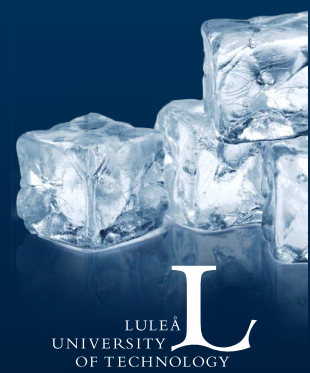
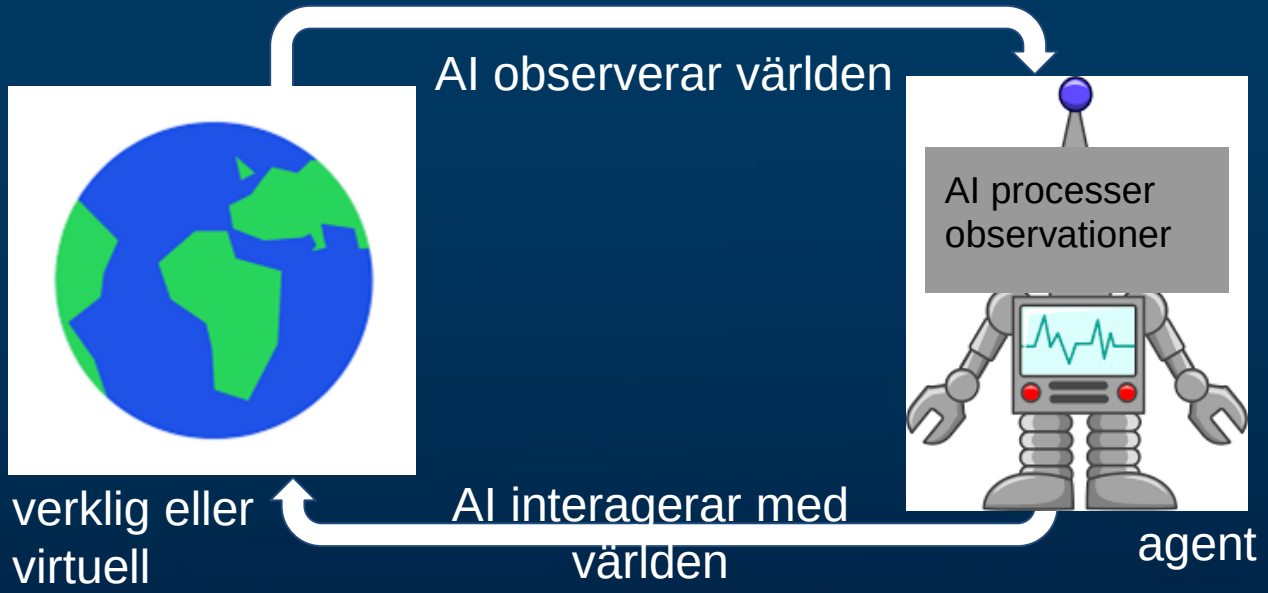
AI for all –
How AI will benefit the society at large

Marcus Liwicki
EISLAB Machine Learning (chair)
Luleå University of Technology

bit.ly/2019-medarbetar



Vad är Artificiell Intelligens?



Men – är min tvättmaskin en AI?



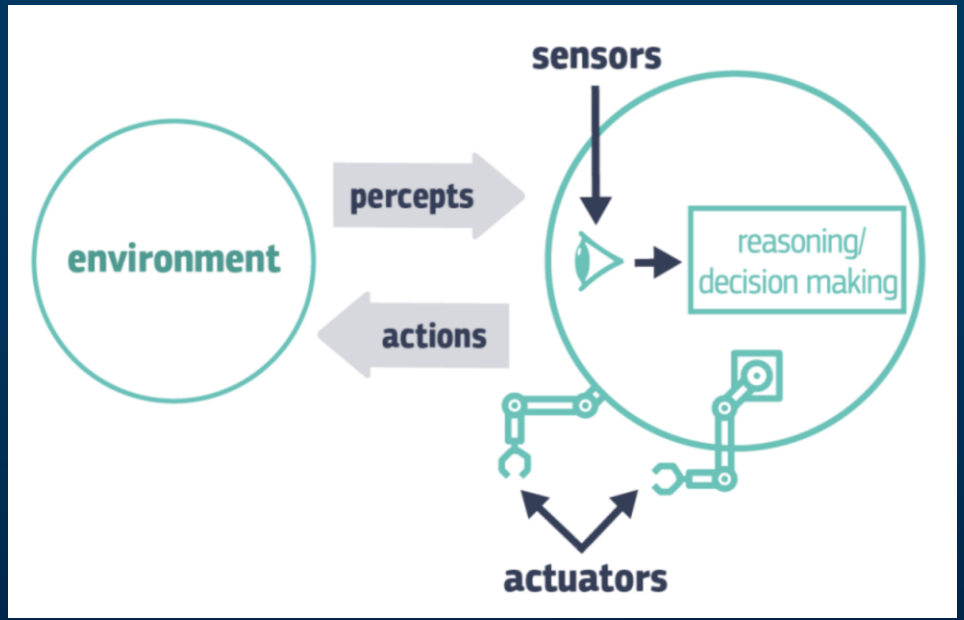
AI observerar världen

AI interagerar med världen

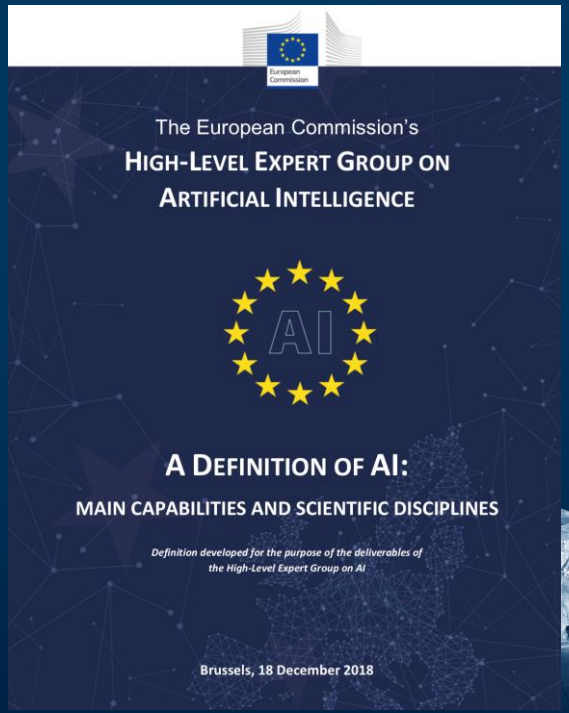


ja ... nej ... kanske

AI modelen är inte ny och inte skrivs ut



Russel & Norvig, 1995



Vi använder AI på många ställen



Den nya tekniken kommer, som alltid

Det var många uppfinningar tidigare, alla har risker











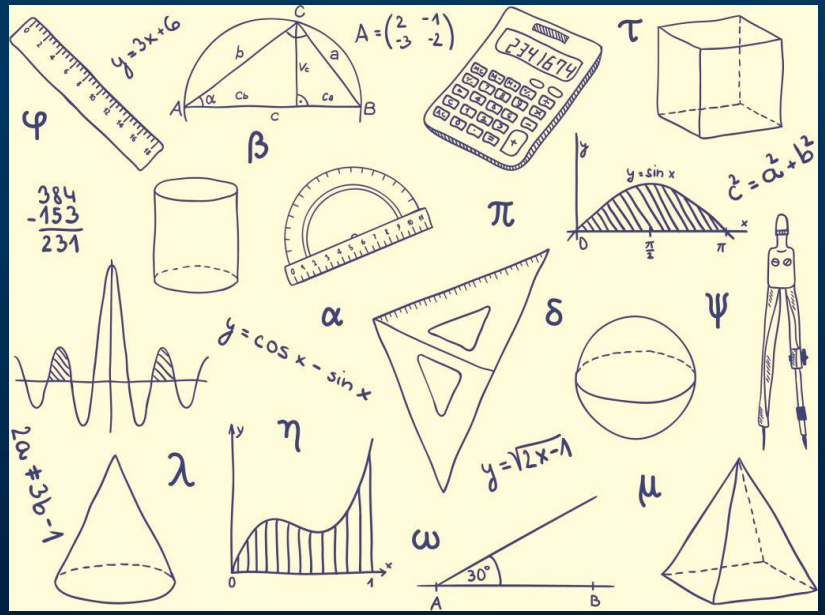
Den nya maskinen kan lära sig

som heter AI

eller maskininlärning

Hur bygger vi maskiner?

Med hjälp av matematik!



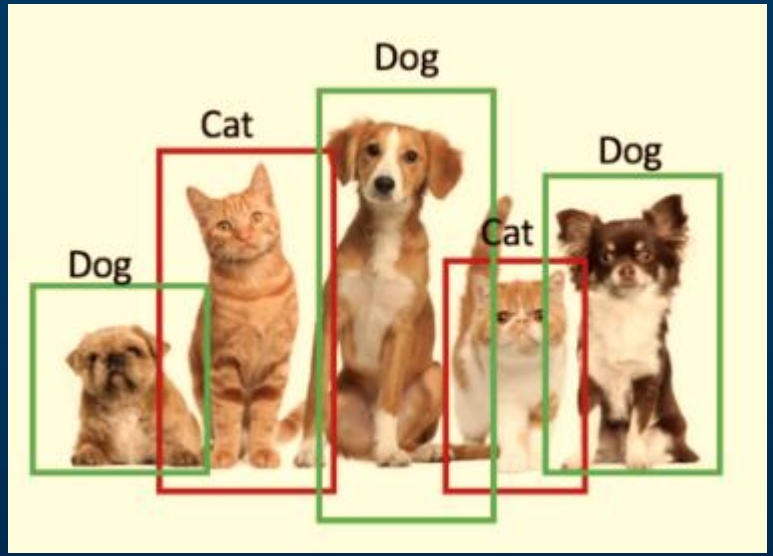
Används även av biologer, läkare, ekonomer…

För att beskriva och förutse världen

Ingenjörer skapar maskiner

T.ex. rymdraketer

Kan vi bygga en hund/katt-maskin?

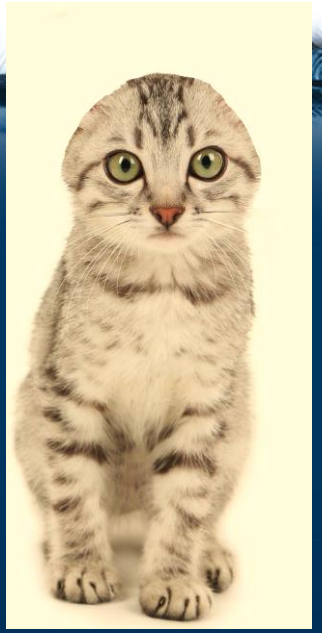


Finns det regler för att beskriva katter?

Men, det fungerar inte?

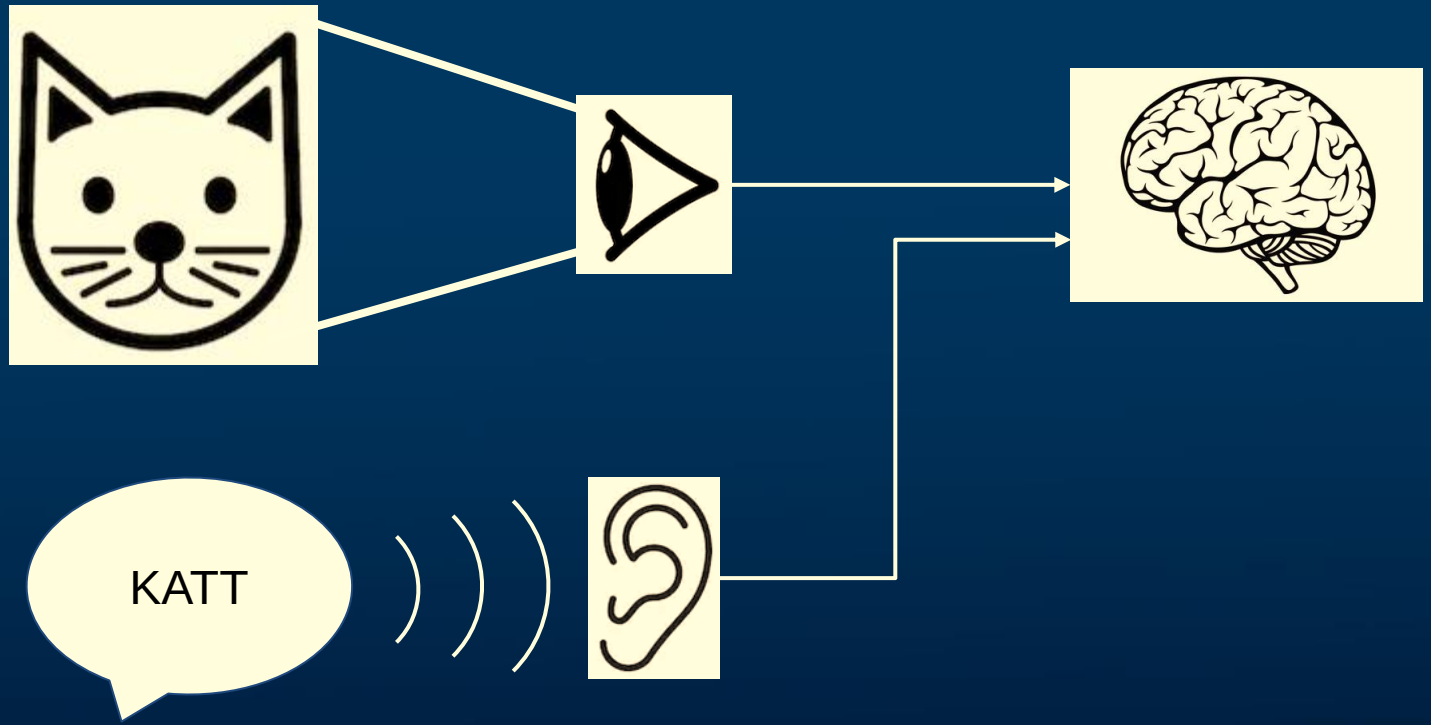







Men du kan känna igen mig !?!
Hur fungerar det

Du lär dig!



Lärande maskiner!

Vad vill vi ha av vår lärande maskin?

1. Visa den en bild
2. Vi berättar vad som är på bilden
3. Den lär sig!
4. Vi visar en ny bild
5. Den berättar vad som är på bilden
6. Om den är fel – korrigerar vi det

This is what
I do all my life



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PhD in Bern, Switzerland



2004
–
2007



First time Deep Learning on handwriting recognition

From 60 % to 86 %

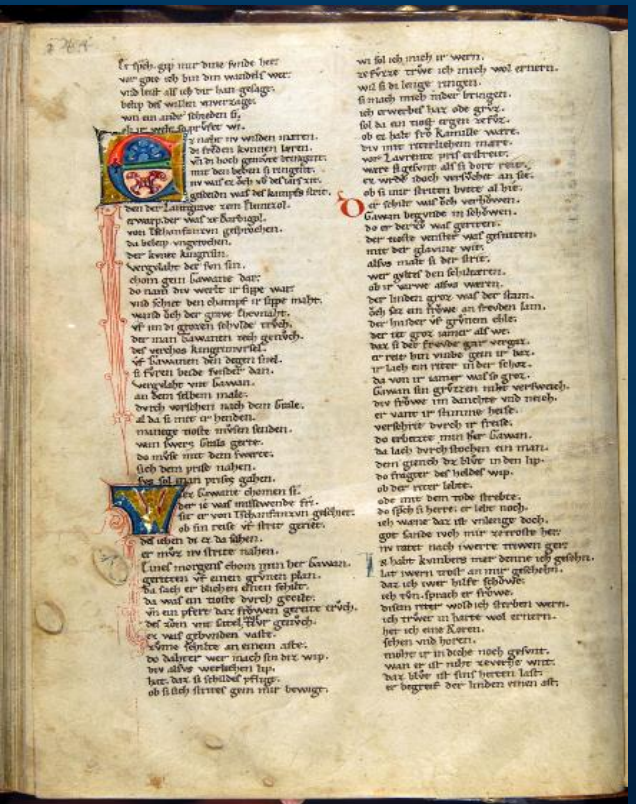
Now 97 %

Used by Microsoft & co

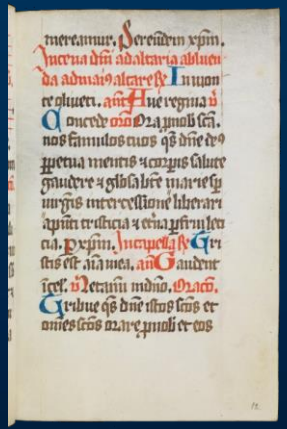
Try it out: https://workbench.imuscica.eu/

Marcus @ German Research Center for AI

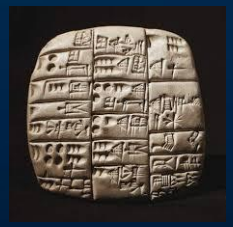
2008 – 2014

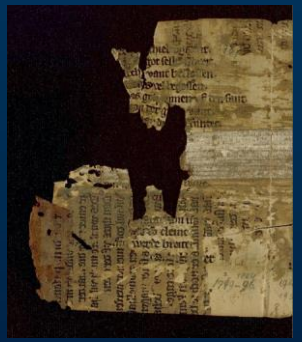


- Historical document analysis
- Good character recognition
- Even more useful tools for research in the humanities











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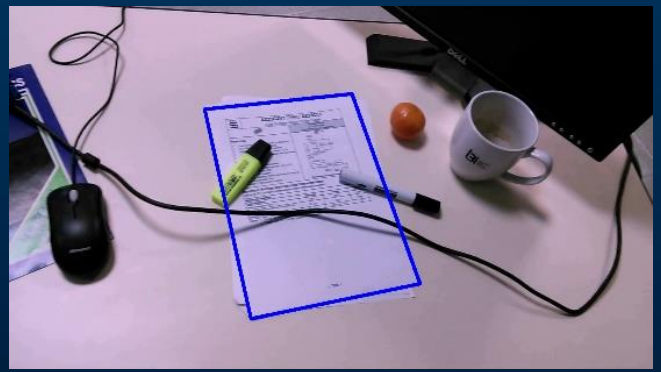
Works on modern documents

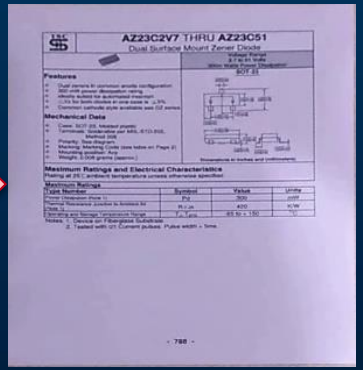
2012
–
2018

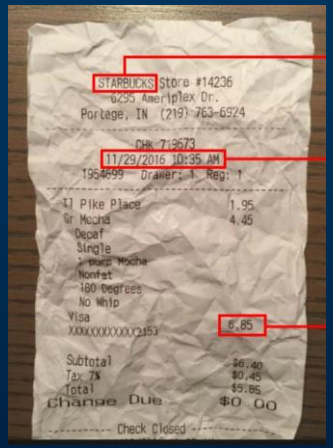
Deep learning for scanned documents

Part-time work at insiders technologies GmbH

Nowadays, mobile captured documents used in mobile phone apps

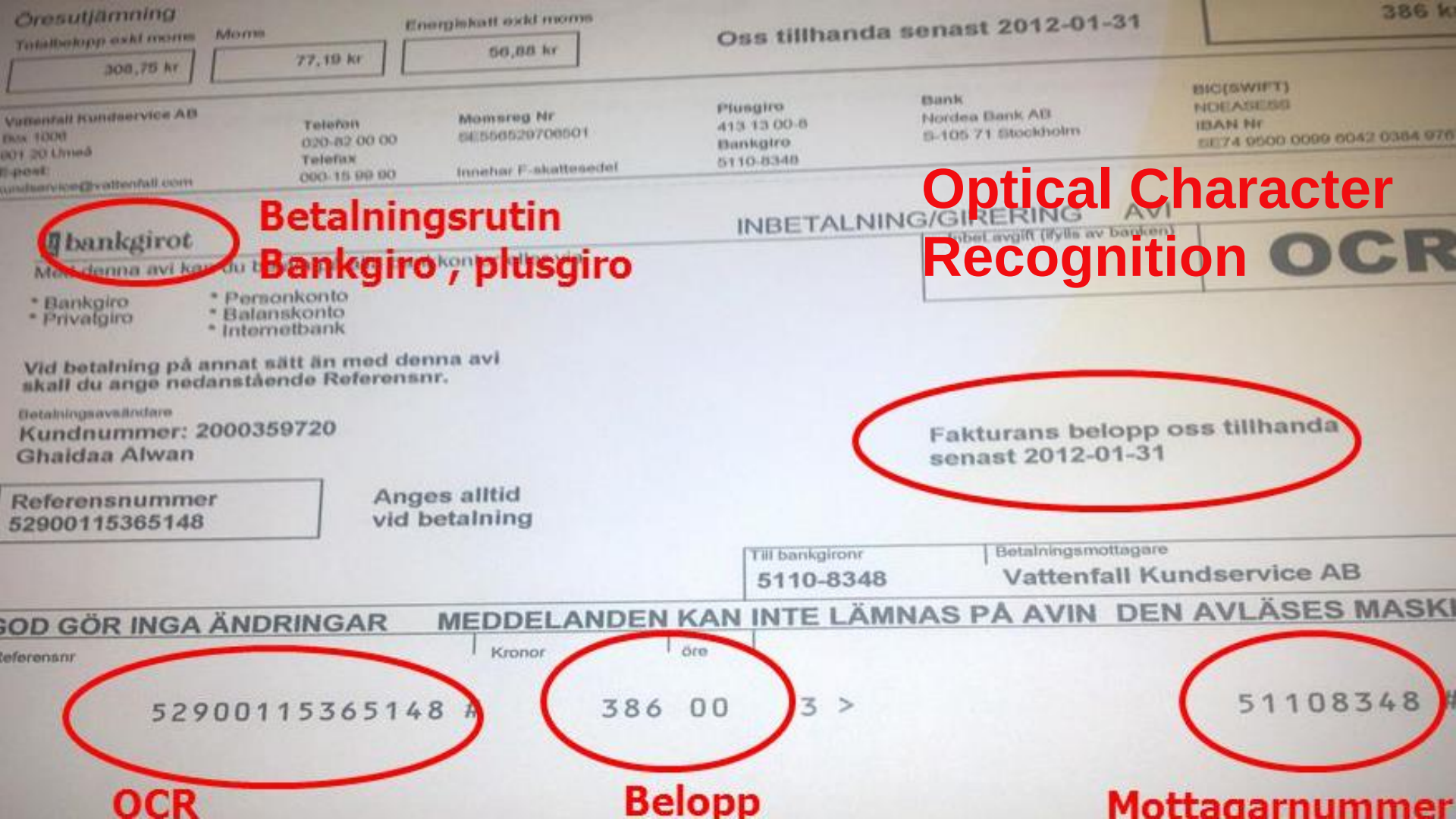








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Öresutjämning
Totalbelopp exkl moms
308,75 kr
Moms
77,19 kr
Energiskatt exkl moms
56,88 kr
Oss tillhanda senast 2012-01-31
386 kr
Vattenfall Kundservice AB
Box 1000
901 20 Umeå
E-post:
kundservice@vattenfall.com
Telefon
020-82 00 00
Telefax
090-15 99 90
Momsreg Nr
SE556529706501
Innehar F-skattesedel
Plusgiro
413 13 00-8
Bankgiro
5110-8348
Bank
Nordea Bank AB
S-105 71 Stockholm
BIC(SWIFT)
NDEASESS
IBAN Nr
SE74 9500 0099 6042 0384 976
Betalningsrutin
Bankgiro , plusgiro
Optical Character
Recognition
bankgirot
INBETALNING/GIRERING AVI
OCR
* Bankgiro
* Privatgiro
* Personkonto
* Balanskonto
* Internetbank
Vid betalning på annat sätt än med denna avi
skall du ange nedanstående Referensnr.
Betalningsavsändare
Kundnummer: 2000359720
Ghaidaa Alwan
Fakturans belopp oss tillhanda
senast 2012-01-31
Referensnummer
52900115365148
Anges alltid
vid betalning
Till bankgironr
5110-8348
Betalningsmottagare
Vattenfall Kundservice AB
GOD GÖR INGA ÄNDRINGAR MEDDELANDEN KAN INTE LÄMNAS PÅ AVIN DEN AVLÄSES MASKI
Referensnr
Kronor
öre
52900115365148
386 00
3 >
51108348
OCR
Belopp
Mottagarnummer

We can also use it for Biometrics

2009 – 2014

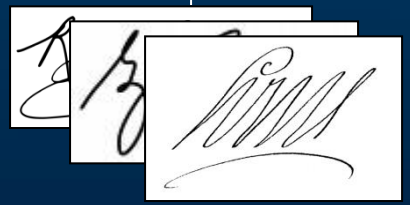


Louis XIV

Signature Verification

Accept

Reject



digipen technologies

CeBIT INNOVATION AWARD 2015

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eHealth - rehabilitation



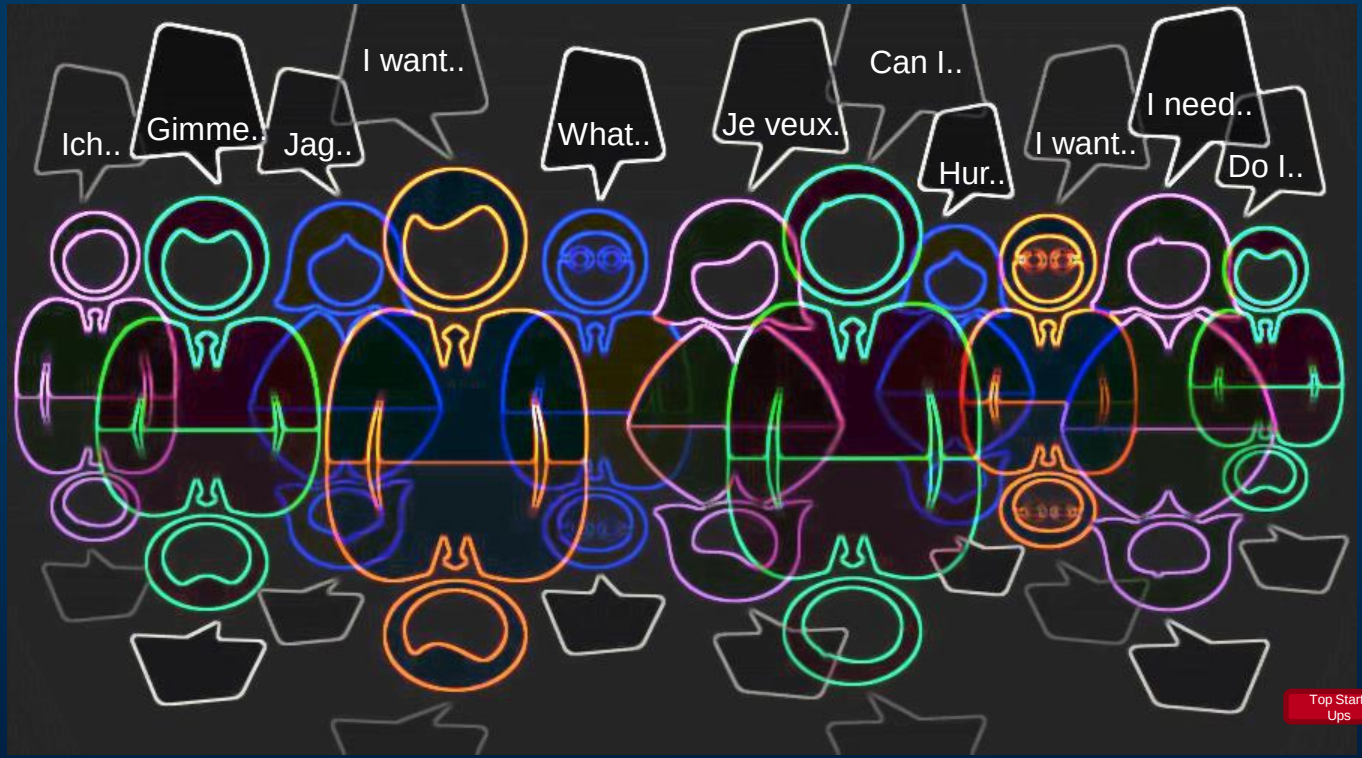
The same machine learning methods are used for recognizing human motion (for rehabilitation)

Nowdays used for many other use cases (e.g., Golf, ballet, fitness, …)



2009 – 2015

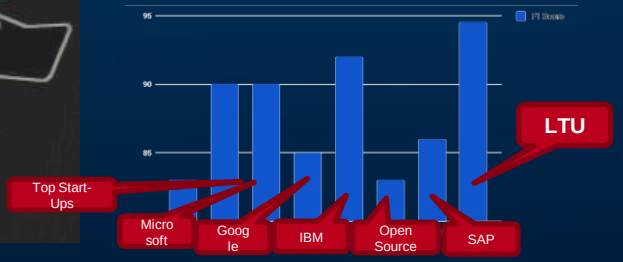
Natural Language Processing & Chatbots @ LTU



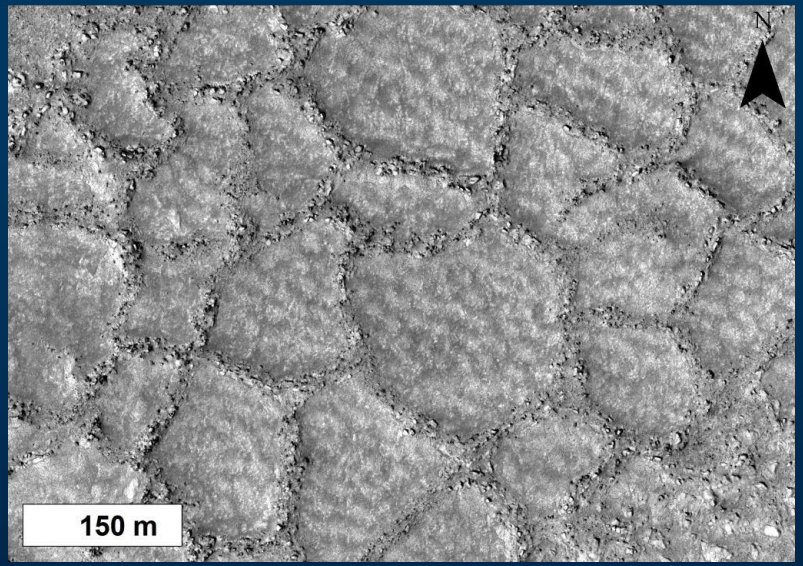
2018 – now

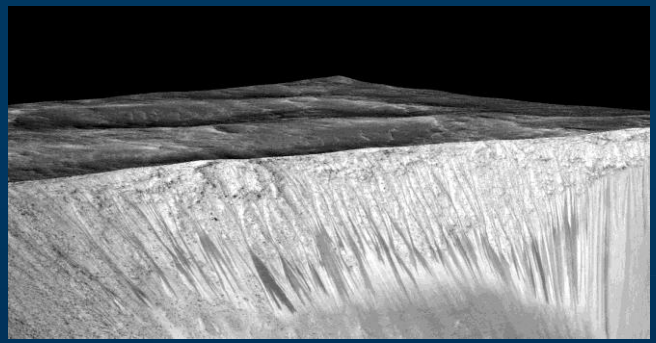
Better than Google & co

Soon useful for all of you!



Potential in processing space images 2018 – now



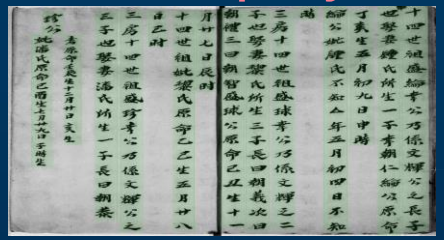




Our research: How can AI help us?

- 2004 – 2007: handwriting recognition
- 2006 – now: historical document analysis
- 2009 – 2014: forensic document analysis
- 2012 – 2018: modern document analysis
- 2018 – now: chatbots
- 2019 – now: national space data lab
- 2019 – now: e-health
- And many more

now: VR project



Thanks to the Machine Learning Group!


Marcus


Pedro


Konstantina

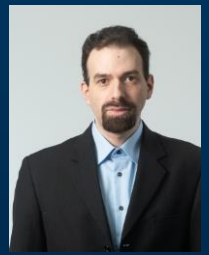

Gustav


Fotini

Notice something?
40% woman




Priyamvada


György


Saleha


Rajkumar



Oluwatosin

Machine Learning for the welfare of society



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We are not the only AI-researchers at LTU

- Faster and energy-efficient AI
- Reading systems
- Industrial applications
- Digital innovation of business models
- Living labs
- Education
- Full set of slides available online





http://bit.ly/ltu-ai











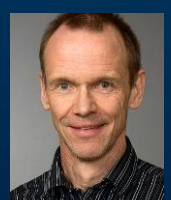










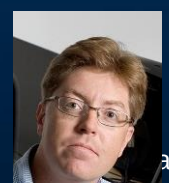












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LTU is well recognized

3 LTU AI-researchers in IVA's 100 list of innovators

Selected in IVA's top Achievements in Engineering 2018

Leaders in various machine learning competitions

Leaders in Aerial Robotics, and many other areas

Young investigator awards in various **Applied AI** topics

World’s 1st PhD student in living labs

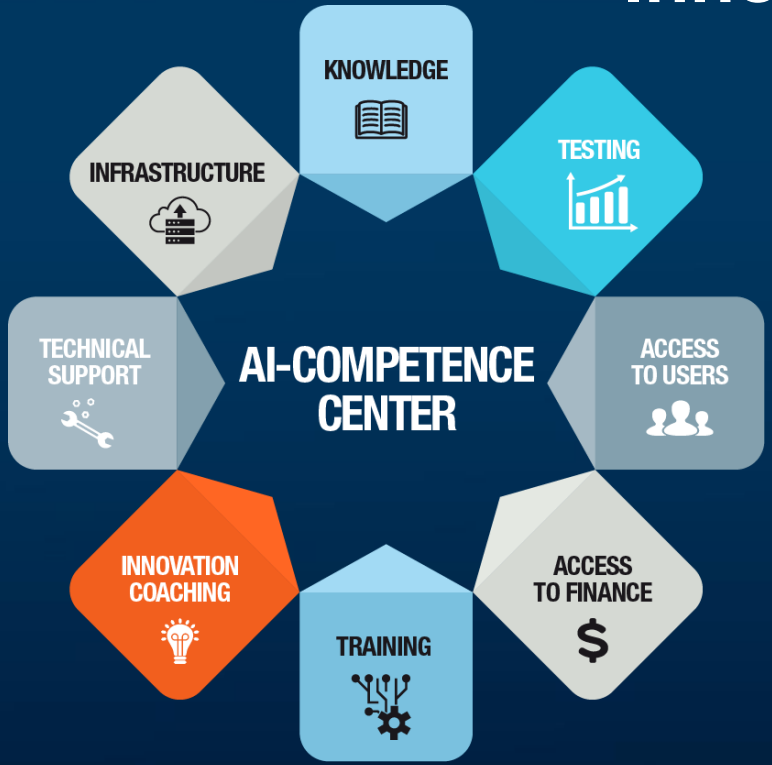
Sweden's only NVIDIA DLI ambassador

Recently:

- Northern node of ai.se
- AI Agenda of Sweden, Kempe, …



We are building up an Applied AI Digital Innovation Hub



- Connected sustainable AI region
- Increased industrial competitiveness
- Gateway for projects at all levels
- Networking
- Skilled engineers
- AI excellence center
- Support development of new products and services
- AI on demand innovation platform
- Flagship region in AI



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You can be part of it

- If you know programming
  - Various NVIDIA Deep Learning Institutes with certificate
  - Next one on 19th of December (advanced for NLP)

https://www.ltu.se/research/subjects/Maskininlarning/Workshop-om-grundlaggande-djupinlarning-for-sprakteknologi-1.193583

- If not, take part in a 7.5 credits course on AI

https://www.ltu.se/edu/course/D00/D0030E/D0030E-Introduktion-till-artificiell-intelligens-1.190270

- Or just get informed and play around: …



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Try out AI by yourself

- https://experiments.withgoogle.com/ai
- https://quickdraw.withgoogle.com/

- http://bit.ly/liwicki-vdl-17 (all my lecture material)



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How far “we” got (also try at home)



http://www.netwars-project.com/ - our tracks in the web

http://www.plugandpray-film.com/en/ - AI possibilities

https://www.youtube.com/watch?v=7AGgUYUl4qE – human – AI?

Did you hear about DeepFakes?

https://www.youtube.com/watch?v=1OqFY_2JE1c

http://moralmachine.mit.edu/

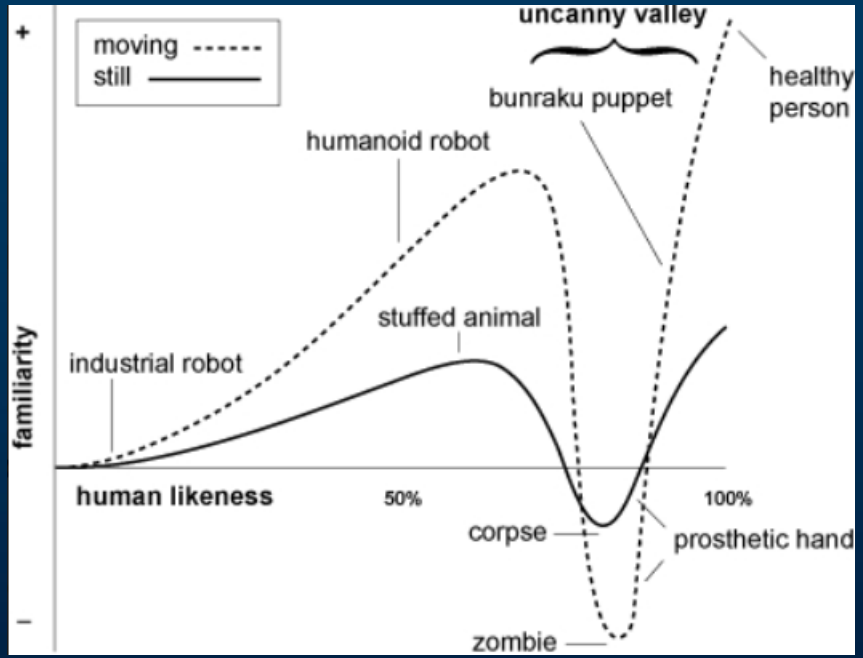
https://www.youtube.com/watch?v=vrCaxWsiJL0

https://www.youtube.com/watch?v=DEHmT5FEALk

https://www.youtube.com/playlist?list=PLOm6ZK4yOLncnKC0UPfmgh6Gf3OUsxmbc

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The Uncanny Valley



Can AI Harm Us?

http://moralmachine.mit.edu/



People might loose their jobs

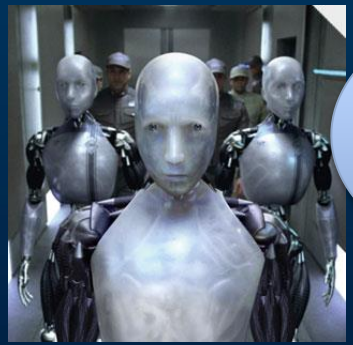
People might have to much/few leisure time

People might loose the conception of being unique

People might loose freedom (rights)

People might loose responsibility

AI systems might take over the world



ML should assist us, not replace us

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Two Prominent Thoughts on AI

Weizenbaum said to his students before starting a thesis

> "Before starting to develop a system consider everything which the system would be able to do. If there is any situation when the system would cause a threat to anyone and you need and button in order to switch off the system then **do not begin to develop the system**."

Thoughts by Russel & Norvig (AI, modern approach)

> "Wouldn't it be nice to develop machines (as our children)"
>
> "A species develops a new species which is better than itself and will survive longer – isn't that the ultimate goal of a species?"



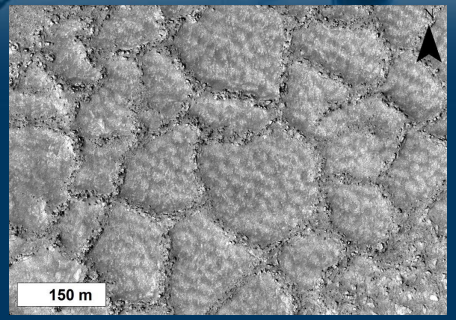
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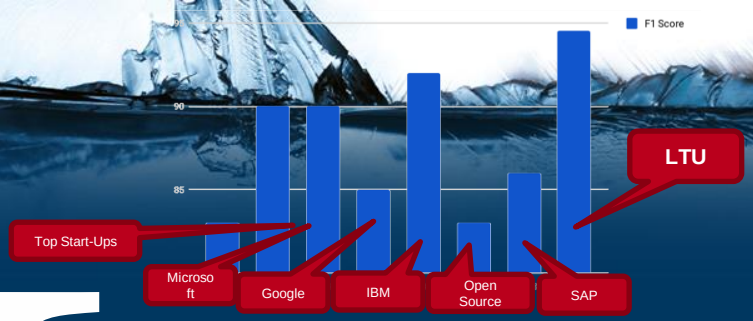
Let us discuss more about AI Ethics

- I follow https://ai4good.org/
- Include ethics in lectures
- Special movie night
  - Plug & Pray – and discussion
  - 29th January, 18:30 – save the date!
  - If you come 18:00 there will also be some pizza ;)









bit.ly/2019-medarbetar

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