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NTNUs strategiske satsing på kunstig intelligens (AI) – bakgrunn, aktiviteter og fremtidsvyer

Geir E. D. Øien, dekan
Fakultet for informasjonsteknologi og elektroteknikk
Trondheim 12.11.18

…. med bidrag fra og stor takk til
Ole Jakob Mengshoel, Heri Ramampiaro og **Torbjørn Svendsen**!

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8. mars 2017: Åpningen av Telenor-NTNU AI Lab

telenor

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SINTEF

14. august 2018: Annonsering av Norwegian Open AI Lab

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Hva ER kunstig intelligens (AI)?

"The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages."

Oxford English Dictionary

norwegian

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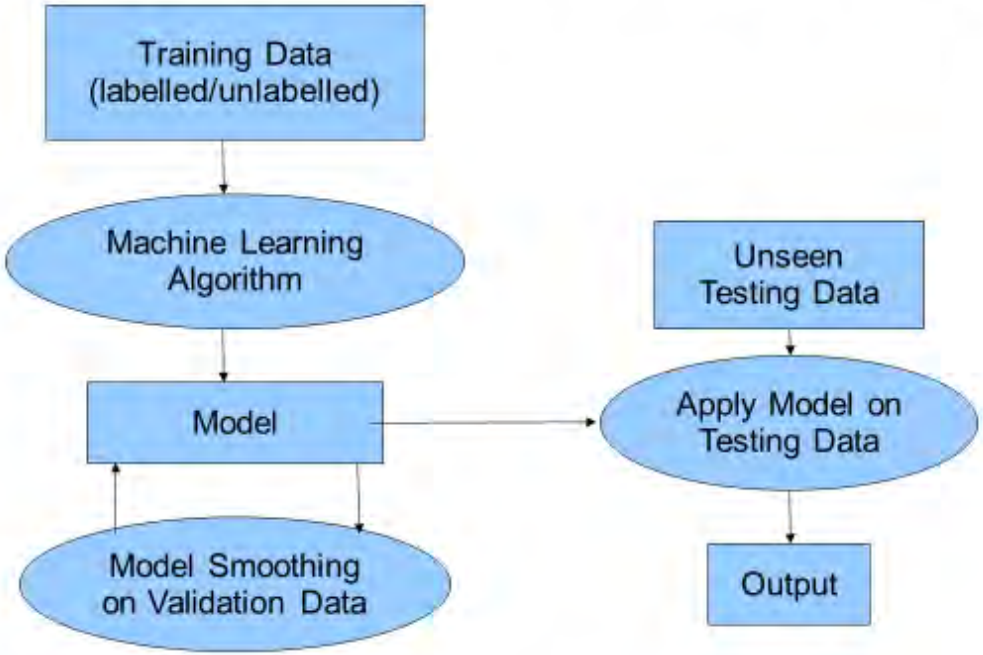
Machine Learning (ML): Typical Approach



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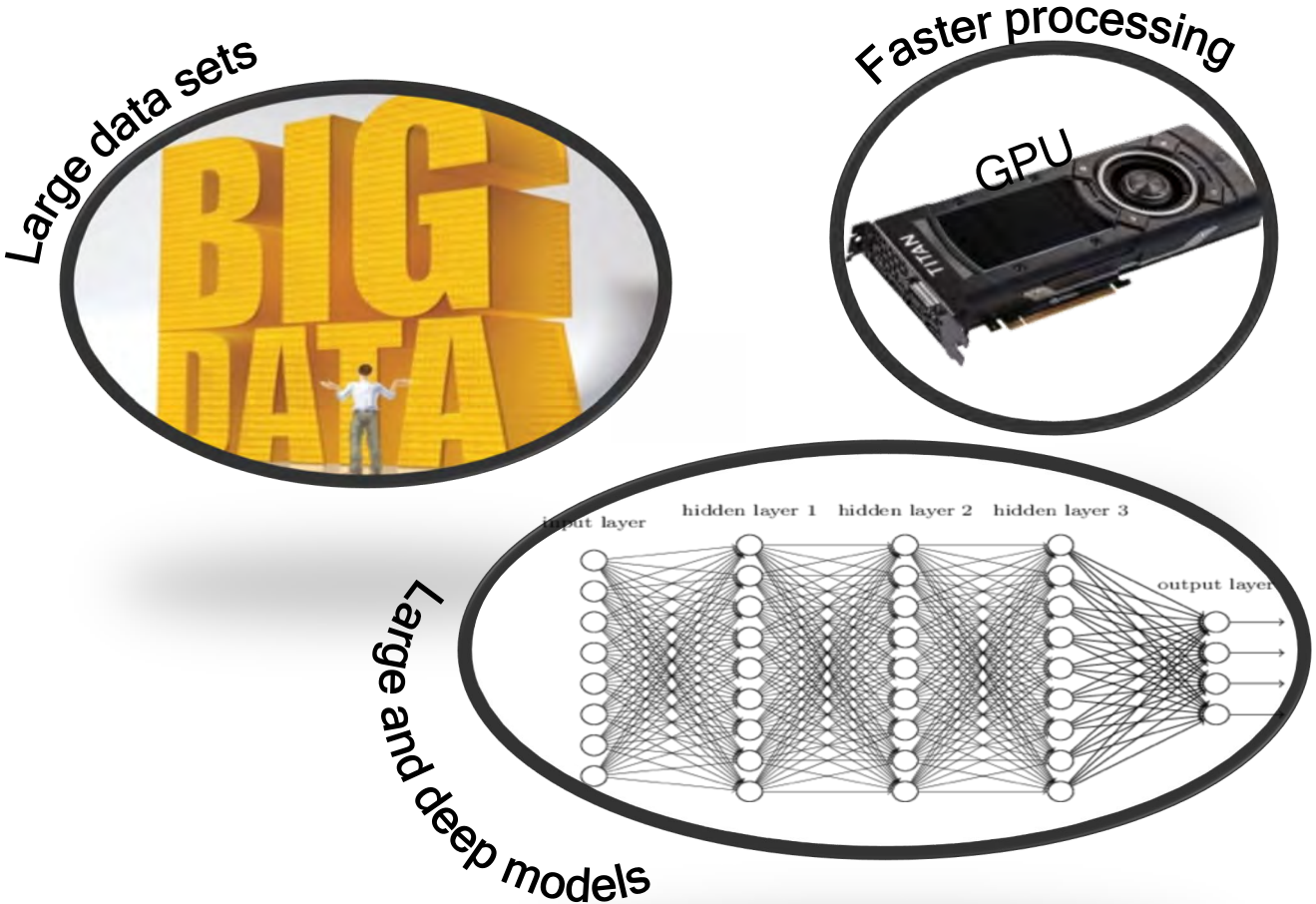
Successes of Artificial Intelligence (AI)

- May 1997: Deep Blue was the first computer system to defeat a reigning world champion. It beat Kasparov 3½–2½ under standard chess tournament time controls.
- October 2005: Stanford Racing Team wins the DARPA Grand Challenge, a 212 km (132 mi) off-road course, near the California/Nevada state line.
- April 2006: Google introduces Translate, a services that translates text from one language into another. United Nations and European Parliament transcripts were used to gather linguistic data.
- February 2011: IBM's Watson computer system wins first place and $1 million in Jeopardy! against former winners Brad Rutter and Ken Jennings.
- October 2011: Apple introduced the iPhone 4S with Siri, an intelligent assistant with a voice recognition user interface.
- March 2016: AlphaGo, using Google's DeepMind AI, won its third Go match against Lee Sedol, one of Go's most dominant players.
- May 2016: Google Assistant, a virtual personal assistant, engages users in two-way conversations via voice and keyboard. It can search the Internet, schedule events and alarms, and show information from the user's Google account.

Tre faktorer som forklarer AIs moderne suksesser



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domains

blue sky

health energy telecom ocean space smart environments

application areas

language understanding/ conversational systems

personalization

smart infrastructure

internet of things (IoT)

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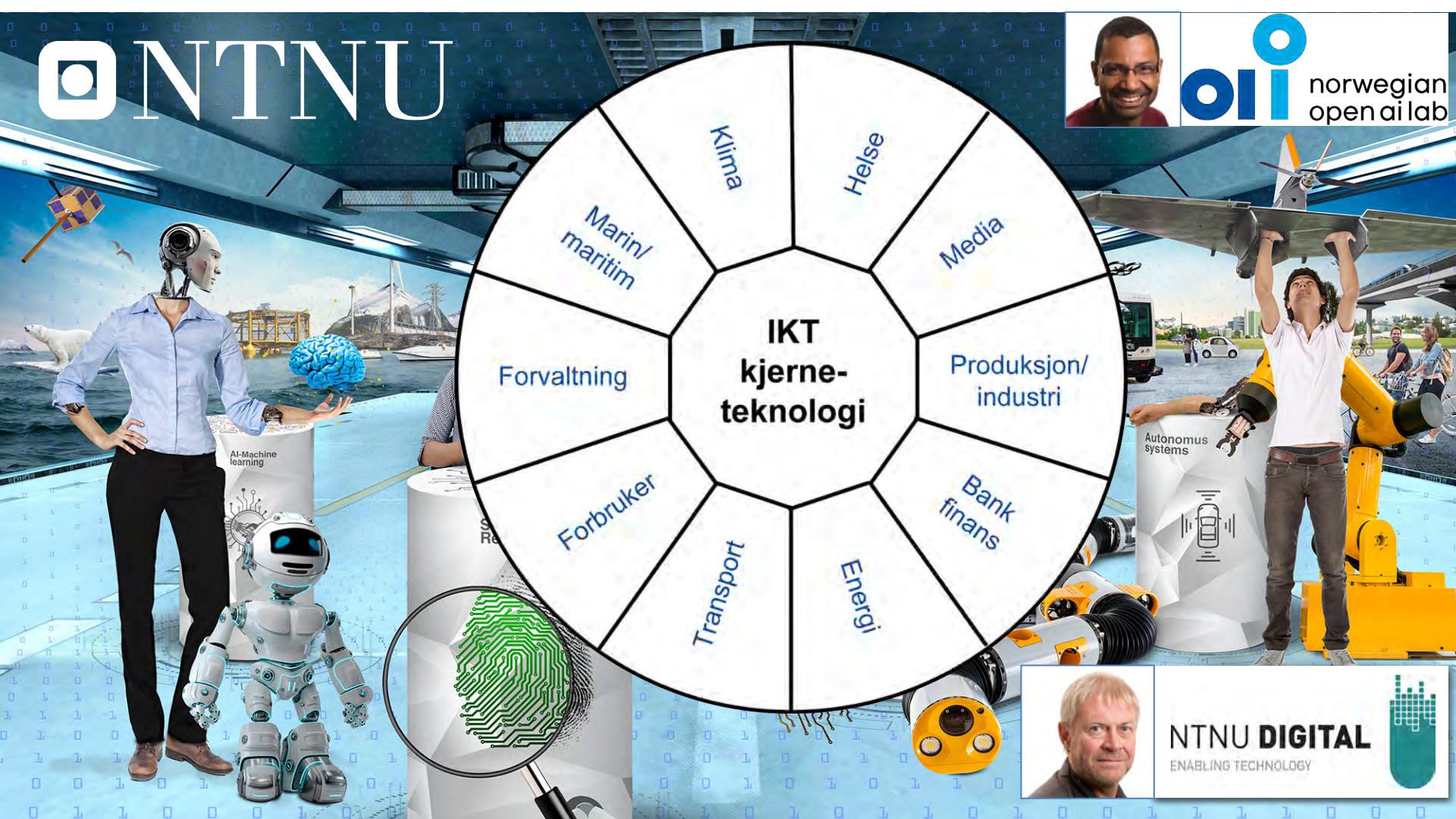
deep learning
evolutionary methods
CBR
deep reinforcement learning
bayesian methods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IKT kjerne-teknologi
Klima
Helse
Media
Produksjon/ industri
Bank finans
Energi
Transport
Forbruker
Forvaltning
Marin/ maritim
AI-Machine learning
Autonomus systems
NTNU DIGITAL
ENABLING TECHNOLOGY

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Trends of AI and ML

- From knowledge (expert systems) to data (machine learning)
- From stationa… computing
- Phones: Fro…
- From Small …
- From Small …
- From accura… fairness, acc… transparenc…
- From cloud c… computing (including IoT)
- From isolated computing to connected, social computing
- …e AI to AI + *X*,
- …sting device,
- …uct, service, or
- …nn to …chitectures: …-core, …d others
- …ne) to …-line) learning
- Other on-going computing and networking evolutions and revolutions!

XAI – Explainable AI

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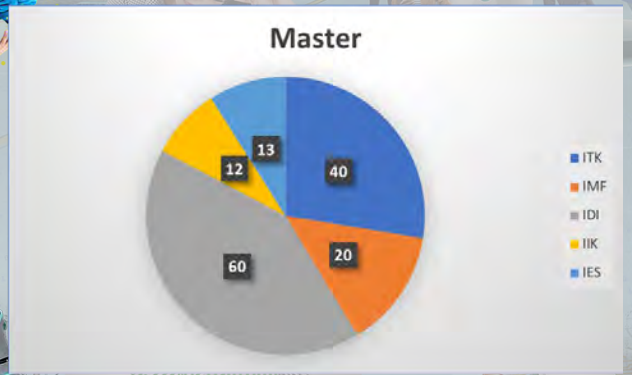
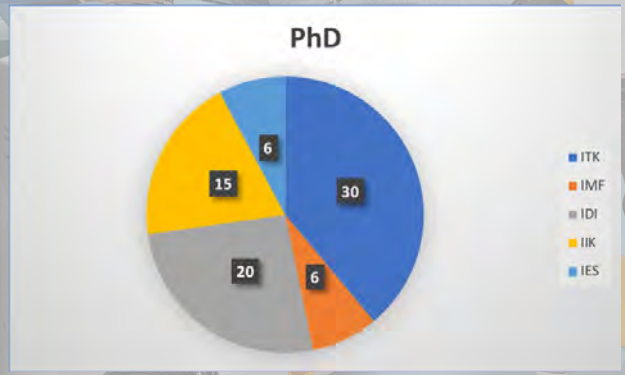
- Over 30 pågående forskningsprosjekter med AI-komponent
- Over 30 faste vitenskapelig ansatte involvert i AI-forskning
- Ca 15 studietilbud som gir ulike former for AI-kompetanse

Ved Fakultet for informasjonsteknologi og elektroteknikk:

- Ca 145 master-oppgaver innen AI 2017/2018
- Ca 75 pågående ph.d.-prosjekter
- Stor deltakelse fra mange institutter





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AI & FNs bærekraftsmål

Noen pågående prosjekter i Norwegian Open AI Lab

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7 REN ENERGI FOR ALLE	9 INNOVASJON OG INFRASTRUKTUR	11 BÆREKRAFTIGE BYER OG SAMFUNN	14 LIV UNDER VANN
Bærekraftig kraftproduksjon	**Energieffektive og smarte IoT sensorer**	**Forbedring og effektivisering av transporttilbud**	**Fiskevelferd, sikkerhet og miljøovervåking**
			

AI-Lab-prosjekter: Eksempler fra medisin og helse

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Diagnose av Cerebral Parese (CP)

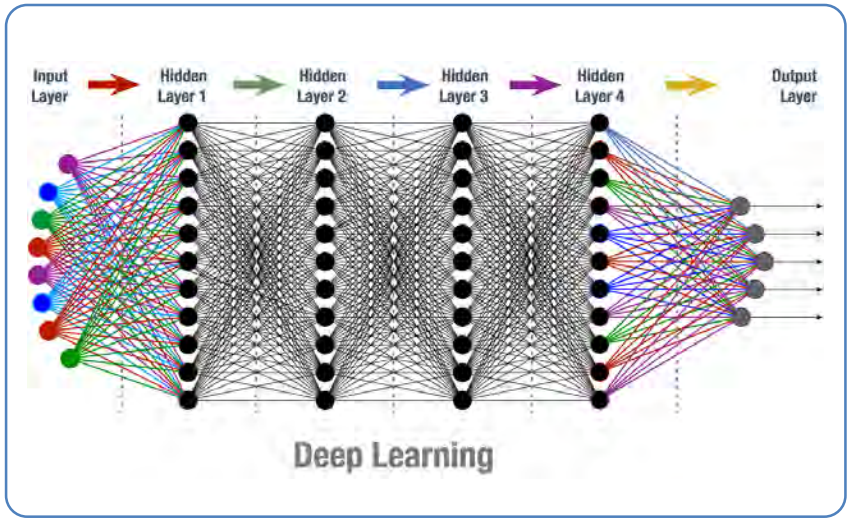
15 millioner barn født for tidlig i året

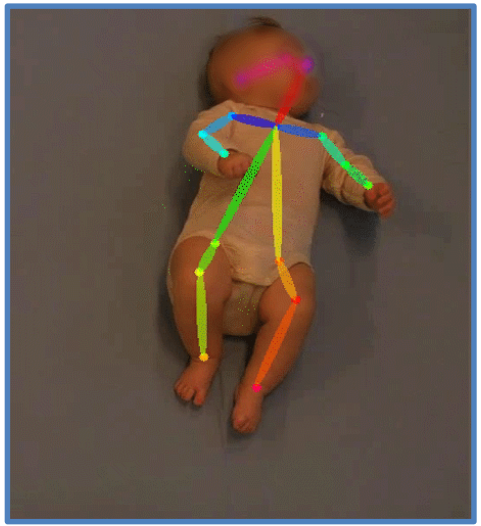
4% med CP

Tidlig diagnose

Muliggjøre terapi

Diagnose av CP (2)





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Teknologien gjør en forskjell!

Tilgjengelighet

Objektivitet

Skånsom

Presisjon

Tidlig tiltak

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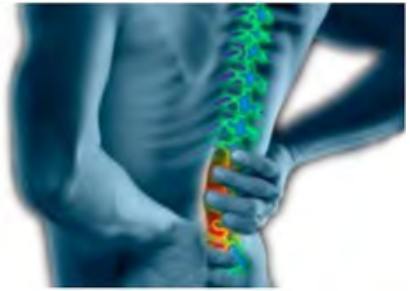
AI mot ryggplager



selfBACK

3 GOD HELSE

17 SAMARBEID FOR Å NÅ MÅLENE

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AI mot nettmobbing

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Eksempler på AI-Lab-prosjekter innen andre temaer

- **Mobility Analytics** (Telenor)
- **IoT for monitoring air quality** (Telenor/IoT Lab)
- **IoT Security** (Telenor, NTNU)
- **MUSED** – Multi-Source Event Detection, Research Strategic Project (NTNU)
- **ART** – Smart IoT (NTNU, Telenor)
- **DeepInMotion** – Motion-based CP Diagnosis on Newborn Baby (tverrfakultært, NTNU)
- My Medical Digital Twin (tverrfakultært, NTNU
- **AutoFerry** (tverrfakultært, NTNU + flere industripartnere)
- **NapLab** – Newly Established Autonomous Vehicle

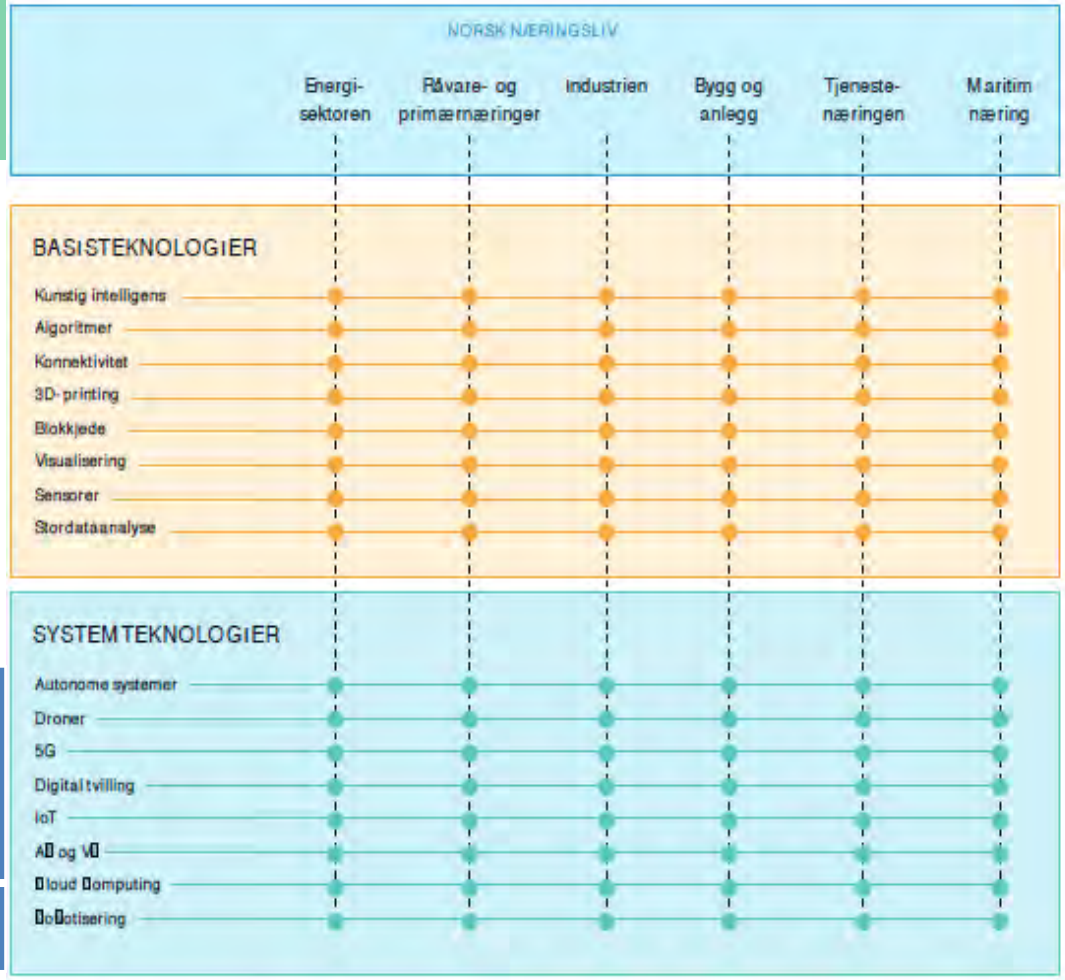
digital 21

Basis for en fremtidig nasjonal strategi på kunstig intelligens?

www.digital21.no

4 + 1 prioriterte områder:

Kunstig intelligens	Tingenes internett (IoT)	Big Data	Autonome systemer
Cybersikkerhet			



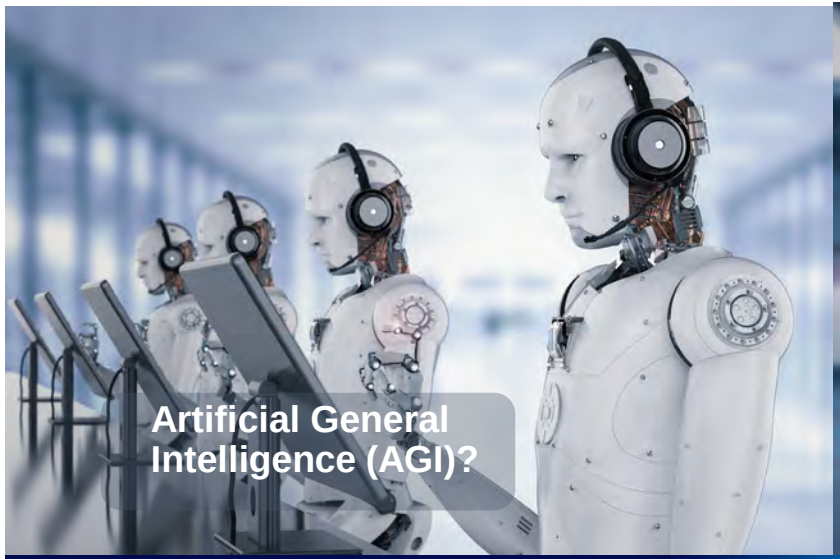
AI: Utfordringer og dilemmaer

- **Rettferdighet**
- **og likebehandling**
- **Sensur vs. ytringsfrihet**
- **Ansvarsplassering**
- **Forklarbarhet**
- **Uønskede/ukjente konsekvenser**
- **Overvåkning**
- **Utilbørlig påvirkning**
- **Uredelig databruk**
- **...**

"*The rise of powerful AI will either be the best or the worst thing ever to happen to humanity*"

Stephen Hawking

Hva vil kunne skje i fremtiden?



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