Artificiell intelligens

– Opportunities and Challenges for Medical Education

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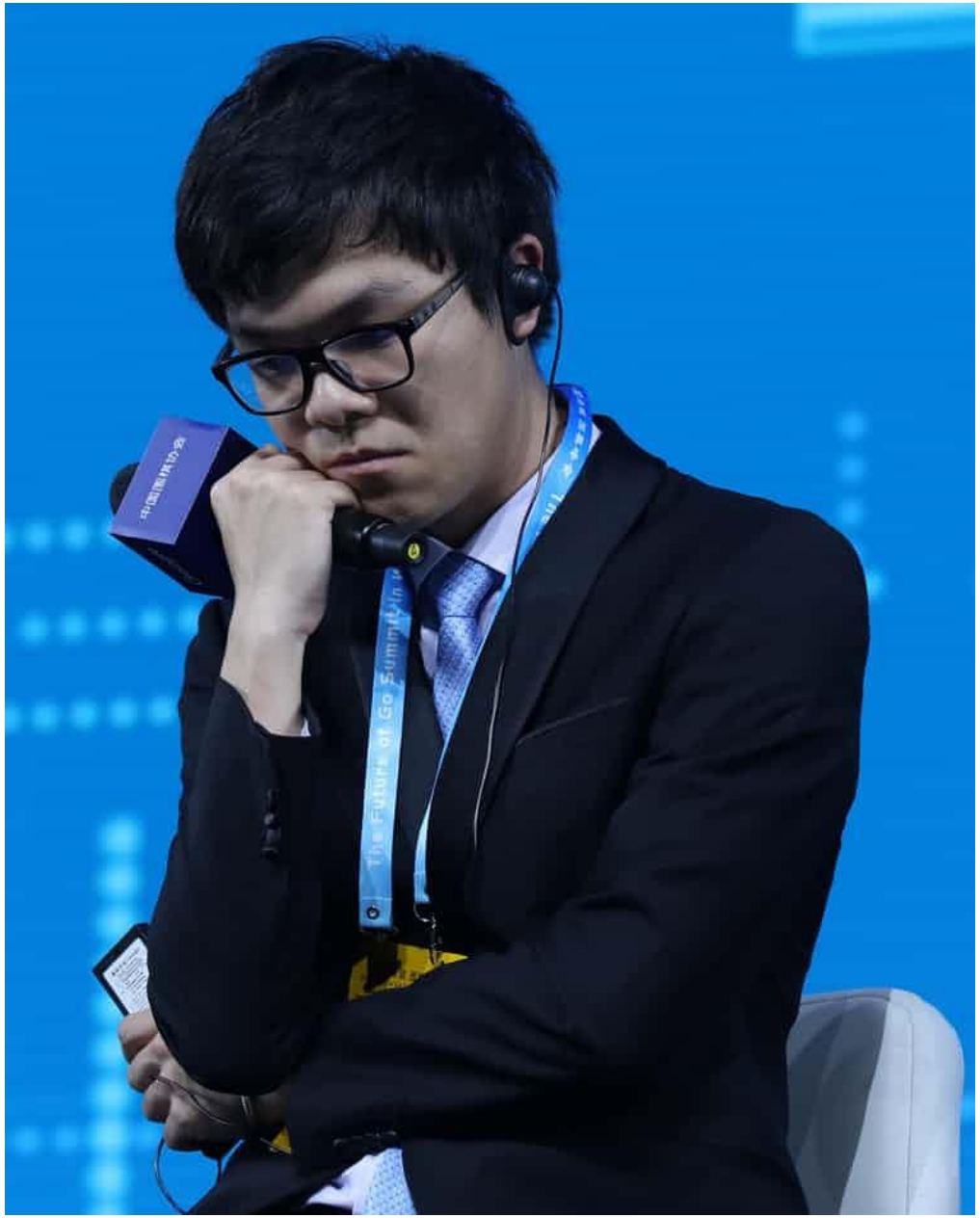
SWEDISH ARTIFICIAL INTELLIGENCE SOCIETY

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https://www.thispersondoesnotexist.com/

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Artificial Intelligence – What is it? – Definitions

"Artificial Intelligence is the **science** and **engineering** of **making intelligent machines**, especially intelligent computer programs."
- John McCarthy, Stanford

"Artificial intelligence (AI) refers to **systems that display intelligent behaviour** by analysing their environment and taking actions – with some degree of **autonomy** – to achieve specific **goals**."
- EU Communication 25 April 2018

"the scientific understanding of the **mechanisms underlying thought** and **intelligent behavior** and their embodiment **in machines**." - AAAI

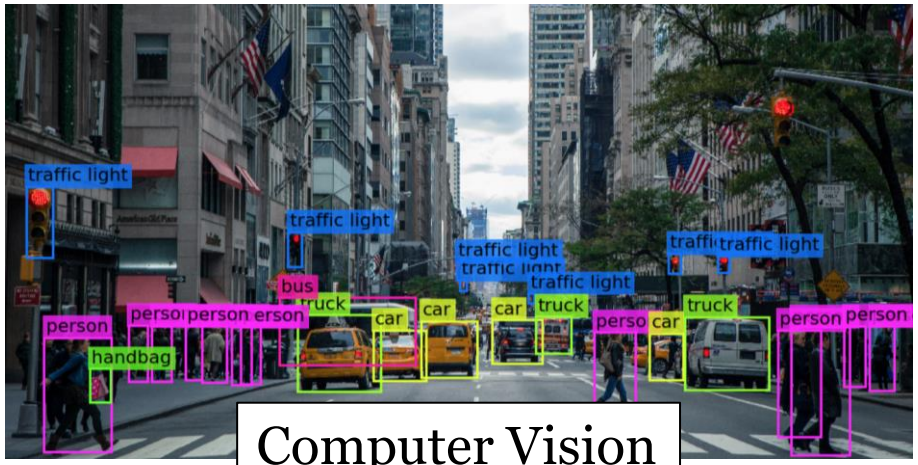
Digitalization and AI

Digitization first wave → **Big Data** second wave → **AI** third wave

Well defined problems
Predictable situations
Structured data
General solutions
Rationalizes
Evolutionary
...

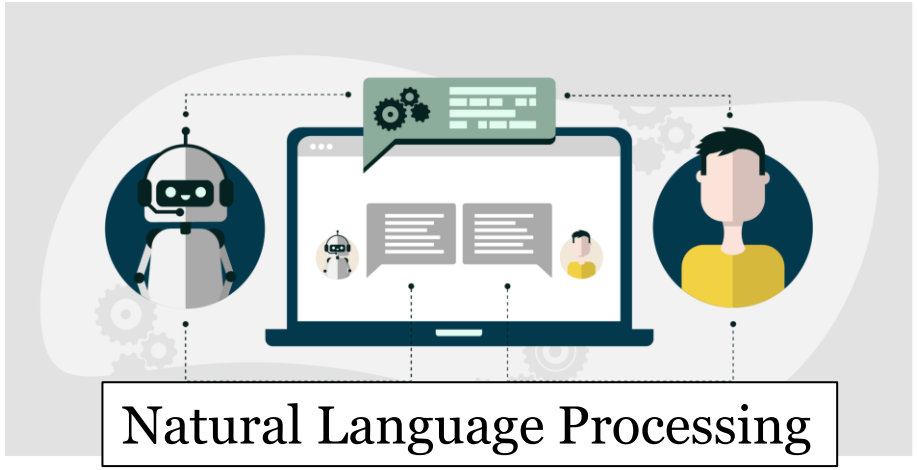
Hard to define problems
Unanticipated situations
Unstructured data
Adaptable solutions
Amplifies
Revolutionary
...

Applications of AI

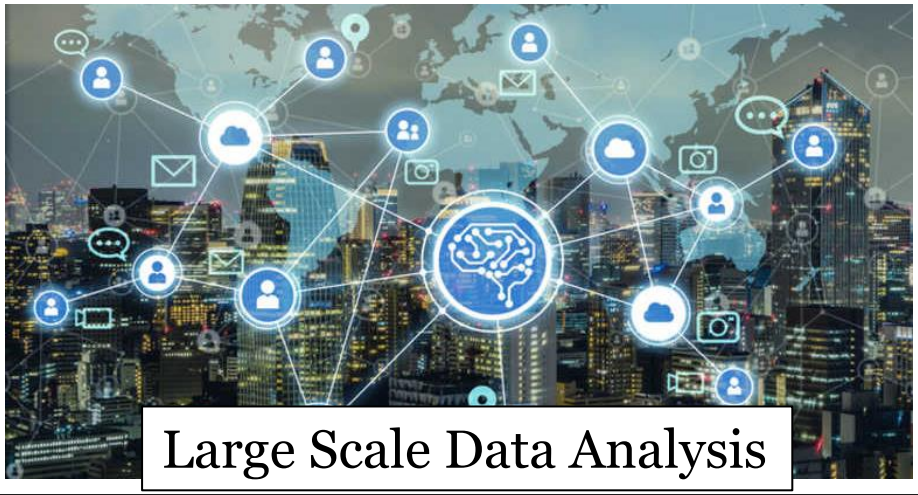


Computer Vision

Voice Recognition



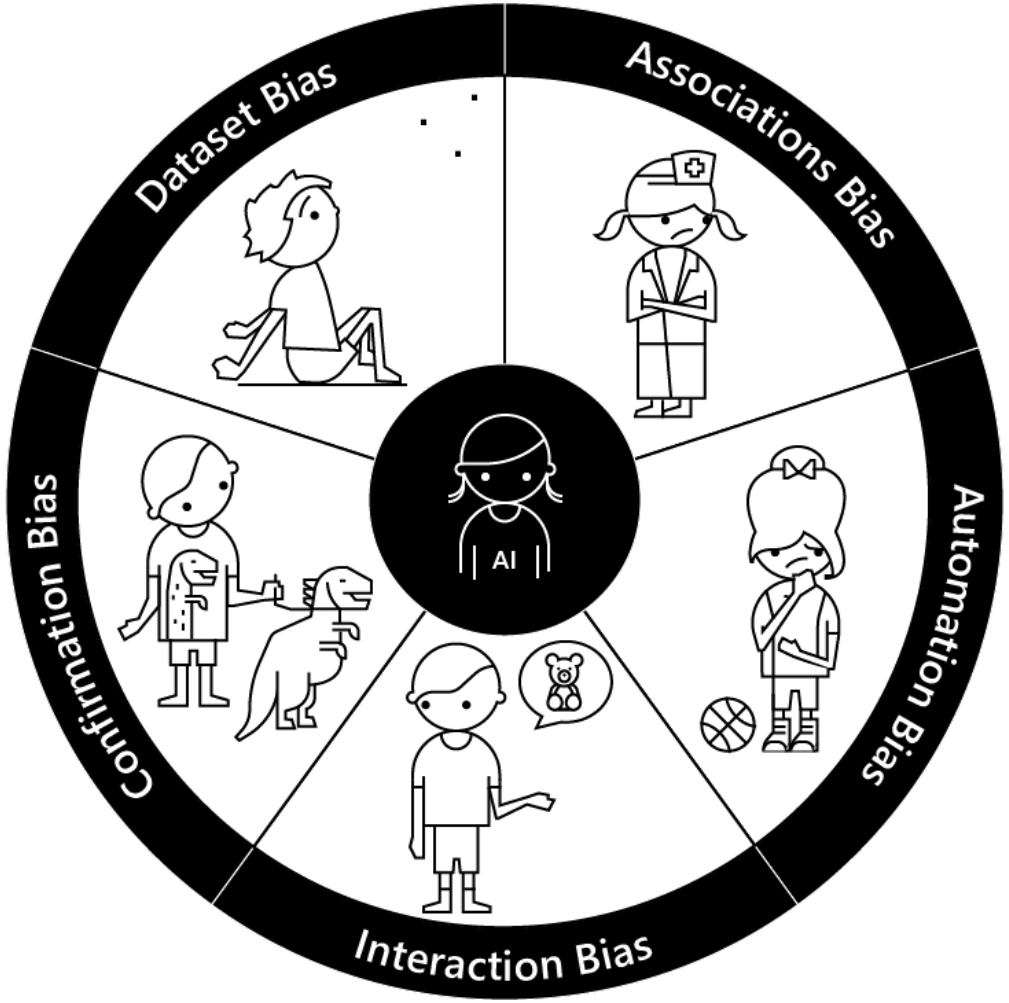
Natural Language Processing



Large Scale Data Analysis

Bias

- **Dataset bias** – When the data used to train machine learning models doesn't represent the diversity of the customer base.
- **Association bias** – When the data used to train a model reinforces and multiplies a cultural bias.
- **Automation bias** – When automated decisions override social and cultural considerations.
- **Interaction bias** – When humans tamper with AI and create biased results.
- **Confirmation bias** – When oversimplified personalization makes biased assumptions for a group or an individual.



https://medium.com/microsoft-design/how-to-recognize-exclusion-in-ai-ec2d6d89f850

Ethics Guidelines for Trustworthy AI – Overview

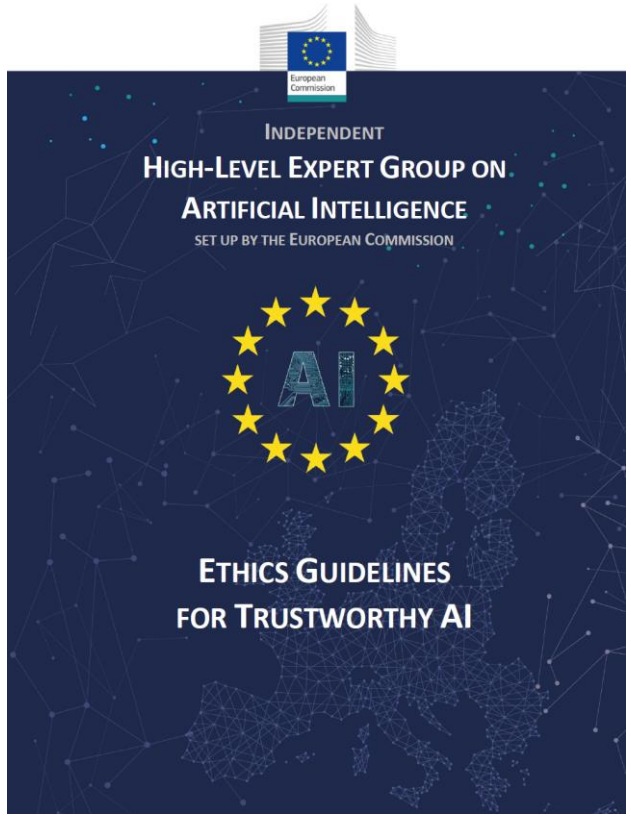
Human-centric approach: AI as a means, not an end

Trustworthy AI as our foundational ambition, with three components

- Lawful AI
- Ethical AI
- Robust AI

Three levels of abstraction

- from principles (Chapter I)
- to requirements (Chapter II)
- to assessment list (Chapter III)



https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai

Ethics Guidelines for Trustworthy AI – Principles

4 Ethical Principles based on fundamental rights

Respect for human autonomy

Augment, complement and empower humans

Prevention of harm

Safe and secure. Protect physical and mental integrity.

Fairness

Equal and just distribution of benefits and costs.

Explicability

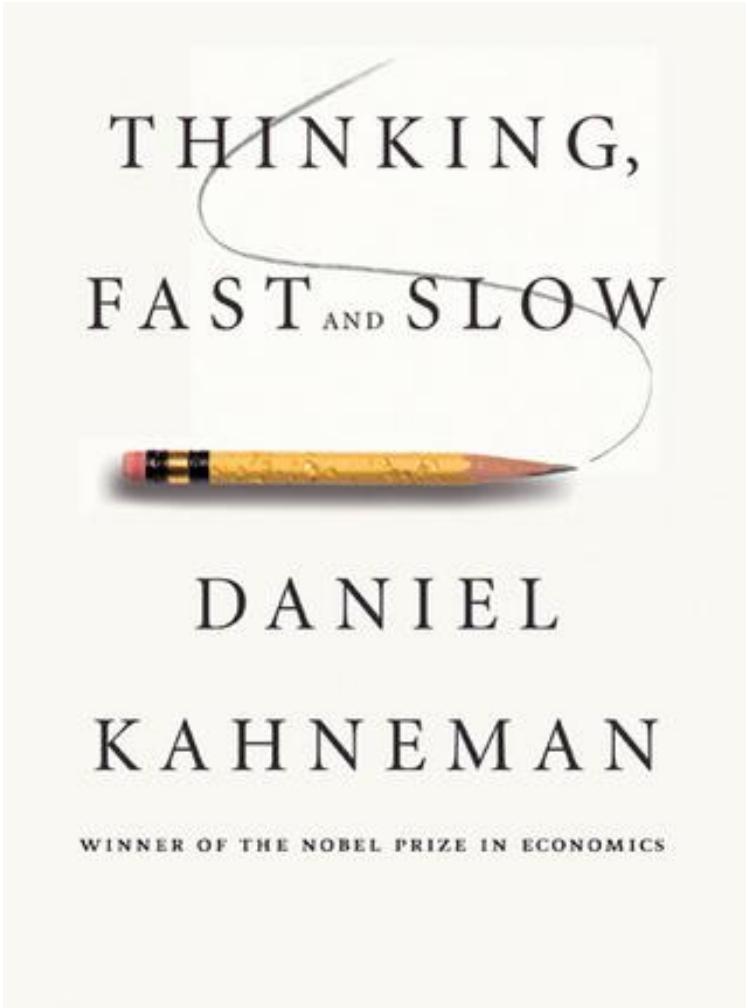
Transparent, open with capabilities and purposes, explanations

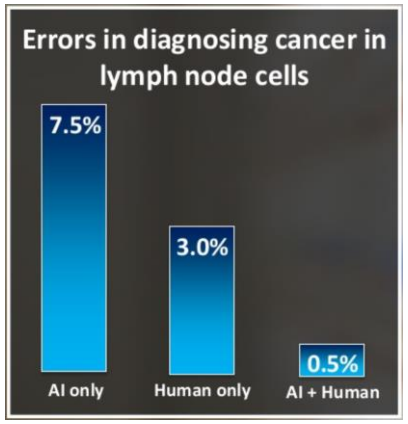
https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai

Human and Computational Thinking – Learning and Reasoning

Figure 1: A Comparison of System 1 and System 2 Thinking

System 1 "Fast"	System 2 "Slow"
DEFINING CHARACTERISTICS Unconscious Effortless Automatic	DEFINING CHARACTERISTICS Deliberate and conscious Effortful Controlled mental process
WITHOUT self-awareness or control	WITH self-awareness or control
"What you see is all there is."	Logical and skeptical
ROLE Assesses the situation Delivers updates	ROLE Seeks new/missing information Makes decisions





"Weak human + machine + superior process was greater than a strong computer and, remarkably, greater than a strong human + machine with inferior process."

Garry Kasparov

Base medical decisions on all available information? Decision support required!

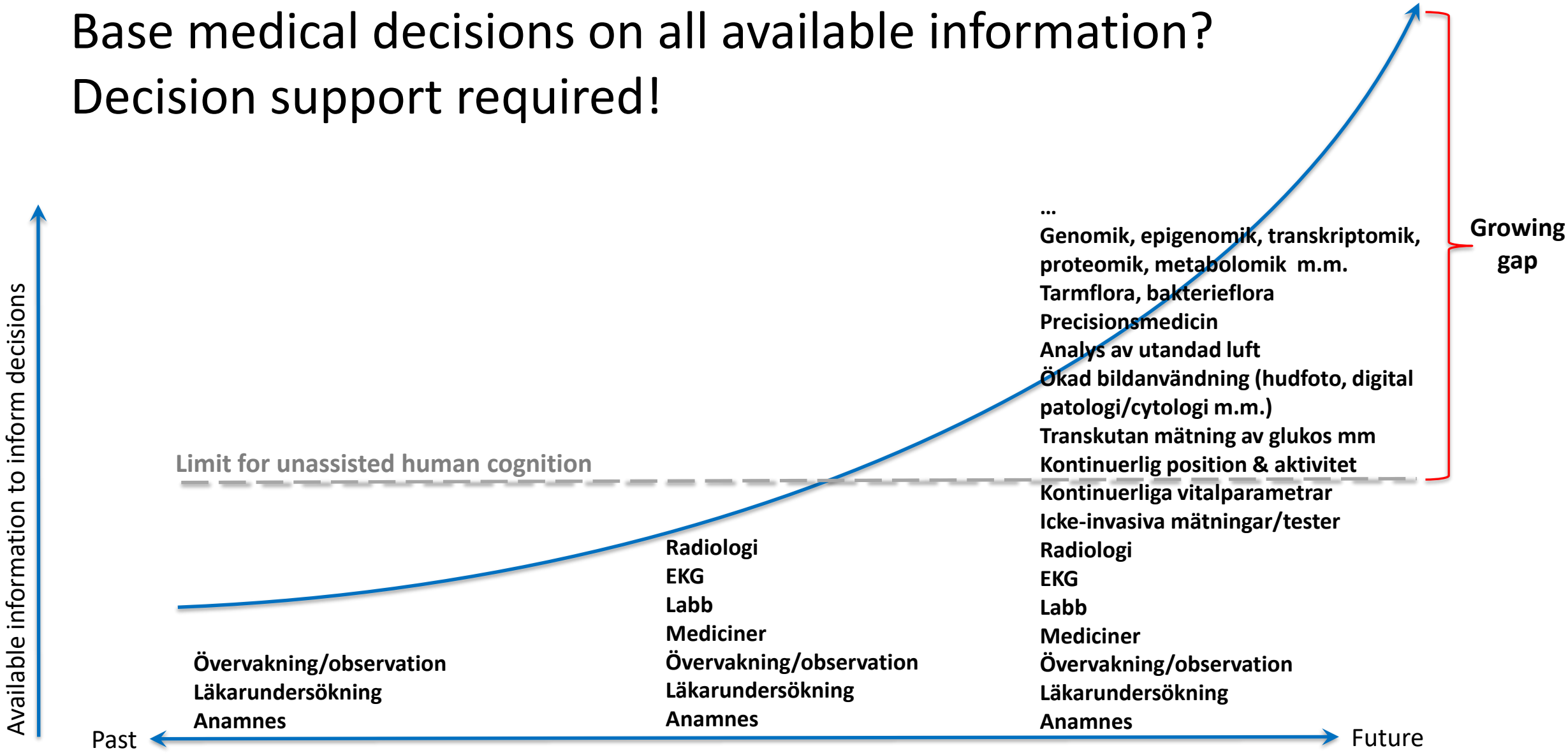


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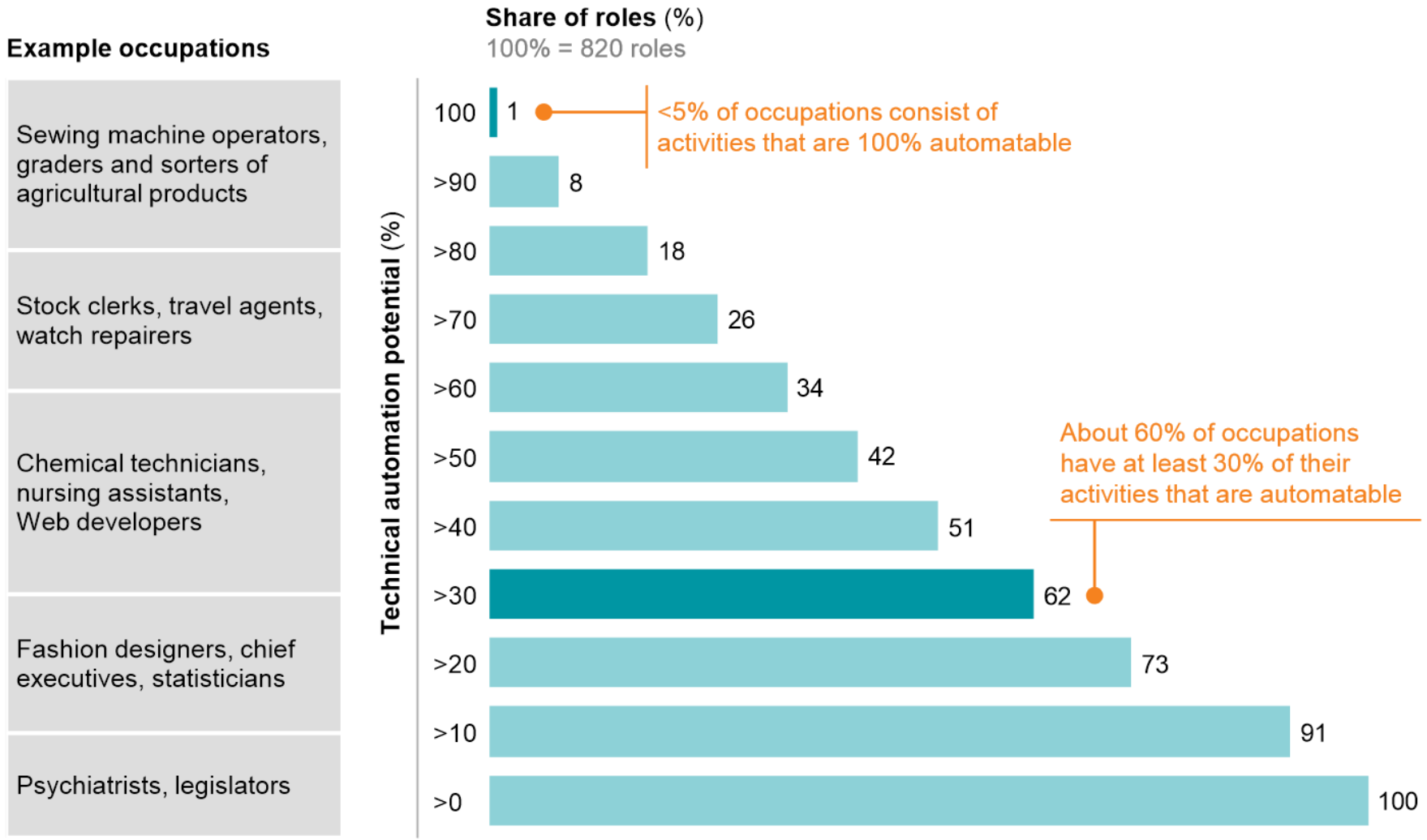
Illustration gjord av Erik Sundvall, Region Östergötland & LiU. Delvis baserad på: Evidence-Based Medicine and the Changing Nature of Healthcare: Workshop Summary (IOM Roundtable on Evidence-Based Medicine) Mark B. McClellan, Michael McGinnis, Elizabeth G. Nabel, and LeighAnne M. Olsen, Institute of Medicine. ISBN: 0-309-11370-9 https://www.nap.edu/catalog/12041/evidence-based-medicine-and-the-changing-nature-of-health-care Fig 5-1. page 116

Automation potential based on demonstrated technology of occupation titles in the United States (cumulative)[1]



1 We define automation potential according to the work activities that can be automated by adapting currently demonstrated technology.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

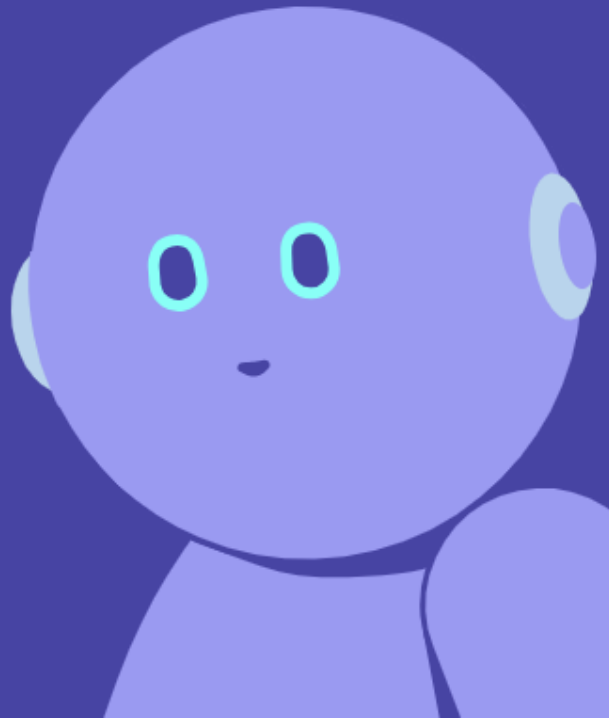
Elements of AI

Finnish →

Welcome to the Elements of Artificial Intelligence free online course

English ▾ | Start the course

Distance course at Linköping University to get 2ECTS



UNIVERSITY OF HELSINKI

Reaktor

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AI INNOVATION of Sweden

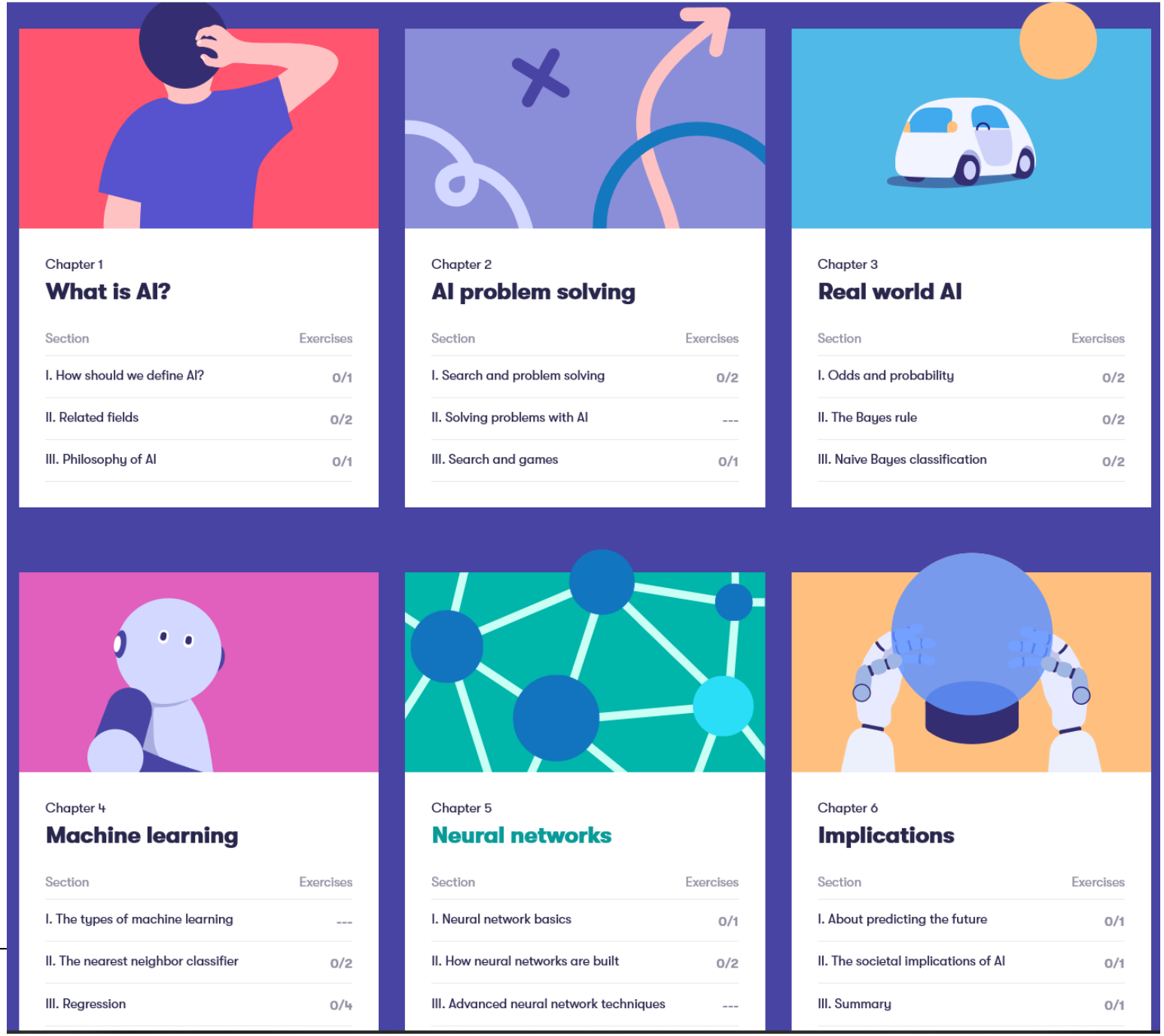
AI COMPETENCE FOR SWEDEN

https://www.elementsofai.se/

Swedish launch funded by VINNOVA Sweden's Innovation Agency

Content

1. What is AI?
2. AI problem solving
3. Real world AI
4. Machine learning
5. Neural networks
6. Implications



Chapter 1
What is AI?

Section	Exercises
I. How should we define AI?	0/1
II. Related fields	0/2
III. Philosophy of AI	0/1

Chapter 2
AI problem solving

Section	Exercises
I. Search and problem solving	0/2
II. Solving problems with AI	---
III. Search and games	0/1

Chapter 3
Real world AI

Section	Exercises
I. Odds and probability	0/2
II. The Bayes rule	0/2
III. Naive Bayes classification	0/2

Chapter 4
Machine learning

Section	Exercises
I. The types of machine learning	---
II. The nearest neighbor classifier	0/2
III. Regression	0/4

Chapter 5
Neural networks

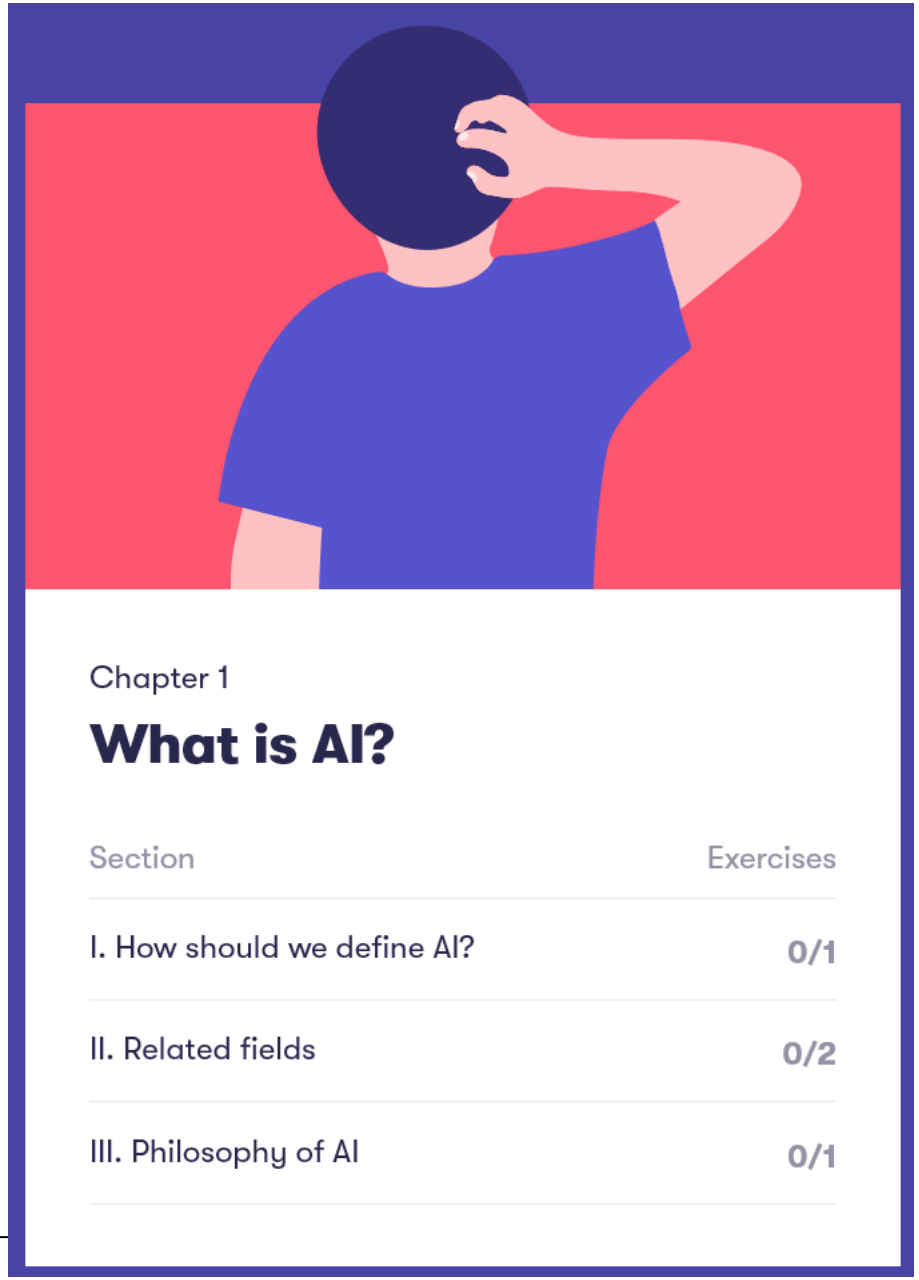
Section	Exercises
I. Neural network basics	0/1
II. How neural networks are built	0/2
III. Advanced neural network techniques	---

Chapter 6
Implications

Section	Exercises
I. About predicting the future	0/1
II. The societal implications of AI	0/1
III. Summary	0/1

What is AI?

- How should we define AI?
  - Exercise 1: Is this AI or not? (*choice*)
- Related fields
  - Exercise 2: Taxonomy of AI (*choice*)
  - Exercise 3: Examples of tasks (*choice*)
- Philosophy of AI
  - Exercise 4: Definitions, definitions (*essay*)



AI Competence for Sweden

Regeringen

40 MSEK 2018-2019

CHALMERS UNIVERSITY OF TECHNOLOGY · GÖTEBORGS UNIVERSITET · KTH VETENSKAP OCH KONST · LINKÖPINGS UNIVERSITET · LUNDS UNIVERSITET · UMEÅ UNIVERSITET · ÖREBRO UNIVERSITY

Purpose promote increased knowledge about artificial intelligence in both the private and the public sector to strengthen competitiveness and improve the welfare

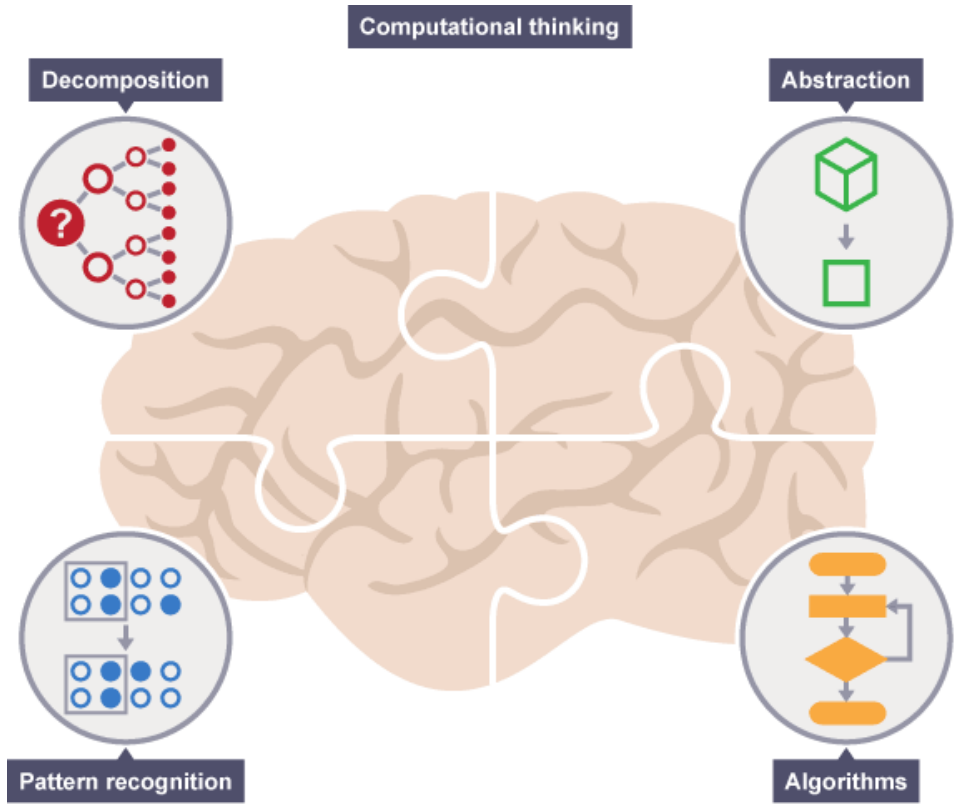
AI COMPETENCE FOR SWEDEN

Knowledge platform
(10 mnkr)

Competence development activities
(30 mnkr)

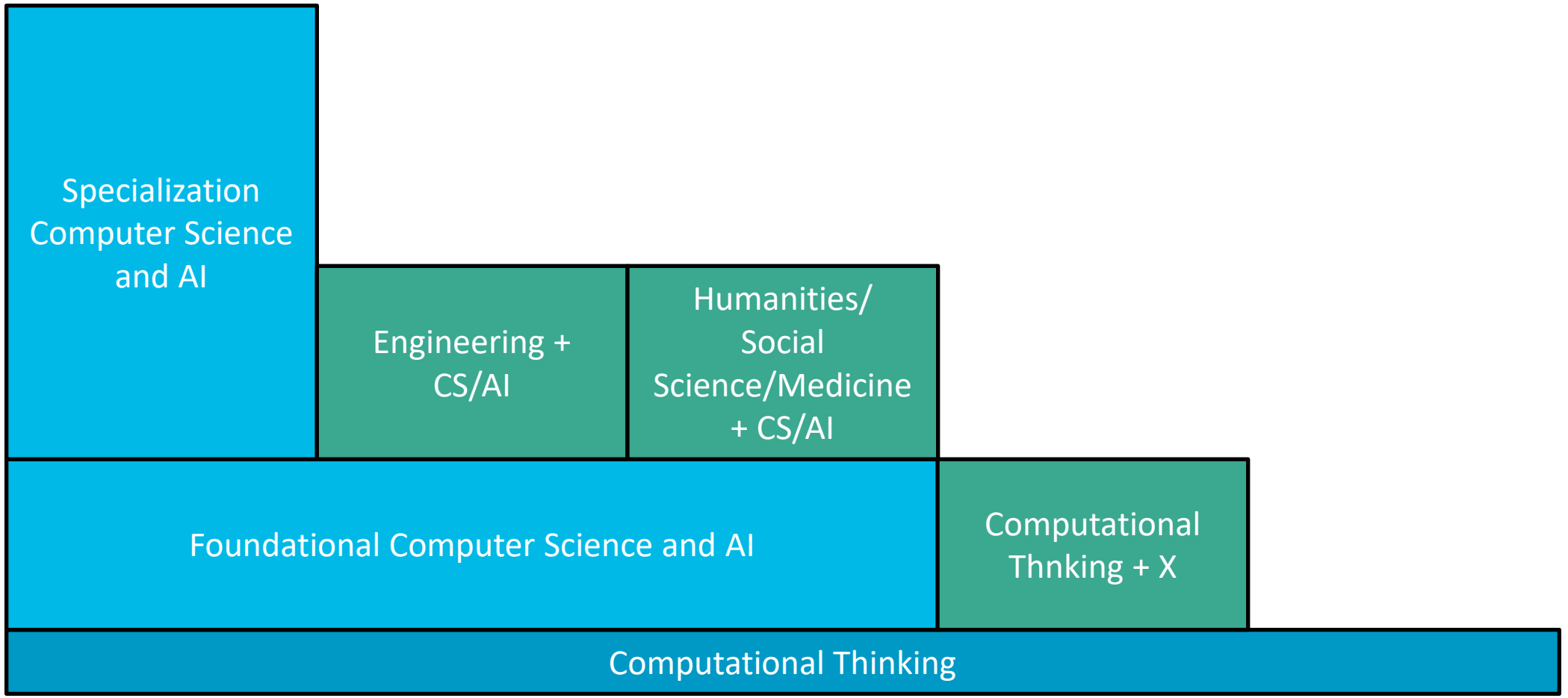
http://ai-competence.se/

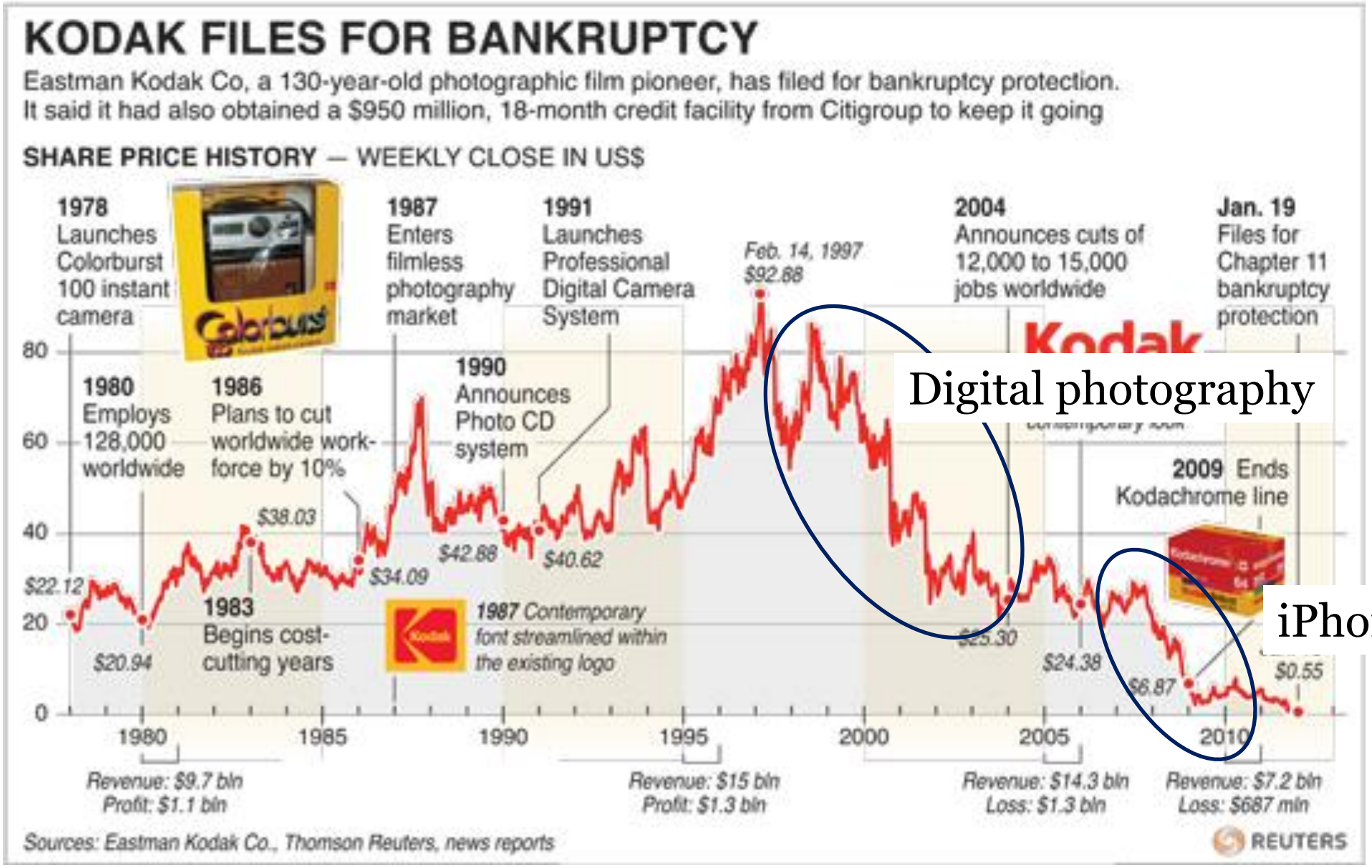
Digital Competence



Computational Thinking

Combinations of Competences




KODAK FILES FOR BANKRUPTCY
Eastman Kodak Co, a 130-year-old photographic film pioneer, has filed for bankruptcy protection.
It said it had also obtained a $950 million, 18-month credit facility from Citigroup to keep it going
SHARE PRICE HISTORY — WEEKLY CLOSE IN US$
1978 Launches Colorburst 100 instant camera
1980 Employs 128,000 worldwide
1983 Begins cost-cutting years
1986 Plans to cut worldwide work-force by 10%
1987 Enters filmless photography market
1987 Contemporary font streamlined within the existing logo
1990 Announces Photo CD system
1991 Launches Professional Digital Camera System
Feb. 14, 1997 $92.88
2004 Announces cuts of 12,000 to 15,000 jobs worldwide
Jan. 19 Files for Chapter 11 bankruptcy protection
2009 Ends Kodachrome line
Digital photography
iPhone era
$22.12
$20.94
$38.03
$34.09
$42.88
$40.62
$25.30
$24.38
$6.87
$0.55
80
60
40
20
0
1980
1985
1990
1995
2000
2005
2010
Revenue: $9.7 bln
Profit: $1.1 bln
Revenue: $15 bln
Profit: $1.3 bln
Revenue: $14.3 bln
Loss: $1.3 bln
Revenue: $7.2 bln
Loss: $687 mln
Sources: Eastman Kodak Co., Thomson Reuters, news reports
REUTERS

Take Away Message

- AI is about understanding intelligence and developing intelligent systems.
- AI will affect **all** aspects of our society. **Trust is essential**.
- To be **trustworthy** an **AI-system** should be **legal**, **ethical** and **robust**.
- Education and lifelong learning will be absolutely necessary!
- Educational challenges:
  - New ways of working
  - The amount of knowledge grows exponentially
  - We need domain experts that also understands AI
- Educational opportunities:
  - New exciting content
  - Individualize exercises/teaching
  - Fast, detailed and tailored feedback
- ***Digital tools will only provide value when you learn how to use them effectively and adapt your organization to leverage them!***
- **Human + AI**