FCAI

Finnish Center for Artificial Intelligence

Petri Myllymäki
Professor of Artificial Intelligence and Machine Learning, University of Helsinki
Vice-Director, FCAI

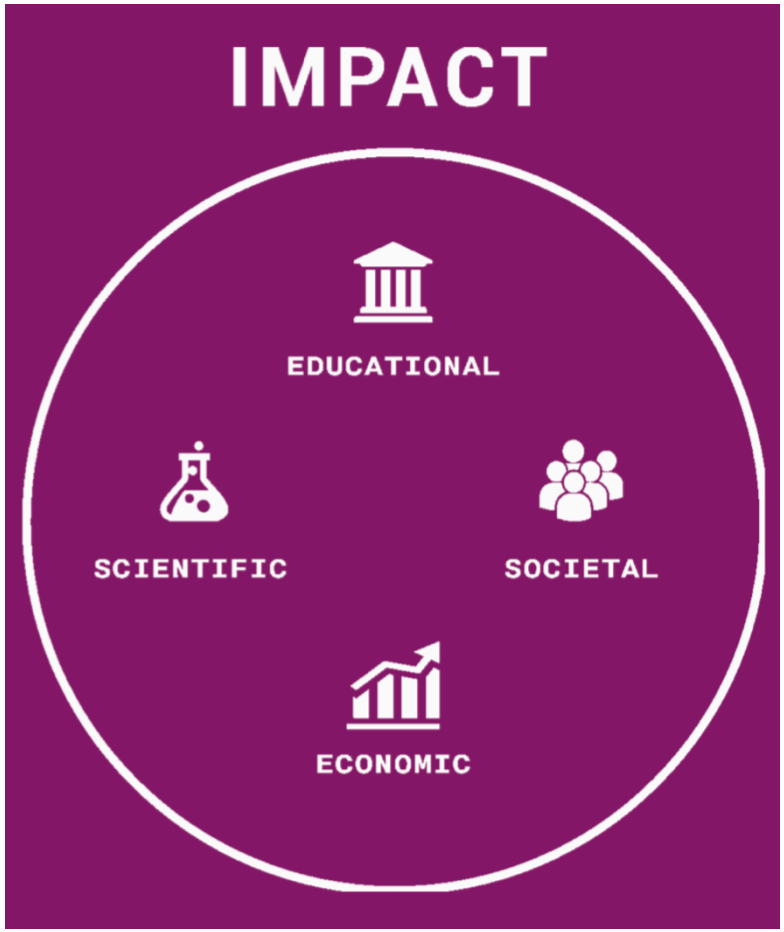
Aalto University

UNIVERSITY OF HELSINKI

VTT

FCAI: The Finnish Flagship on AI

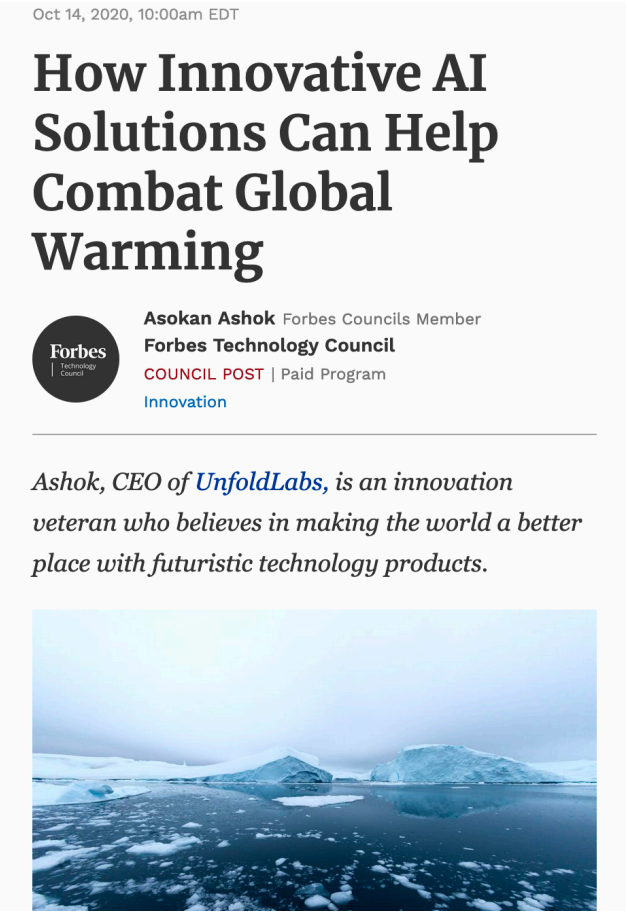
- The Flagship Programme is an instrument of the Academy of Finland aiming at increasing the impact of our top researchers.
- One of the six Flagships is **the Finnish Center for Artificial Intelligence (FCAI)** with the mission of developing and promoting AI that effectively benefits society and industry, and helps to solve real-life problems of real people.
- The total budget of FCAI is 250 M€ for the 8 year period 2019-2026.



FCAI

Using AI in solving high-impact global problems

- Obviously, questions related to the sustainability of our environment are among the most central problems we can address with the help of AI
  - One of the highlight spearheads of FCAI is “Atmospheric AI”
  - AI can be used in analyzing the current situation in many domains for increasing our understanding, but also in planning / decision support / optimization (e.g. in traffic/logistics, building/construction, agriculture, energy, etc.)
- However, AI is such a versatile technology that its use is quickly spreading in **all** areas of our society
  - This can lead to better public services and accelerated economic growth, but it is fair to ask what is the cost (footprint) of this technology?
  - Can the technologies be improved, can AI be made more efficient?



Oct 14, 2020, 10:00am EDT

How Innovative AI Solutions Can Help Combat Global Warming

Asokan Ashok Forbes Councils Member
Forbes Technology Council
COUNCIL POST | Paid Program
Innovation

Ashok, CEO of UnfoldLabs, is an innovation veteran who believes in making the world a better place with futuristic technology products.

Why is AI so successful?

Recent breakthroughs in AI largely due to advances in machine learning, methods that learn from data, made possible by:

- Increased computing capacity (GPU etc.)
- Larger data sets (ImageNet, web-scale text data etc.)
- Easy-to-use software, backed up by web-scale companies (PyTorch,TensorFlow etc.)
- Some algorithmic improvements (especially in deep neural networks)
- By “lowering the bar” and focusing on clever applications of “narrow AI” (e.g. not translating novels, but food menus or tweets)

From 'Jeopardy' to poker to reading comprehension, robots have managed to beat humans in all of these contests in the past decade

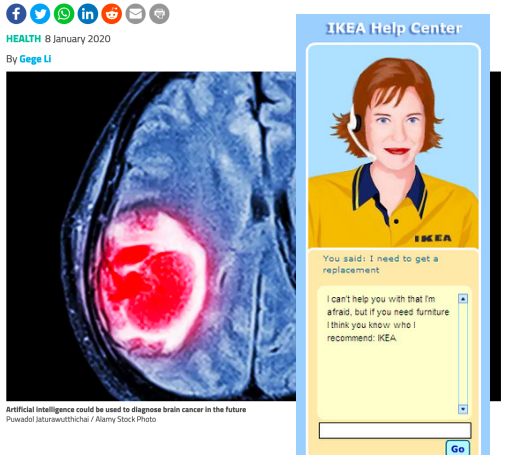
Aaron Holmes 11/16

When IBM's Deep world chess champ world responded w computers had con Standard headline

AI matches humans at diagnosing brain cancer from tumour biopsy images

HEALTH 8 January 2020

By Gege Li



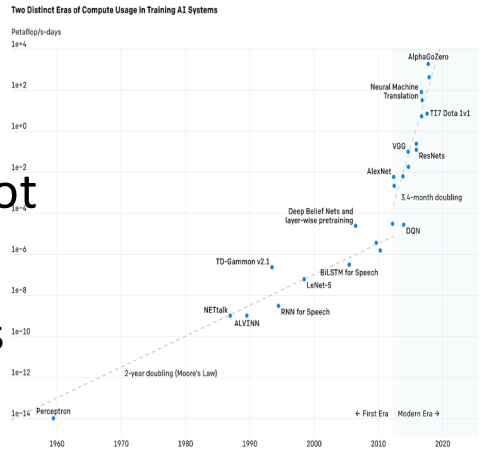
Artificial intelligence could be used to diagnose brain cancer in the future

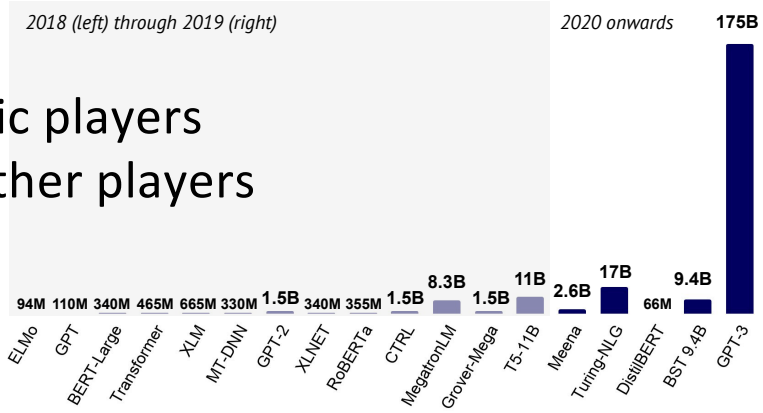
Puwadol Jaturawutthichai / Alamy Stock Photo

FCAI

Some political aspects of data efficiency

- The most well-known ML models (Google Translate, GPT-3, etc) have a huge number of parameters, and for training this type of models, you need a huge amount of data.
- Training big neural network models with a lot of parameters, using a lot of data, requires of lot of computing which is rather costly
  - It has been estimated that training of this type of a model requires dozens of millions of dollars. This makes this approach financially impossible for e.g. startups and smaller companies.
- In this type of situation, the parties who have access to the data and can afford the computing costs, have a clear advantage
- Should not leave ML/AI as a prerogative of big monopolistic players who cleverly acquire our data through several channels: other players need AI too!





FCAI

Environmental aspects

- Neural networks do not scale up well: it has been estimated that improving the ImageNet error rate (a well-know benchmark for computer vision) from 11.5% down to 1% with the current methods would cost 100 billion billion dollars (stateof.ai).
- Obviously, the energy consumption of ML is directly related to the amount/cost of computing, which means that AI energy consumption is increasing rapidly and is quickly approaching unsustainable levels.
- Development of more data-efficient AI is one of the three main objectives of FCAI

WIRED BACKCHANNEL BUSINESS CULTURE GEAR IDEAS SCIENCE SECURITY SIGN IN SUBSCRIBE

WILL KNIGHT BUSINESS 01.21.2020 07:00 AM

AI Can Do Great Things—if It Doesn't Burn the Planet

The computing power required for AI landmarks, such as recognizing images and defeating humans at Go, increased 300,000-fold from 2012 to 2018.

theguardian

Only huge firms such as Facebook can house the number of processors that machine learning requires. Photograph: Jim Thompson/Zuma Press/eyevine

Can the planet really afford the exorbitant power demands of machine learning?

John Naughton

There is, alas, no such thing as a free lunch. This simple and obvious truth is invariably forgotten whenever irrational exuberance teams up with digital technology in the latest quest to "change the world". A case in point was the bitcoin frenzy, where one could apparently become insanely rich by "mining" for the elusive coins. All you needed was to get a computer to solve a complicated mathematical puzzle and – lo! – you could earn one bitcoin, which at the height of the frenzy was worth $19,783.06. All you had to do was buy a mining kit (or three) from Amazon, plug it in and become part of the crypto future.

The only problem was that mining became progressively more difficult the closer we got to the maximum number of bitcoins set by the scheme and so more and more computing power was required. Which meant that increasing amounts of electrical power were needed to drive the kit. Exactly how much is difficult to calculate, but one estimate published in July by the Judge Business

11/26/2019 6:00 PM Page 1 of 3

FCAI

FCAI

Finnish Center for Artificial Intelligence

REAL AI FOR REAL PEOPLE IN THE REAL WORLD

Aalto University

UNIVERSITY OF HELSINKI

VTT