotorer använder AI för att förstå vad du letar efter och ge dig de bästa resultaten.
2. **Rekommendationssystem:** Har du märkt hur Netflix eller YouTube föreslår filmer eller videor du kanske gillar? Det är tack vare AI-agenter som lär sig vad du gillar och ger dig rekommendationer baserat på det.
3. **Digitala assistenter:** Kanske har du hört talas om Siri, Alexa eller Google Assistant. Dessa är digitala assistenter som använder AI för att svara på dina frågor, utföra uppgifter åt dig eller kontrollera dina smarta hem-enheter.
4. **Autonoma fordon:** AI-agenter används i självkörande bilar för att känna av sin omgivning, fatta beslut och köra säkert.
5. **Medicinsk diagnostik:** Inom medicin används AI-agenter för att analysera medicinska bilder, som röntgenbilder eller MR-scanningar, för att hjälpa läkare att upptäcka sjukdomar tidigt.
6. **Spel:** När du spelar dataspel, kan du möta AI-agenter som styr dina motståndare eller hjälper till att skapa en mer realistisk spelupplevelse.

AI agents

"Generative agents wake up, cook breakfast, and head to work; artists paint, while authors write; they form opinions, notice each other, and initiate conversations; they remember and reflect on days past as they plan the next day,"

Voyager represents an “embodied agent,” an AI that can freely and purposefully move and act within a simulated or real environment..



World simulation

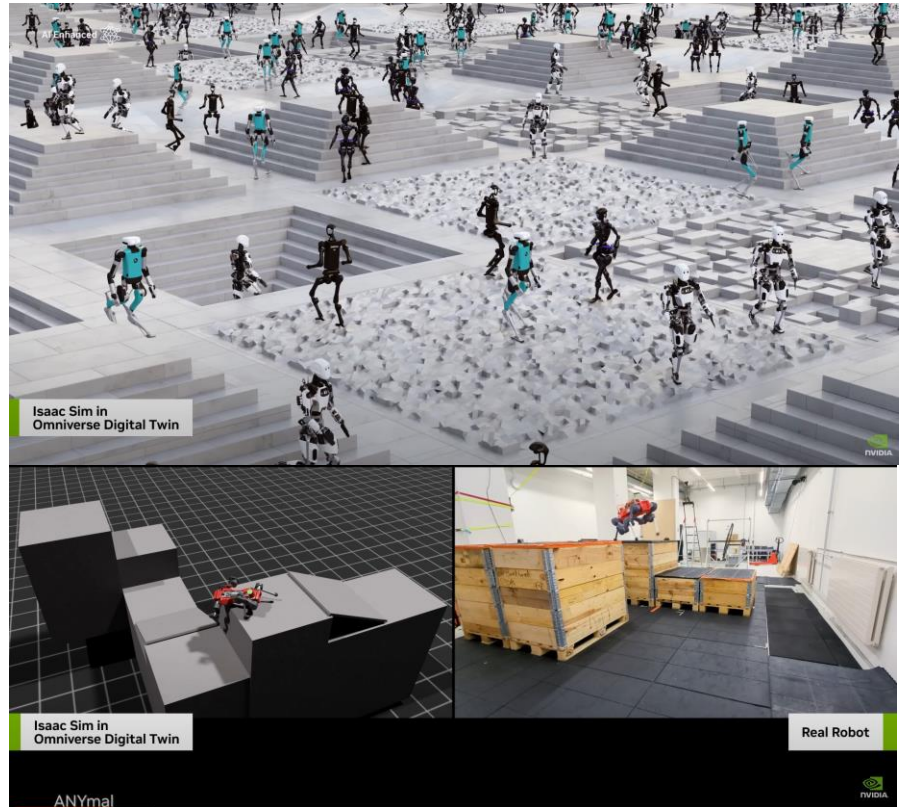
Ai agents are trained in virtual environments to be able to perform tasks in the real world

Foundation model for robotics

→ Understand the environment

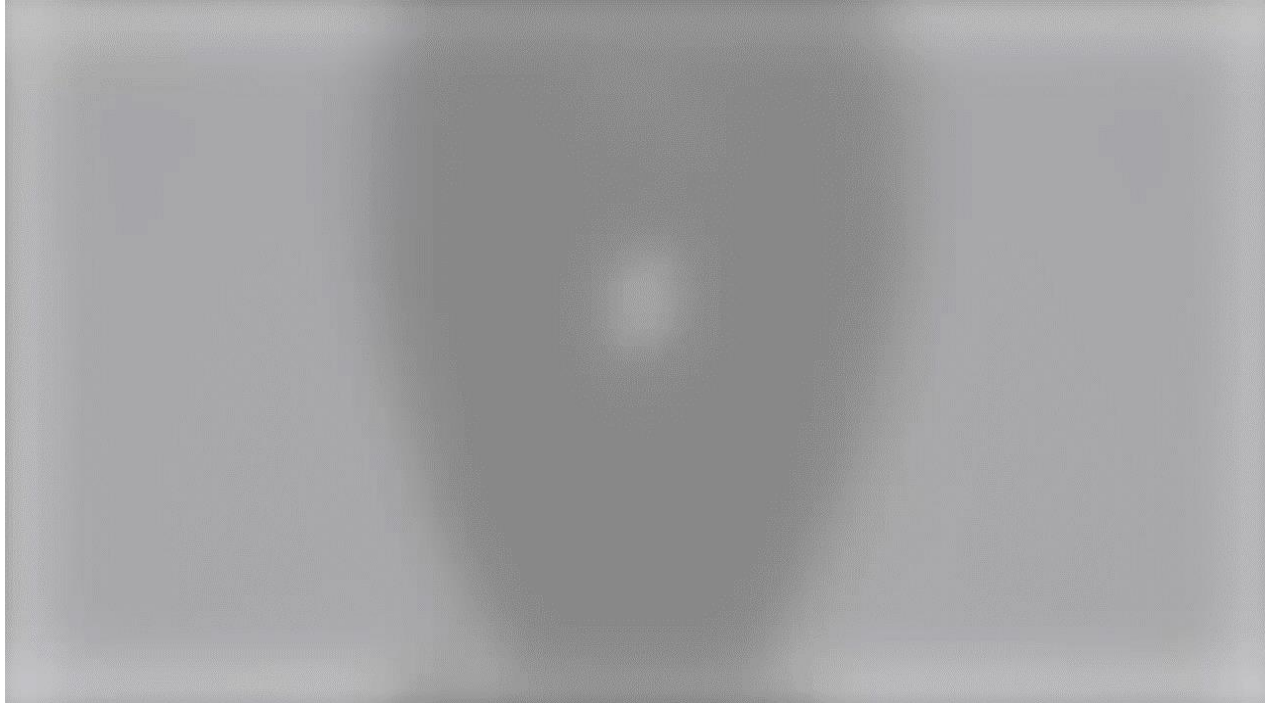
Ai agents

→ Decision on what to do



General purpose robotic platform

We add all things together



What to expect in the next 10 years

Transform research

There's a much bigger set of ideas that humans with computers, plus AI, can successfully tackle



AI a pillar of foreign policy

Importance of partnerships to maintain and strengthen competitiveness.



Enable next-gen consumer experiences

Next generation consumer Experiences.



Addressing the climate crisis

Taking a holistic view of environmental information and interdependence



Extra

Dag Wästlund
Section Manager, Data
Science & AI

id:7 Has_fin 0.98
id:7 Male 0.95
id:7 Salmon 0.95

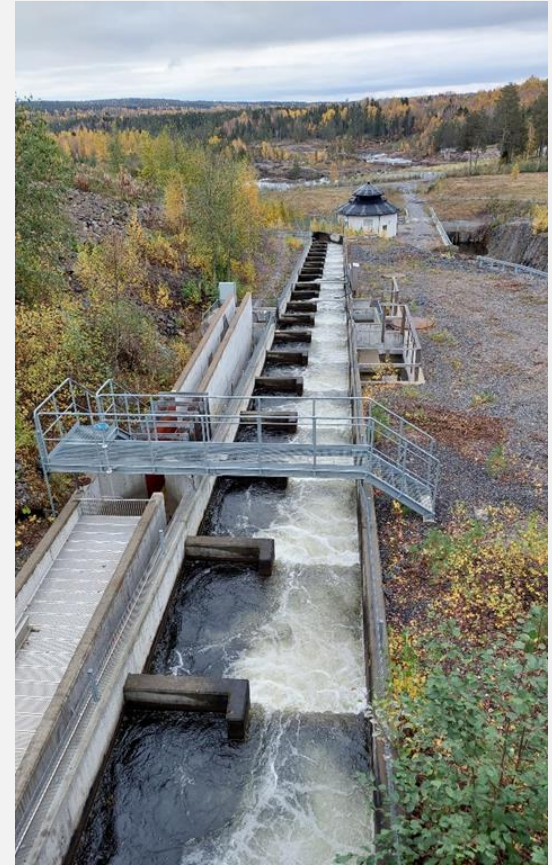
Fish AI



Hik1

FishAI

- A real-time monitoring system to count and classify salmon passing the fish ladder at Stornorrfors
- Use results to evaluate fish ladder and get insights into fish population (Environmental national Plan)



FishAI

Purpose

- Evaluate fish ladder
- Get insights into salmon population and migration season

Real time monitoring



- Counting
- Classifying

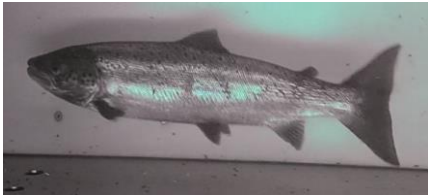
Location



- Stornorrfors fishladder
- Extra sites added

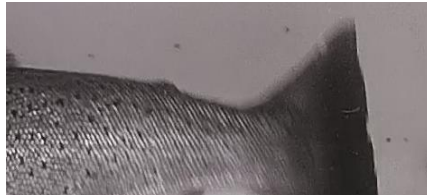
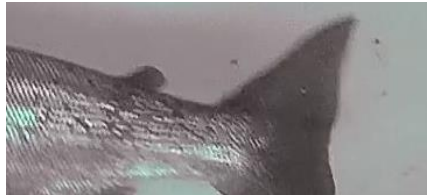
What do we classify

Species



- Salmon
- Trout

Origin



- Wild
- Farmed

Sex



- Male
- Female

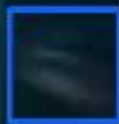
Health



- Fungus infection

30-06-2023 05:33:2

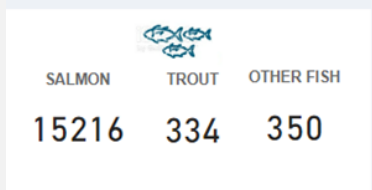
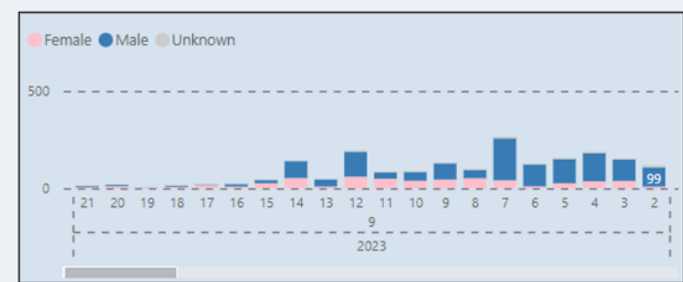
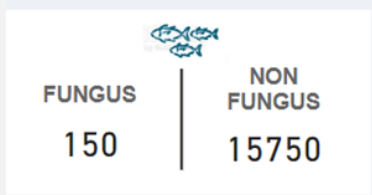
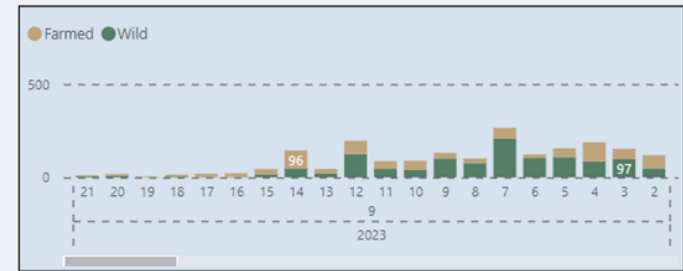
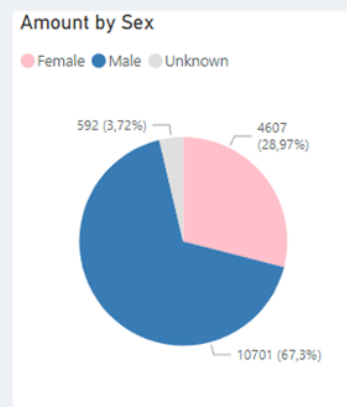
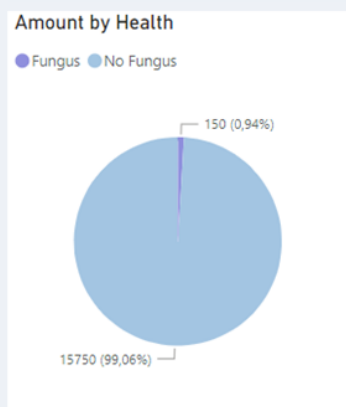
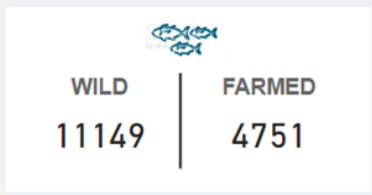
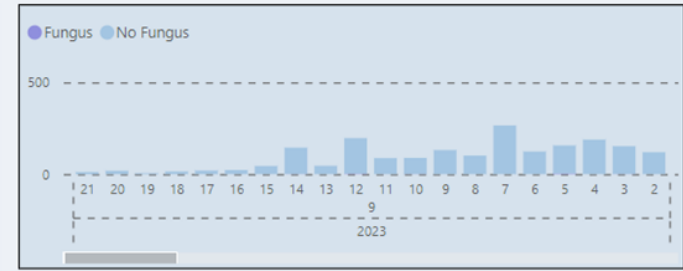
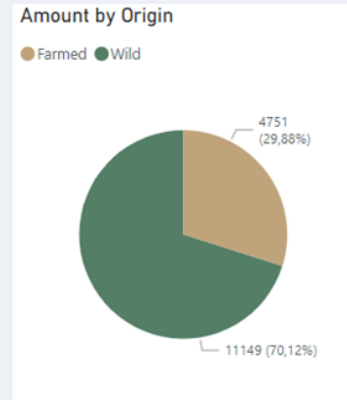
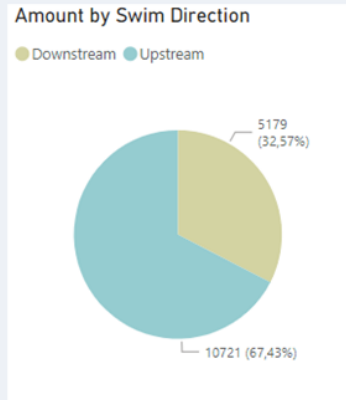
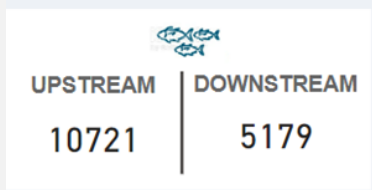
id:1 Salmon 0.70



Hi

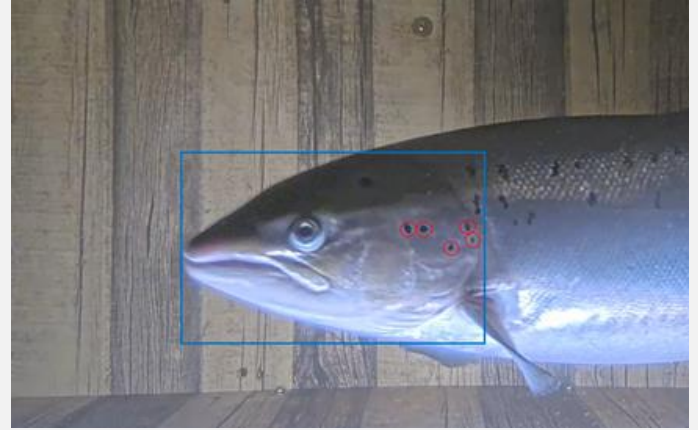
Fish Migration Season:

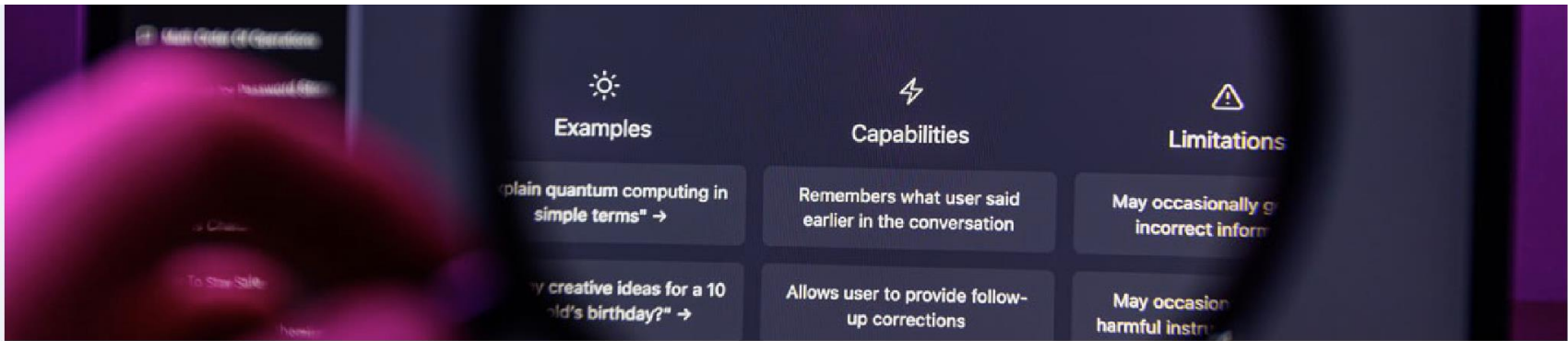
27-5-2023 1-11-2023
 Origin: Alle
 Health: Alle
 Sex: Alle
 Fish species: Alle
 Swim direction: Alle



Individual recognition

- Recognize individual salmon by spot pattern on the head





Artificial intelligence brings opportunities for Vattenfall

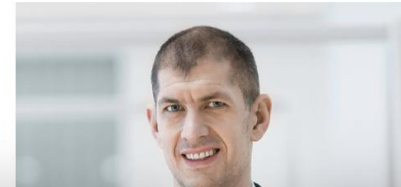
Artificial Intelligence is becoming smarter and smarter. The latest version of world famous ChatGPT now outperforms the average college graduate. For Vattenfall the development brings numerous opportunities. But there are pitfalls.

Get engaged

 Like 49

 Discuss 3

GPT4, the latest version of ChatGPT, scores better than 99 percent of the Biology Olympiad participants and beats 90 percent of the Uniform Bar Examen test-takers – an exam to seek out future lawyers. The generative AI does not only dominate in standardized test, it also competes when it comes to emotional intelligence. It is so good that people start using it to communicate on dating platforms.



Intelligent asset inspection using drones in combination with AI

Drones can replace and surpass manual inspection of assets, greatly enhancing maintenance capacity and reducing costs. AI is used to assess gathered video and other data

