

Intro to AI

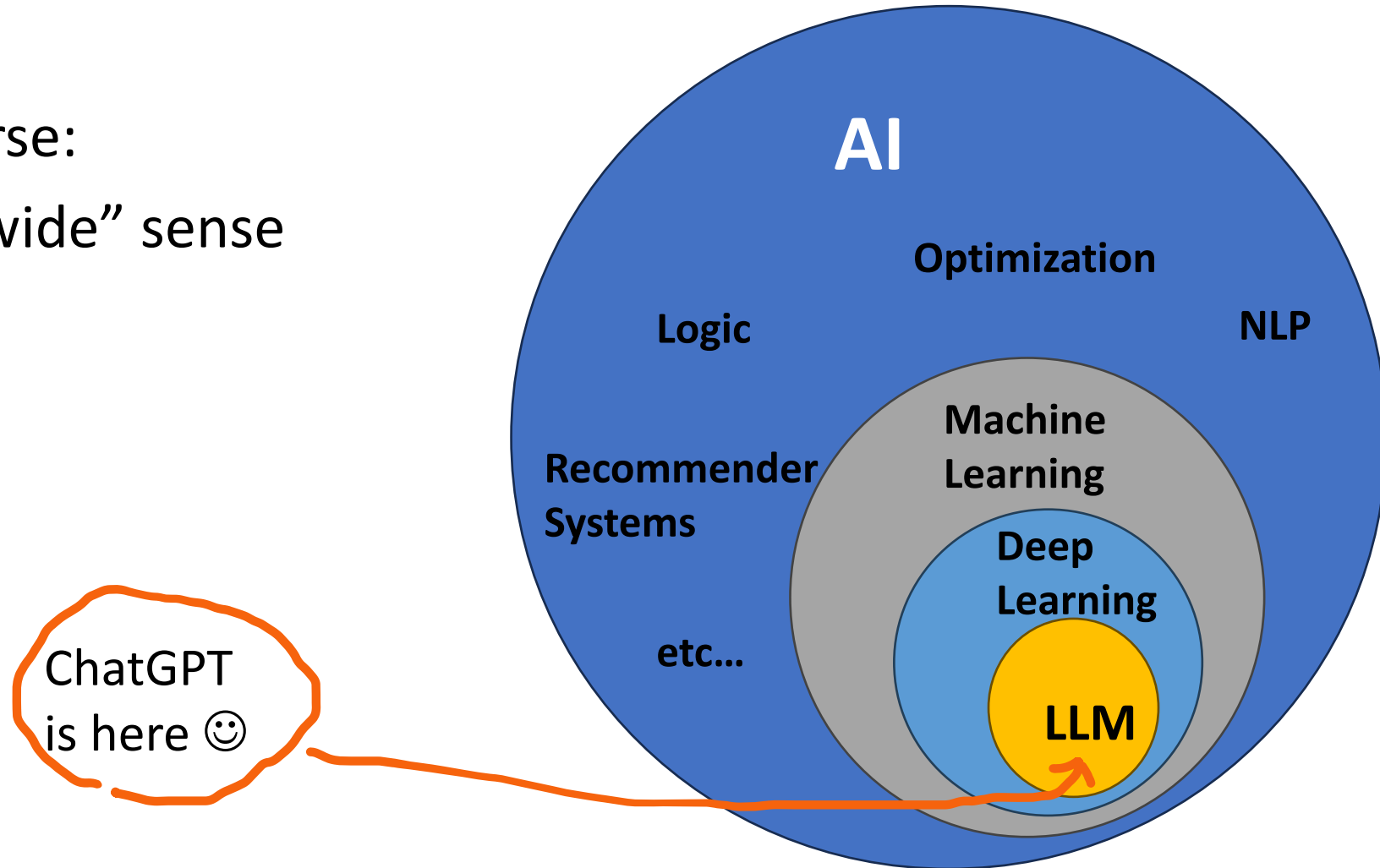
week 1 (2024)

Part 1: What's AI?

The Big Picture

In this course:

AI in the “wide” sense



AI Applications

“Lame” pilt rakendusvaldkondadest – alguses tühi

(enda jaoks peab ette ära täitma)

My favourite classification

Weak AI:

- Solves one problem well

(the problem can be hard, like piloting a helicopter or becoming chess world champion)

Strong AI:

- Other names: HLAI, AGI
- Solve many different problems
- Generalize

(play football on a game console using knowledge from watching TV and playing in real life)

Weak or strong AI

Automated door

Human level AI (HLAI)?



Weak or strong AI

Automated door

~~Human level AI (HLAI)~~

Nope (obviously)



Weak or strong AI

IBM Watson

(winner of Jeopardy! gameshow)

HLAI?



Image: Wikimedia Commons

Weak or strong AI

IBM Watson

(winner of Jeopardy! gameshow)

~~HLAI~~

Nope, can't drive a car



Image: Wikimedia Commons

Weak or strong AI

AuveTech bus
(autonomous vehicle)

HLAI?



Weak or strong AI

AuveTech bus
(autonomous vehicle)

~~HLAI~~

Nope, cannot talk to journalists



Weak or strong AI

ChatGPT chatbot

(can do your homework)

HLAI?



Weak or strong AI

ChatGPT chatbot

(can do your homework)

~~HLAI~~

No, cannot learn new things
dynamically



The point of the exercise

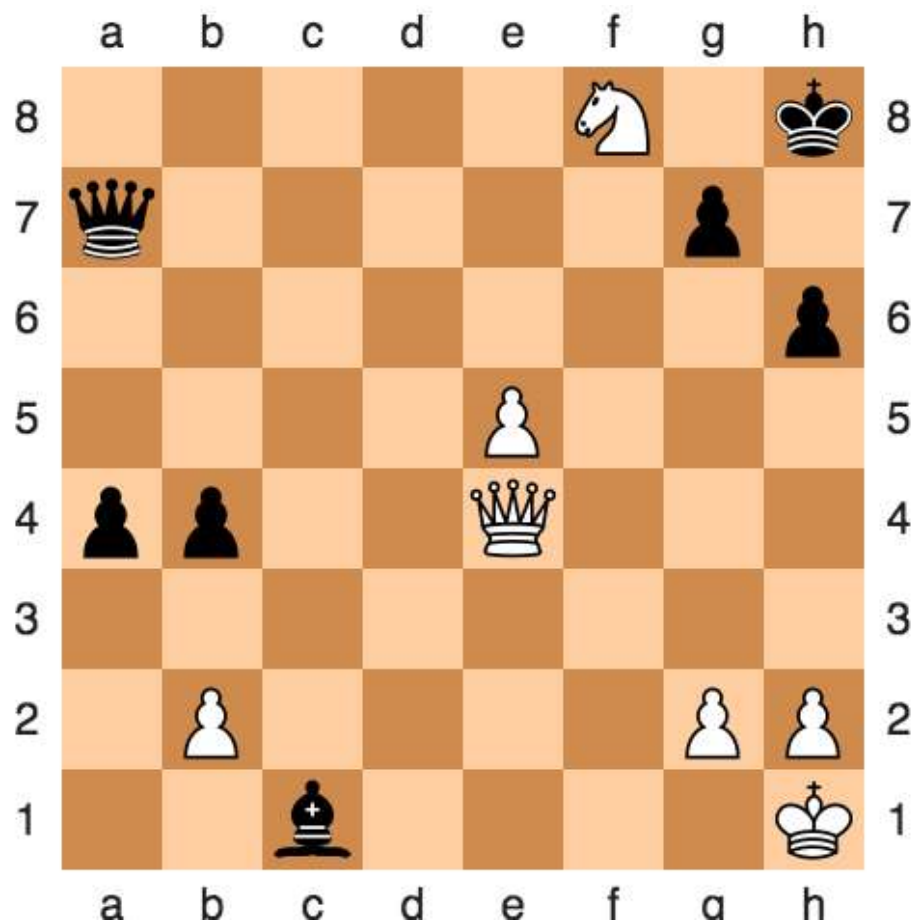
Current AI is **weak AI**

Individual algorithms and tools that do one thing
(and do it well)

Part 2: solved and unsolved

What's hard for a human can be easy for AI, and vice versa

What's the best move?



Solved **beyond human level**

(position from Deep Fritz vs V. Kramnik, 2006)

Describe the scene



“black cat is sitting on top of suitcase.”

Close enough!

(Karpathy, Andrej, and Li Fei-Fei. "Deep visual-semantic alignments for generating image descriptions." *CVPR* 2015.)

Commonsense reasoning

Microsoft Bing SEARCH CHAT

Your personal and company data are protected in this chat

Certainly! Let's solve the classic **Water Jug Problem** using the given 1-gallon jug and 1/2-gallon jug. The goal is to measure exactly 1/2 gallon of water.

1. **Fill the 1-gallon jug:** Fill the 1-gallon jug to its maximum capacity.
2. **Pour water from the 1-gallon jug into the 1/2-gallon jug:** Pour water from the 1-gallon jug into the 1/2-gallon jug until the 1/2-gallon jug is full. This leaves you with exactly 1/2 gallon of water in the 1-gallon jug.
3. **Empty the 1/2-gallon jug:** Empty the water from the 1/2-gallon jug.
4. **Transfer water from the 1-gallon jug to the 1/2-gallon jug:** Pour the remaining 1/2 gallon of water from the 1-gallon jug into the 1/2-gallon jug.

Now, the 1-gallon jug contains 1/2 gallon of water, and the 1/2-gallon jug is empty. You've successfully measured 1/2 gallon using the two jugs! 🔍

Feel free to explore more puzzles or ask any other questions! 😊

Unsolved (2024)

The text *looks* like a solution but *is not*

(Exercise: is that a problem?)

Part 3: Why is AI hard?

Example: probabilistic reasoning

- vaja uut näidet, mis illustreerib eksponentsiaalse keerukuse tekkimist AI algoritmis

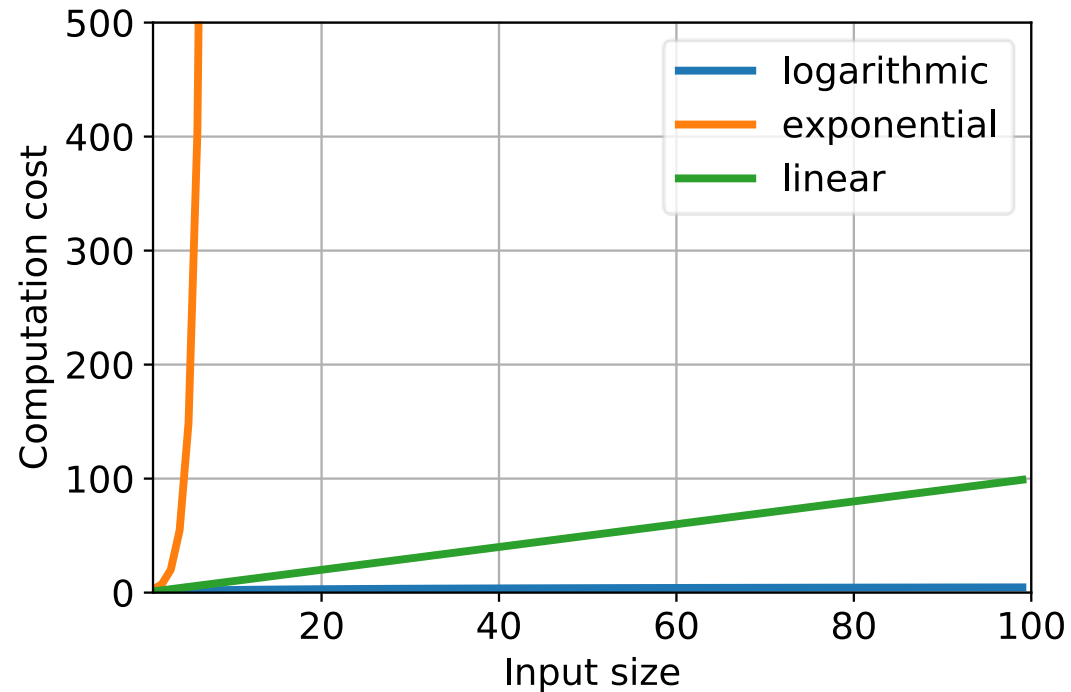
Computational complexity

Many AI problems are in class “**NP-complete**”

NP-complete problems are “**intractable**”, or hard to compute

- Solving requires exponential time and/or space

Computational complexity



Example task	Complexity
Index use	Logarithmic
List scan	Linear
Combinatorial search	Exponential
Optimization	Exponential
Probability model fitting	Exponential
Logical reasoning	Exponential

Why is AI difficult vol 2: The Data

We seem to have:

- lots of big data

Don't actually have:

- labeled, annotated examples for training ML models
- structured knowledge for search and reasoning

In 2022, this stuff still mostly made by human labor 😞

Part 4: Expectations

What parts of AI the course covers

AI Eetika

Kelle huvisid täidab mingi AI rakendus
(tavaliselt optimeerib mingit tulemust)