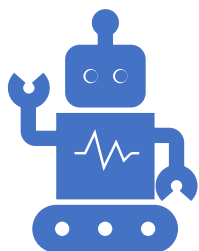




UiO : **University of Oslo**

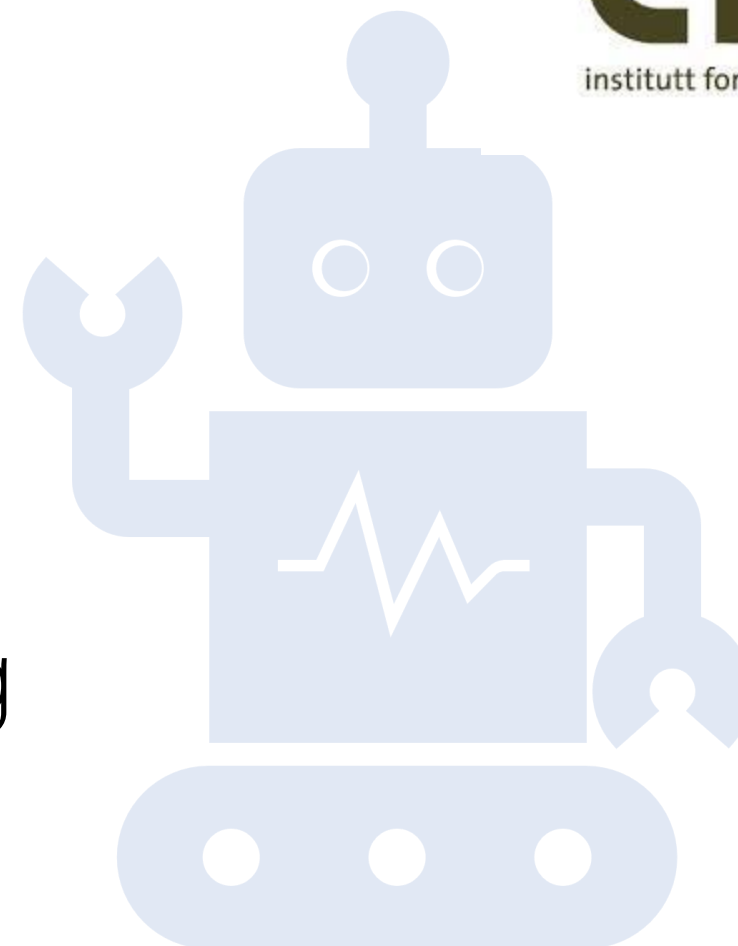


IN3050/IN4050 - Introduction to Artificial Intelligence and Machine Learning

Lecture 1 – 2025

Course Introduction

Kai Olav Ellefsen



Plan for today

- Course introduction
 - Motivation
 - Practical info
- First topic: Search / Optimization



Motivation/State-of-the-art

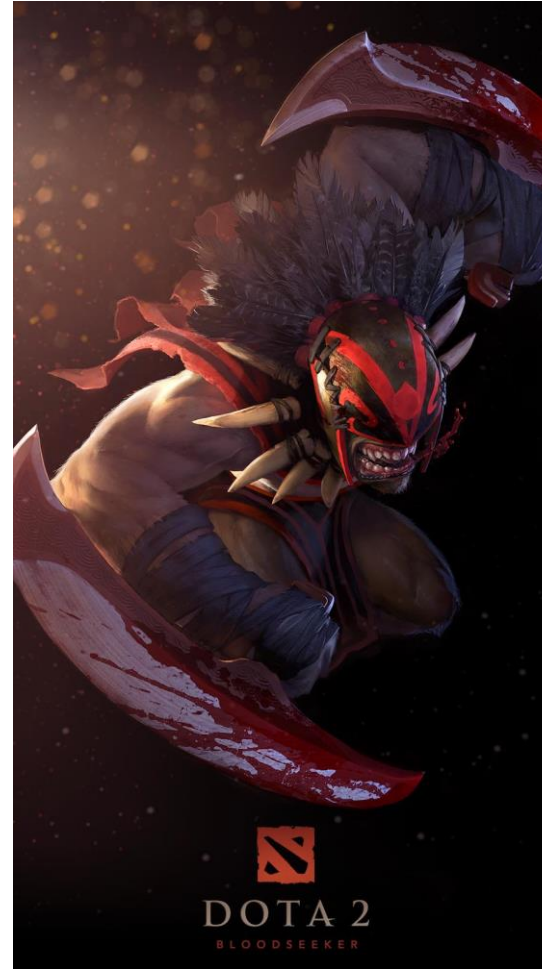
What can we achieve with State-of-the-art AI / ML?

- **Teach a robot to interact with complex objects**



What can we achieve with State-of-the-art AI / ML?

- Teach a robot to interact with complex objects
- **Teach a computer to play complex games**



What can we achieve with State-of-the-art AI / ML?

- Teach a robot to interact with complex objects
- Teach a computer to play complex games
- **Teach a computer to describe images**

A young boy is playing basketball. 	Two dogs play in the grass. 	A dog swims in the water. 
A group of people walking down a street. 	A group of women dressed in formal attire. 	Two children play in the water. 
A skier is skiing down a snowy hill. 	A little girl in a pink shirt is swinging. 	A dog jumps over a hurdle. 

What can we achieve with State-of-the-art AI / ML?

- Teach a robot to interact with complex objects
- Teach a computer to play complex games
- Teach a computer to describe images
- **Generate things (text, video, music, images...)**



A painting of a fox sitting in a field at sunrise in the style of claudé monet

Dall-E 1 (2021)



Dall-E 2 (2022)



Dall-E 3 (2023)





Who are we?

Kai Olav Ellefsen



39 Years Old



Arendal

Education

Master and PhD in
Computer Science



NTNU

Norwegian University of
Science and Technology

Professional Experience



Postdoctoral Researcher and Associate Professor in AI / Robotics

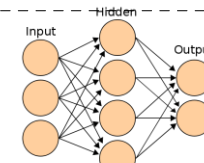
Research Interests



Artificial
Intelligence



Evolutionary
Algorithms



Neural Networks

ROBIN



Kai

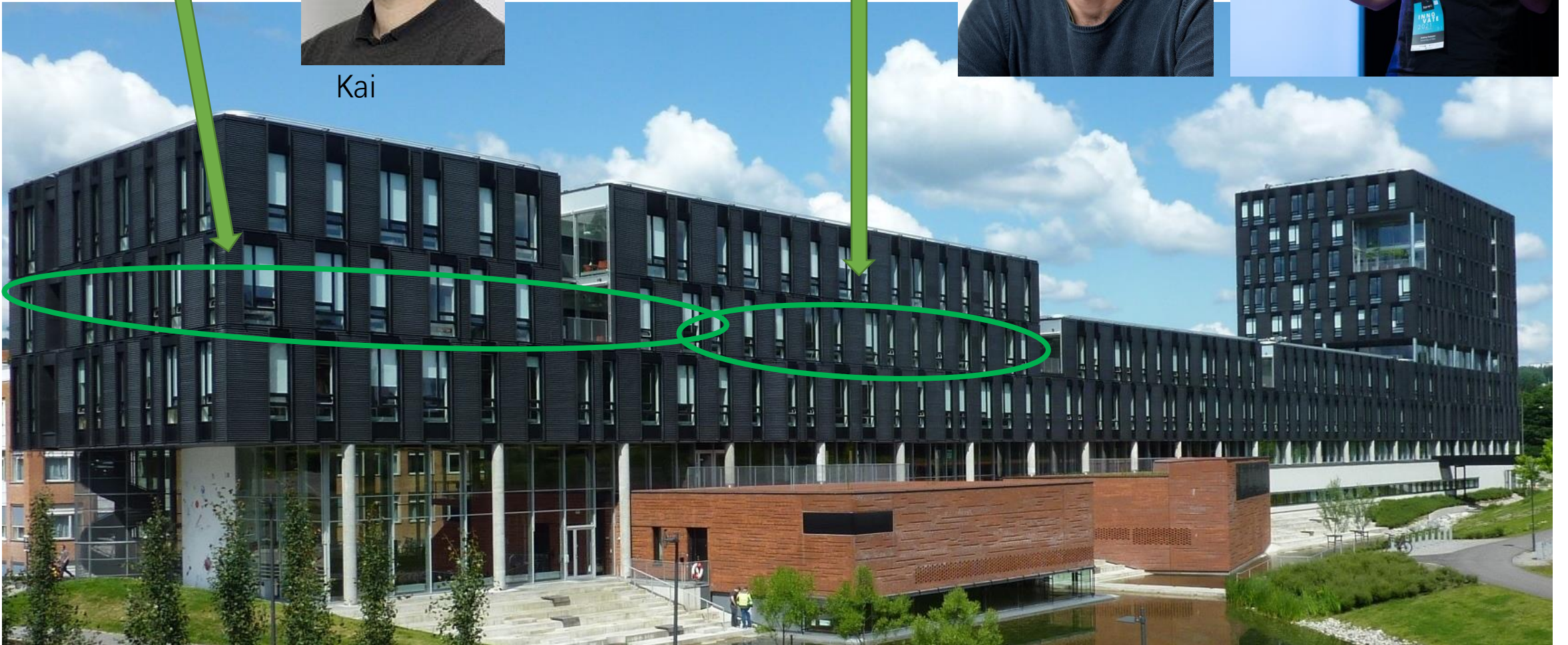
LTG

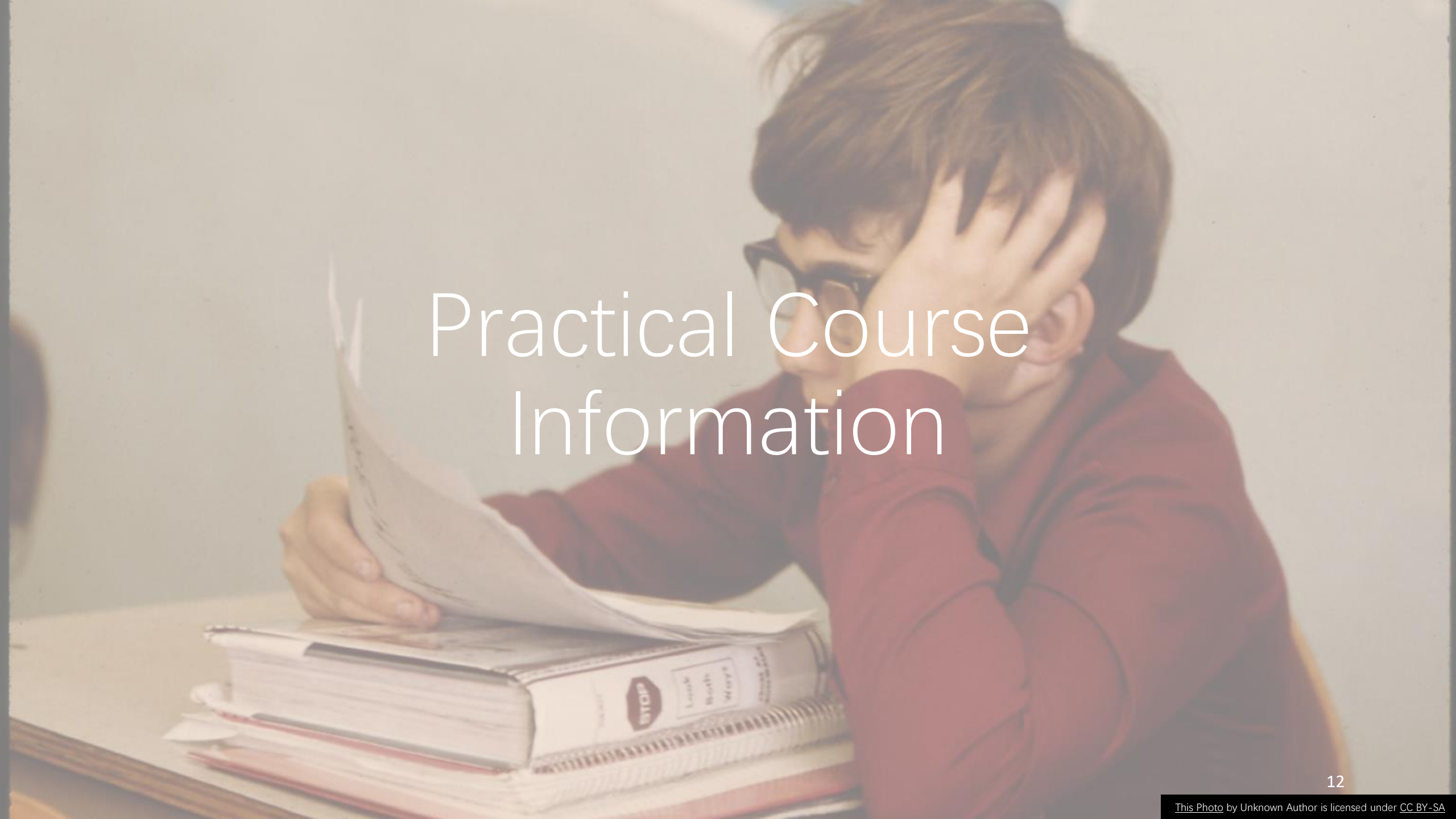


Yves



Andrey





Practical Course Information

IN3050/4050 – Spring 2025

- **Lecturers:**

- Andrey Kutuzov (andreku@ifi.uio.no)
- Kai Olav Ellefsen (kaiolae@ifi.uio.no)
- Yves Scherrer (yvessc@ifi.uio.no)
- Plus some guest lecturers

- **Lecture time:** Monday 12.15-14.00

- **Group Lectures (starting next week):**

<https://www.uio.no/studier/emner/matnat/ifi/IN3050/v25/timeplan/index.html>

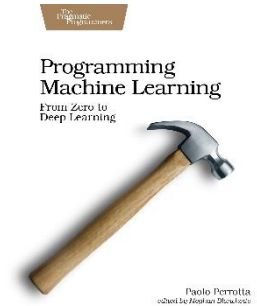
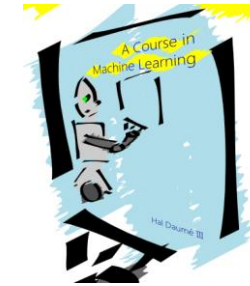
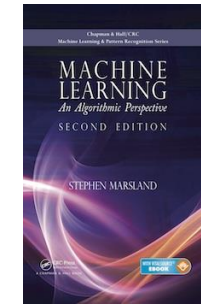
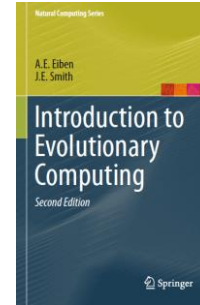
- **Course web page:**

<https://www.uio.no/studier/emner/matnat/ifi/IN3050/v25/index.html>

Syllabus

Syllabus:

- Selected parts of the following books (details on course web page):
 - S. Marsland: Machine learning: An Algorithmic Perspective, Second Edition, ISBN: 978-1466583283
 - A.E. Eiben and J.E. Smith: Introduction to Evolutionary Computing, Second Edition (ISBN 978-3-662-44873-1). Springer.
 - + smaller selections from several other books available online or through O'Reilly
 - On-line material (on the course web page).
- The lecture notes.
- Books are available online through O'Reilly:
 - <https://www.uio.no/studier/emner/matnat/ifi/IN3050/v24/practical-information/o-reilly-library.html>



Exercises

Mandatory Exercises:

- Three exercises: Search & Evolutionary Algorithms, Supervised Learning and Unsupervised Learning.
 - Deadlines: See course webpage
- Published on the course web page (Messages) at least two weeks before the deadline.
- Supervision: Group lectures
- ***Students registered for IN4050 will be given additional tasks in the exercises.***

Non-Mandatory Exercises:

- Weekly, extra material for learning the topics in the course
- Suggested solutions posted later
- Stuck? Get help in group lectures!

Mandatory Exercises – Regulations

- <https://www.uio.no/english/studies/examinations/compulsory-activities/mn-ifi-mandatory.html>
- Important: Exercises should reflect your own individual efforts. If you use code parts from other sources, you should inform us where it came from
- Discussing problems and solutions with others is great – but you should not share your code / use other students' code.
- [Peer evaluation](#) of how well you understand your code by your fellow students (more on that later)

Staying up to date

- Website: <https://www.uio.no/studier/emner/matnat/ifi/IN3050/>
- Lecture Plan Spring 2025: <https://www.uio.no/studier/emner/matnat/ifi/IN3050/v25/index.html>
- Course Forum: <https://astro-discourse.uio.no/c/in3050-25v>

Lecture format

- Lectures are a mix between pre-recorded videos and live «interactive sessions»
- Every week, **find this week's videos in the schedule**
- Interactive sessions typically consist of
 - A summary of last week's videos
 - A quiz on last week's topics
 - A demo and/or dialog related to last week's topics
 - An intro to next week's topic.
- We recommend you **watch the week's video before** going to the interactive session

A course for third year BSc students in informatics

- Focus on algorithms
- Assumed background:
 - 3 programming courses
 - recursion
- We use Python:
 - Numpy
 - Scikit-learn
 - Keras
 - PyTorch
 - Jupyter notebooks
- Machine learning uses mathematics:
 - Vectors, matrices
 - Derivatives
 - Probabilities
- Goal:
 - Not more math than necessary
 - Try to adapt to your background
- But:
 - You must be willing to learn
 - [Note on geometry and linear algebra](#)

FYS-STK4155 Applied data analysis
and machine learning
3 st.p. overlap



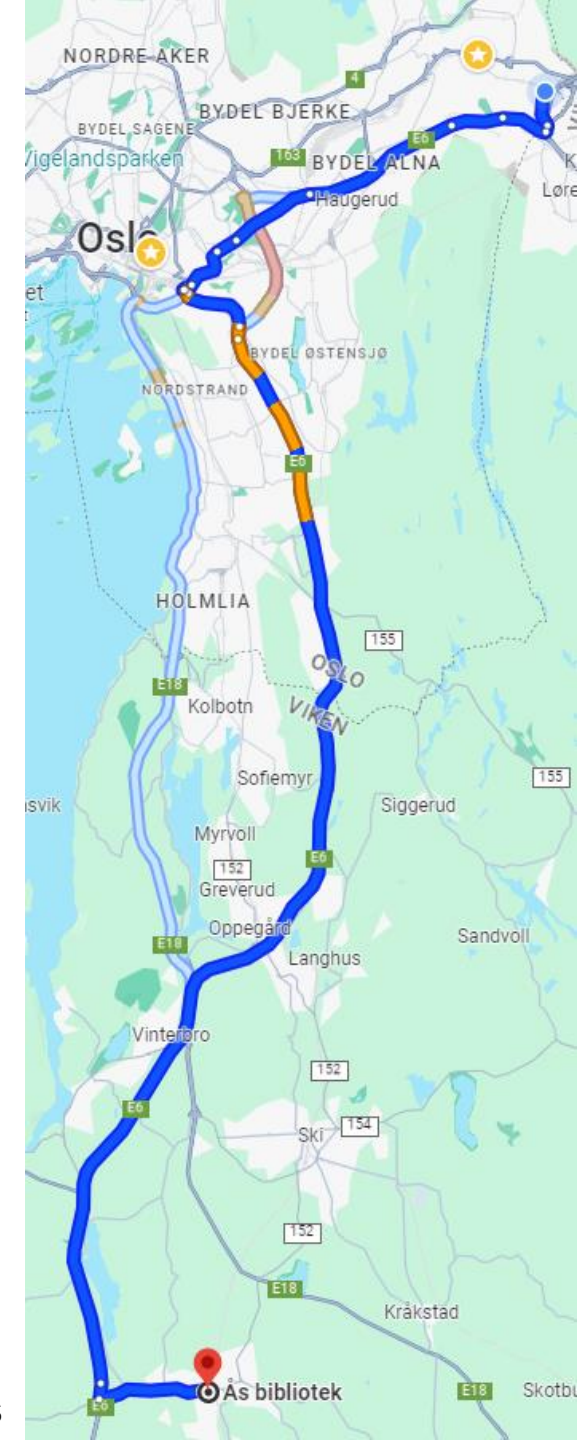
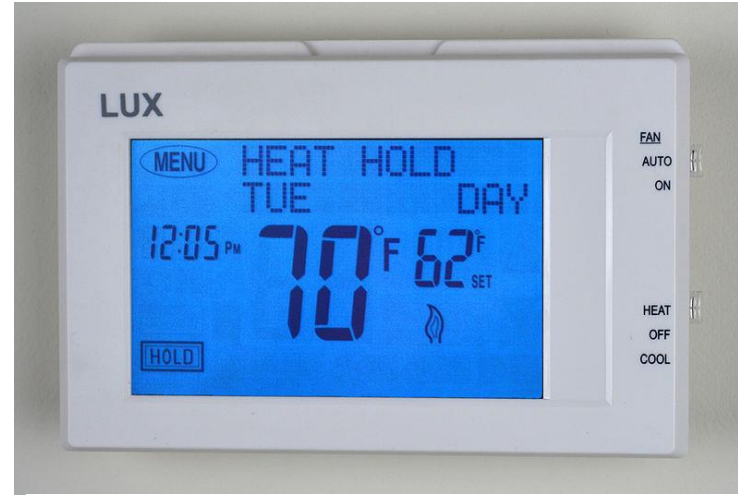
WHAT IS A.I.?

[Source: Wikipedia](#)

What is Artificial Intelligence?

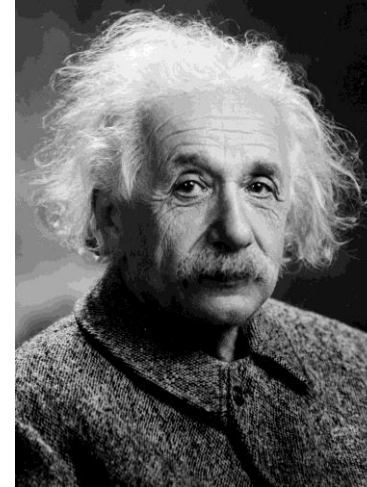
GPT: «Artificial Intelligence (AI) refers to the **simulation of human intelligence processes by machines**, particularly **computer systems**.»

Is this Artificial Intelligence?



Bilder fra Wikipedia og Google Maps

Intelligence isn't a binary quantity



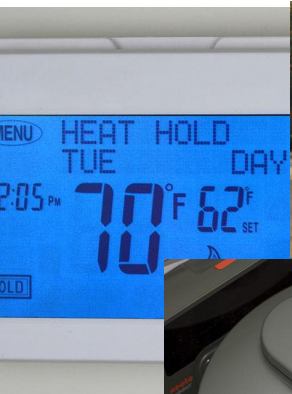
Natural Intelligence

Amount of Intelligence

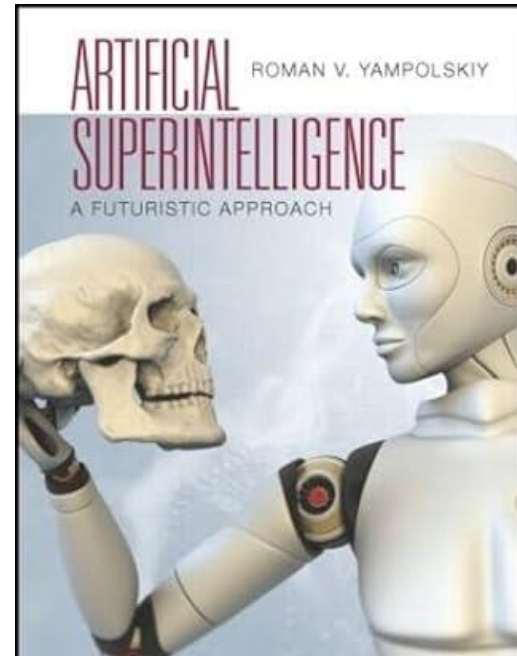


...

...?



Artificial Intelligence



Brief overview of course topics

- **Search/Optimization (today)**

- Evolutionary Algorithms

<- Oblig 1

- **Machine Learning**

- Supervised Learning
 - Unsupervised Learning
 - Reinforcement Learning
 - Deep Learning

<- Oblig 2

<- Oblig 3

- **History and Philosophy of AI**

- **Ethics and Future Perspectives**