

HVA ER EGENTLIG KUNSTIG INTELLIGENS?

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20 September Lukas Bach

Artificial Intelligence is?

"the science of building computer programs that aim to perform tasks that require some intelligence if they were human beings"



Where do we meet AI everyday



Machine versus man







Weak vs. Strong Al

- There have been warnings
- Siri and Alexa could be considered AI, but generally, they are weak AI programs



- Supervised programming, looking for a pattern, classify and gives a predefined response.
- Cluster and associate, here there are no predefined answer to a command.



Digitalization – Digital transformation

Digitalization is about utilizing the possibilities that enabling technologies to provide in improving, renewing and creating new.

Hence, digitalization is not only regarding technology but also about the willingness and ability to change.

Digital21



Digitalization?



To digitize

The process of converting analogue to digital data

Digitalization The process when an organization digitizes central parts of its business





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Digital transformation

The effect of on an organization. New value chains and services.





Why does this happen now?

Three paradigm shifts at once

Large volume of data are available





Technology

Analytics

Data

Data storage, governance and real time processing

Analytics moving from scientific to business environment

Artificial Intelligence





Levers of digitalization



How can this be applied in the construction sector?



DigiBuild – fully digitalized building process

- Develop knowledge on what a fully digitalized building process implies.
- Develop a platform for seamless flow of information between stakeholders and systems.
- Develop a training tool to ease the training of different stakeholders during the transition.



SIGHT – 3D scanning on mobile devices



OptiSite SPACENAKER SINTEF

- Automatically generating site plans that optimize utilization *and* quality
- Realize full potential of undeveloped property
- Take advantage of a wide range of methods across the traditional boundary of AI





Al is a crossroad of multiple fields..

.. and there are several types of Al



- Computer science
- Mathematics
 - Logics
 - Optimisation
 - Analysis
 - Probabilities
 - Linear algebra
- Cognitive sciences
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- Domain expertise

AI - Machine learning – Deep learning?



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Artificial Intelligence (AI)

A program that can sense, decide, act and adapt

Machine Learning:

- A way of achieving AI
- Algorithms whose performance improve as they are exposed to more data

Deep Learning

- Subset of machine learning
- Multi-layered neural networks learn from vast amounts of data



Machine learning

All machine learning have a two step approach:

- Learning phase: Using input data to identify parameters best describing task at hand
- 2. Inference phase: Take learned parameters as input to perform task



Main types of machine learning



Unsupervised learning

- Only given input
- No "correct" answer provided
- No tagged data



- Learning through trial and error with rewards and punishments
- Hybrid between supervised and unsupervised

Supervised learning

Classification

- Discrete output
- One out of several options

Regression

- Continuous output
- Curvefitting







Classification example: wolf or husky?

- BIAS: Importance of training the system with right data
- 5 of 6 correct why is the system wrong in the last picture?



Predicted: Wolf True: Wolf



Predicted: husky True: husky



Predicted: Wolf True: Wolf



Predicted: Wolf True: Wolf



Predicted: husky True: husky Predicted: Wolf True: Husky



Unsupervised learning

- Unlabelled data without additional knowledge
- Goal: Find underlying structure in data, such as categories
- Example: find behaviour profiles from recorded activity without prior knowledge









Reinforcement learning

- Adjust system behaviour based on a rewards and punishment
- Goal: Maximize expected future reward





Challenges and possiblities

- Many methods already exist
- Off-the-shelf often not enough
- Develop new methods by combining data-driven and model based methods
- Industrial use cases







Technology for a better society

Algorithms: Neural Networks

"A neural network is an interconnected assembly of simple processing elements, units or nodes, whose functionality is loosely based on the animal neuron. The processing ability of the network is stored in the interunit connection strengths, or weights, obtained by a process of adaptation to, or learning from, a set of training patterns."



Artificial neural networks are inspired by the human brain, which consists of around 100 billion neurons. A neuron can communicate by sending electric signals via the axon. This is received by other neurons connected to it in the network. Typically, each neuron receives many thousands of connections from other neurons, and is therefore constantly receiving a multitude of incoming signals, and based on the combination of income signals, the neuron will "fire" or generate some response that it sends along the network.



Algorithms: Deep Neural Networks



Universal Approximation Theorem: The theorem thus states that simple neural networks can *represent* a wide variety of interesting functions when given appropriate parameters; however, it does not touch upon the algorithmic learnability of those parameters.

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Big data – the 5 "V"s



- Volume: the vast amount of data
- Velocity: the speed at which new data is generated and the speed at which data moves around
- Value: the ability to use the data to generate value
- Veracity: the messiness or trustworthiness of the data
- Variety: the different types of data we can now use



Digitalisering gir store muligheter for BAE-næringen i Norge

- Digitalisering vil radikalt endre måten vi jobber, samhandler og kommuniserer på
- Her er det store muligheter for de som klarer å tenke nytt ...
- og kanskje noen fallgruver for de som tror at ting vil forbli slik de er
- "Digitalt Veikart" bør gi et godt utgangspunkt for å knytte et langsiktig potensial med tiltak som har effekt på kort sikt



