Artificiell Intelligens
- ett av framtidens forskningsverktyg?

Max Gordon

Kort om mig

- ~ 20 år programmering
- ~ 20 år sjukvård
- Specialist ortopedi 2011
- Disputerade 2014
- 2015 → post-doc inom AI

Vad händer?

Artificial intelligence for analyzing orthopedic trauma radiographs

Deep learning algorithms—are they on par with humans for diagnosing fractures?

Jakub OLCZAK [1], Niklas FAHLBERG [2], Atsuto MAKI [3], Ali Sharif RAZAVIAN [1,3], Anthony JILERT [2], André STARK [1], Olof SKÖLDENBERG [1], and Max GORDON [1]

[1] Department of Clinical Sciences, Karolinska Institutet, Danderyd Hospital; [2] Radiology clinic, Danderyd Hospital, Danderyd Hospital AB; [3] Department of Robotics, Perception and Learning (RPL), School of Computer Science and Communication, KTH Royal Institute of Technology, Stockholm, Sweden
Correspondence: max.gordon@ki.se
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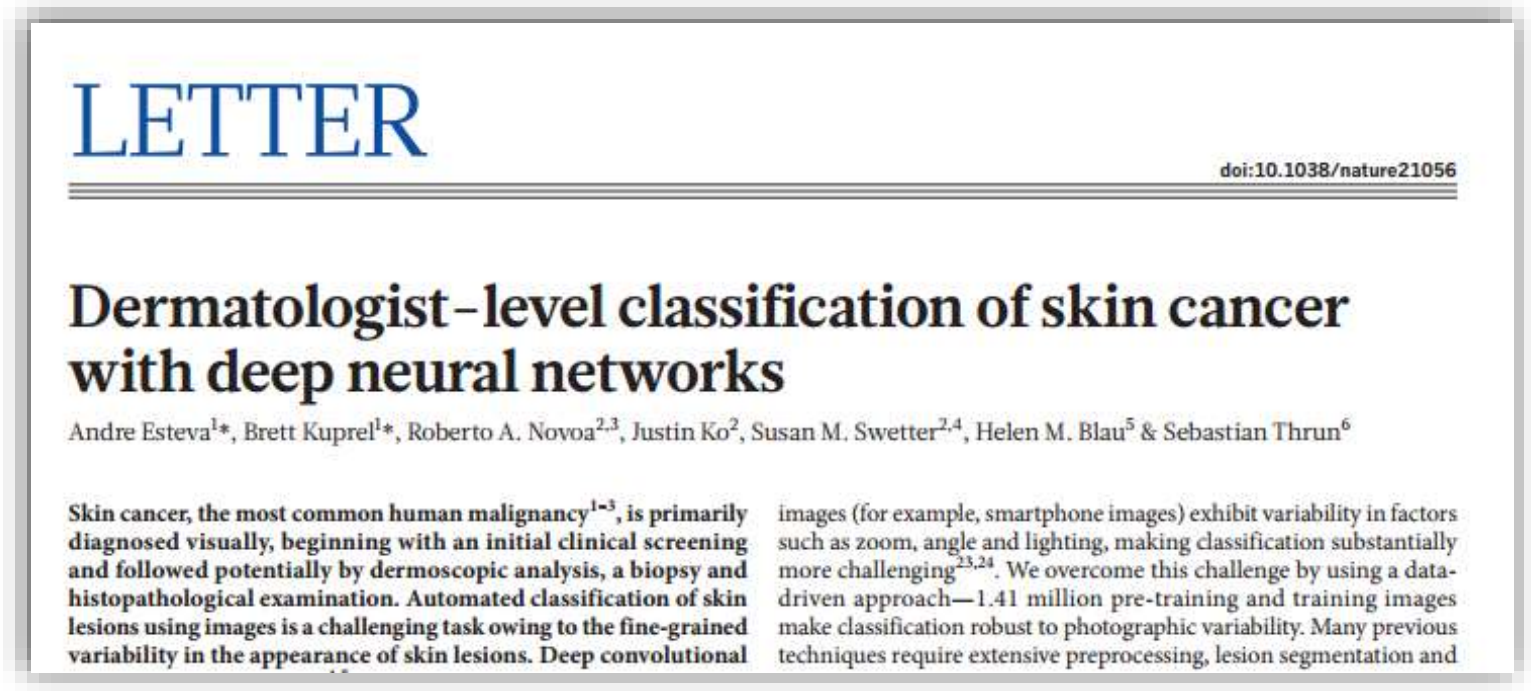
Background and purpose — Recent advances in artificial intelligence (deep learning) have shown remarkable performance in mation from these requires years of training and there is always the question of inter-observer reliability (Andersen et al. 1996,

Vad händer?



LETTER

doi:10.1038/nature21056

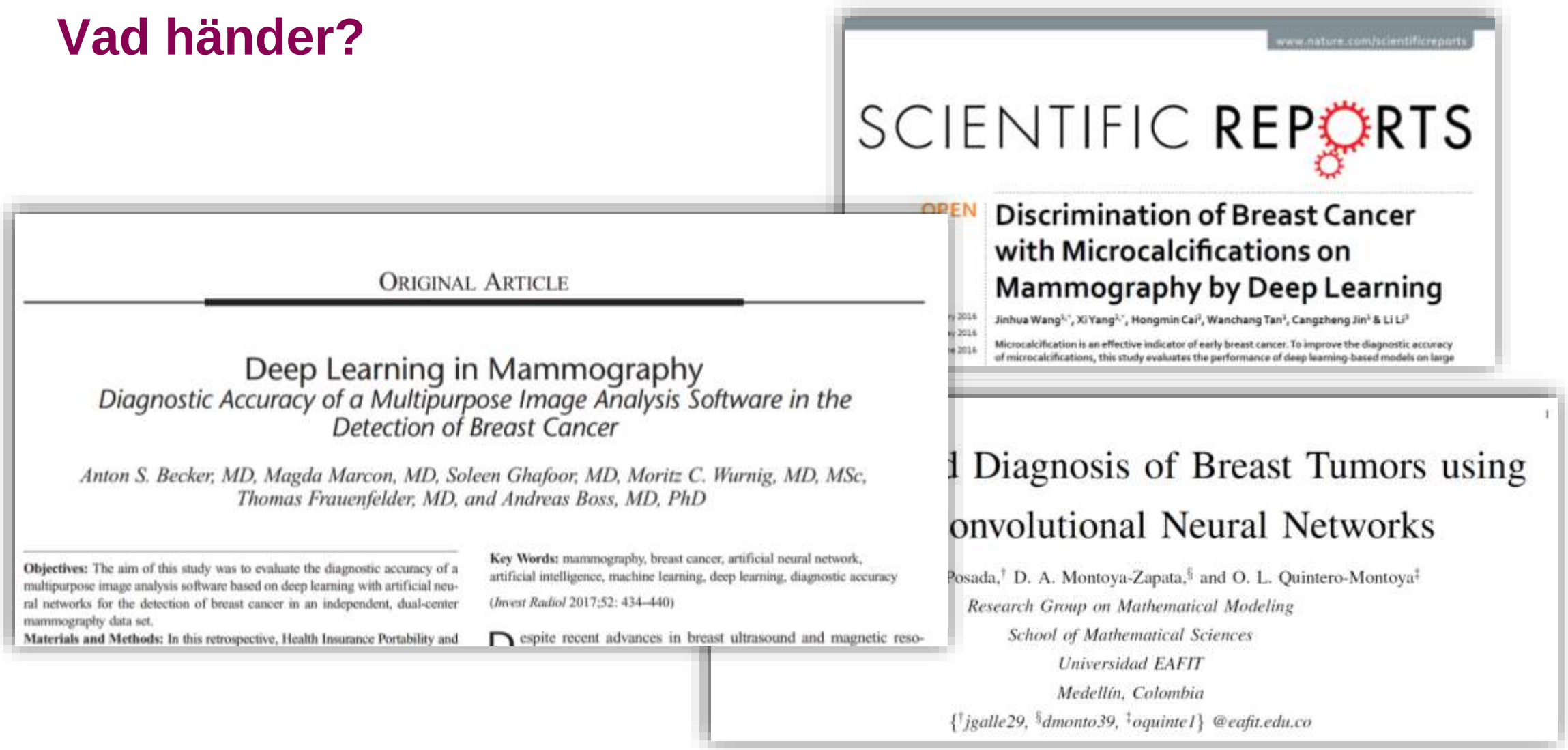
Dermatologist-level classification of skin cancer with deep neural networks

Andre Esteva[1]*, Brett Kuprel[1]*, Roberto A. Novoa[2,3], Justin Ko[2], Susan M. Swetter[2,4], Helen M. Blau[5] & Sebastian Thrun[6]

Skin cancer, the most common human malignancy[1–3], is primarily diagnosed visually, beginning with an initial clinical screening and followed potentially by dermoscopic analysis, a biopsy and histopathological examination. Automated classification of skin lesions using images is a challenging task owing to the fine-grained variability in the appearance of skin lesions. Deep convolutional

images (for example, smartphone images) exhibit variability in factors such as zoom, angle and lighting, making classification substantially more challenging[23,24]. We overcome this challenge by using a data-driven approach—1.41 million pre-training and training images make classification robust to photographic variability. Many previous techniques require extensive preprocessing, lesion segmentation and

Vad händer?



www.nature.com/scientificreports

SCIENTIFIC REPORTS

OPEN

Discrimination of Breast Cancer with Microcalcifications on Mammography by Deep Learning

Jinhua Wang[1,*], Xi Yang[2,*], Hongmin Cai[3], Wanchang Tan[3], Cangzheng Jin[3] & Li Li[3]

Microcalcification is an effective indicator of early breast cancer. To improve the diagnostic accuracy of microcalcifications, this study evaluates the performance of deep learning-based models on large

ORIGINAL ARTICLE

Deep Learning in Mammography

Diagnostic Accuracy of a Multipurpose Image Analysis Software in the Detection of Breast Cancer

Anton S. Becker, MD, Magda Marcon, MD, Soleen Ghafoor, MD, Moritz C. Wurnig, MD, MSc, Thomas Frauenfelder, MD, and Andreas Boss, MD, PhD

Objectives: The aim of this study was to evaluate the diagnostic accuracy of a multipurpose image analysis software based on deep learning with artificial neural networks for the detection of breast cancer in an independent, dual-center mammography data set.

Materials and Methods: In this retrospective, Health Insurance Portability and

Key Words: mammography, breast cancer, artificial neural network, artificial intelligence, machine learning, deep learning, diagnostic accuracy

(*Invest Radiol* 2017;52: 434–440)

Despite recent advances in breast ultrasound and magnetic reso-

l Diagnosis of Breast Tumors using

onvolutional Neural Networks

Posada,† D. A. Montoya-Zapata,§ and O. L. Quintero-Montoya‡

Research Group on Mathematical Modeling

School of Mathematical Sciences

Universidad EAFIT

Medellín, Colombia

{†*jgalle29*, §*dmonto39*, ‡*oquinte1*} *@eafit.edu.co*

Vad händer?

Google Research Blog

The latest news from Research at Google

Assisting Pathologists in Detecting Cancer with Deep Learning

Friday, March 03, 2017

Posted by Martin Stumpe, Technical Lead, and Lily Peng, Product Manager

The results? Standard "off-the-shelf" deep learning approaches like Inception (aka Googl
worked reasonably well for both tasks, although the tumor probability prediction heatma
produced were a bit noisy. After additional customization, including training networks to
the image at different magnifications (much like what a pathologist does), we showed th
possible to train a model that either matched or exceeded the performance of a patholog
had unlimited time to examine the slides.

ACS central science

Research Article

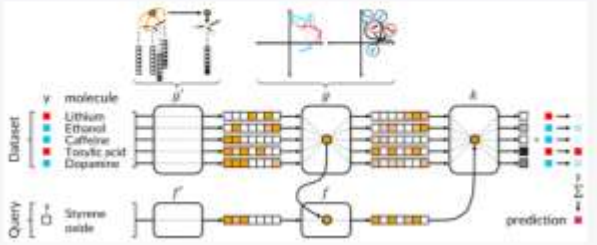
http://pubs.acs.org/journal/acscii

Low Data Drug Discovery with One-Shot Learning

Han Altae-Tran,[†,#] Bharath Ramsundar,[‡,#] Aneesh S. Pappu,[‡] and Vijay Pande*[,§]

[†]Department of Biological Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139-4307, United States
[‡]Department of Computer Science and [§]Department of Chemistry, Stanford University, Stanford, California 94305, United States

ABSTRACT: Recent advances in machine learning have made significant contributions to drug discovery. Deep neural networks in particular have been demonstrated to provide significant boosts in predictive power when inferring the properties and activities of small-molecule compounds (Ma, J. et al. *J. Chem. Inf. Model.* **2015**, *55*, 263−274). However, the applicability of these techniques has been limited by the requirement for large amounts of training data. In this work, we demonstrate how one-shot learning can be used to significantly lower the amounts of data required to make



MEN VAD ÄR AI?

Artificiell intelligens

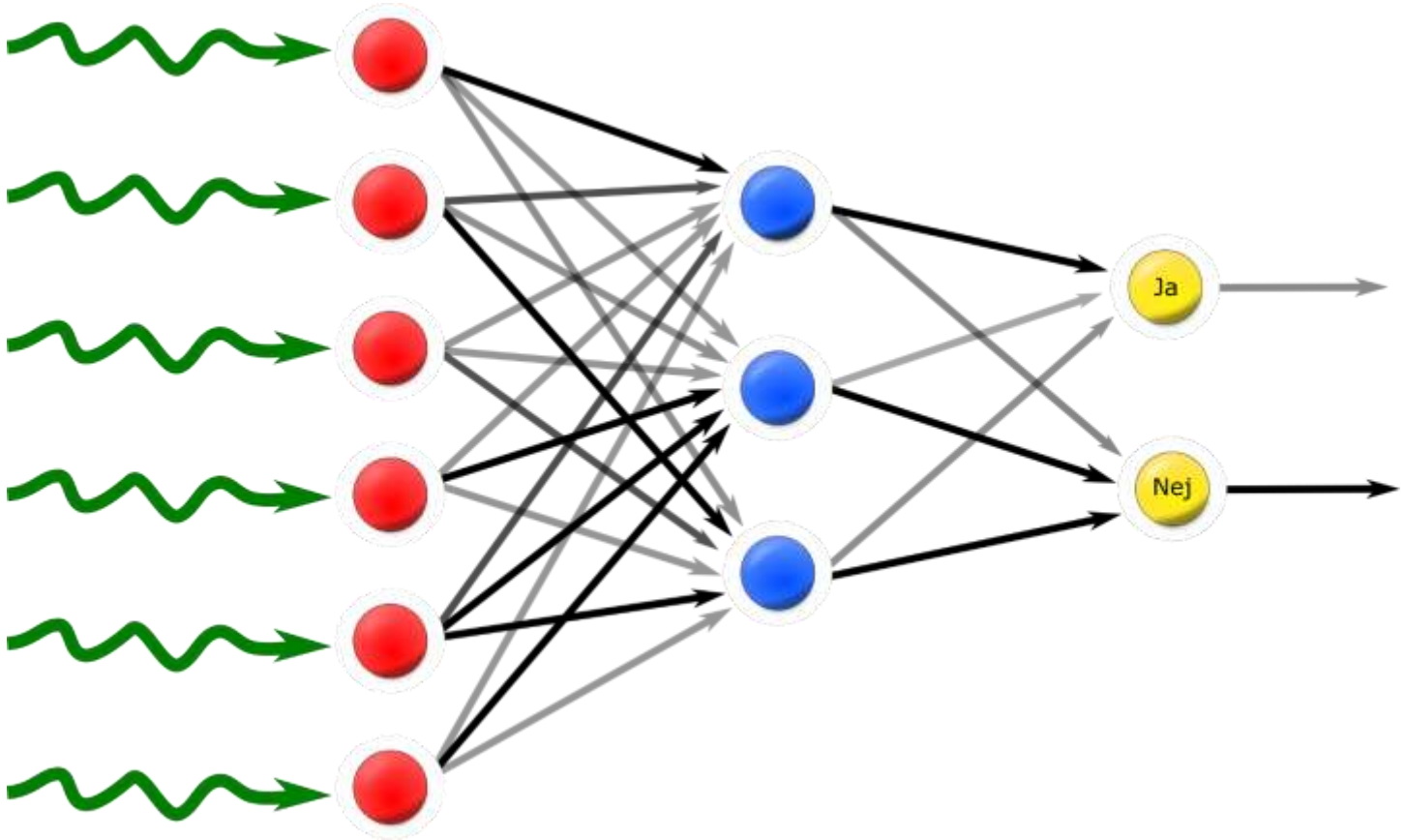
- Svag AI

Courtesy of Tomoki Eto

- Stark AI

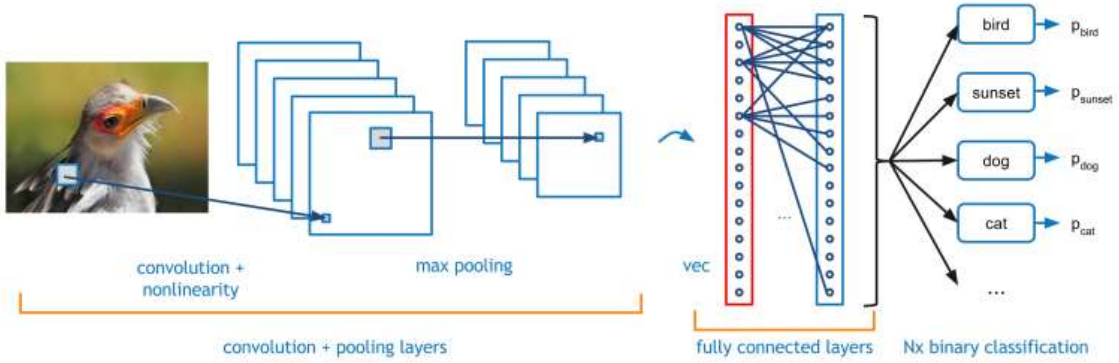
Courtesy of Gaudencio Garcinuño

Legobitarna

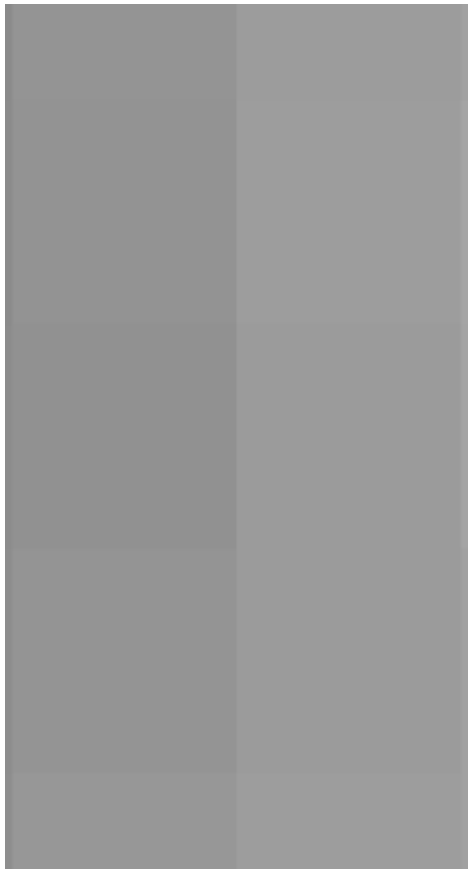


Filter + lager

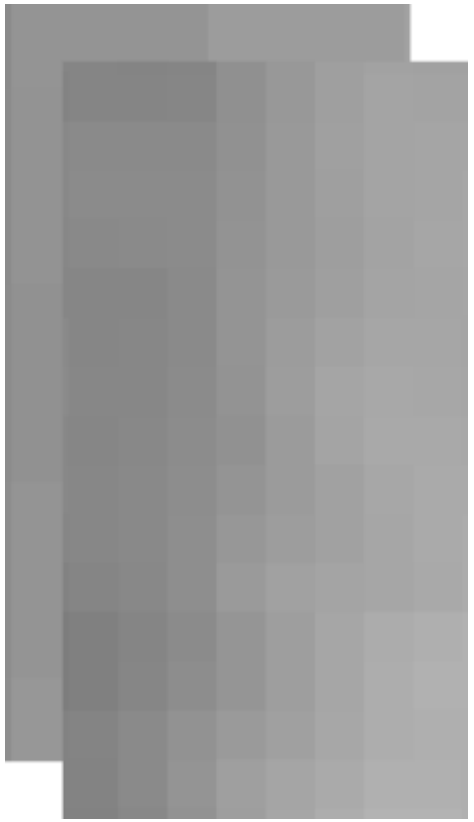
- Struktur
- Hierarki
- Abstraktion



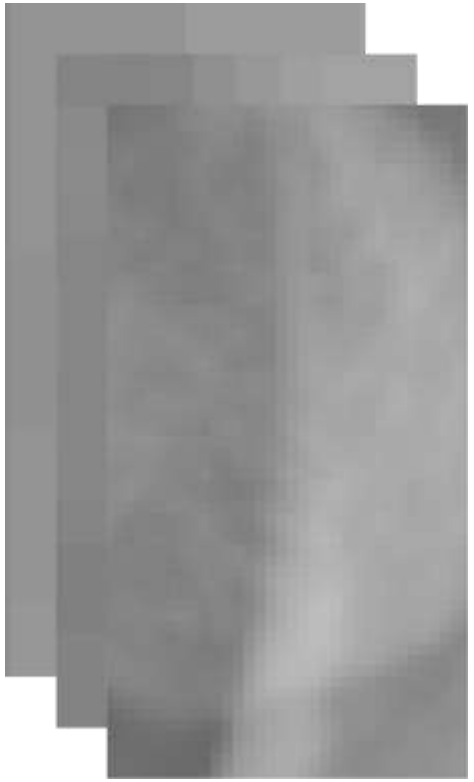
Lagerprincipen - koncept



Lagerprincipen - koncept



Lagerprincipen - koncept



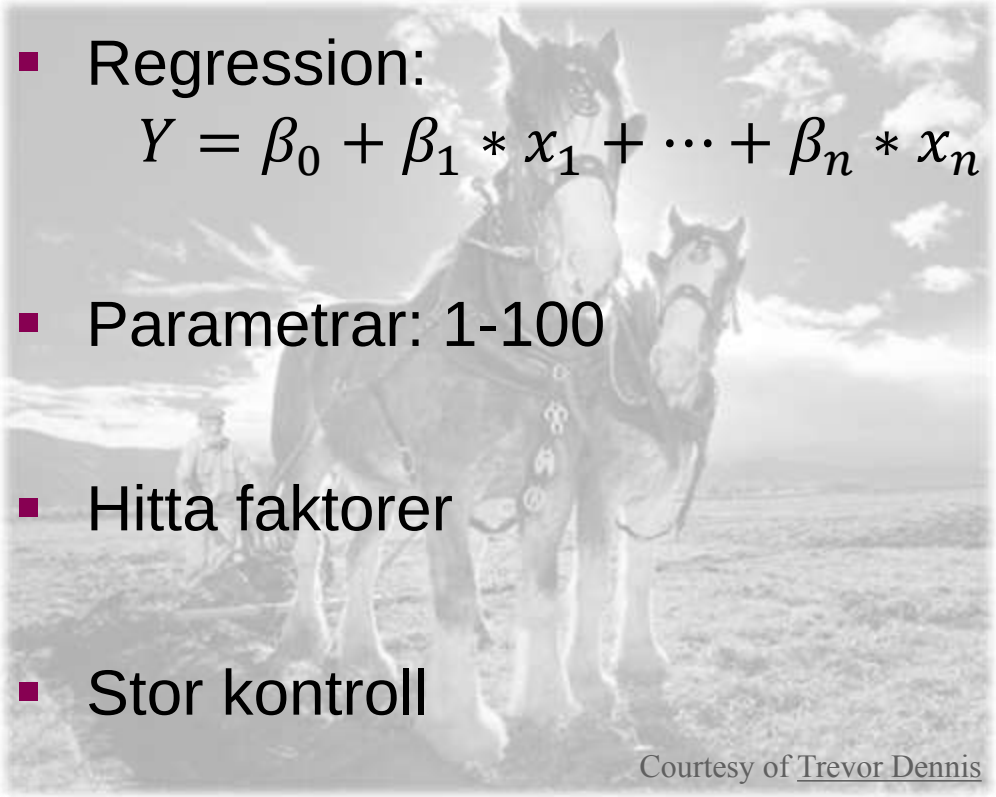
Lagerprincipen - koncept

Lagerprincipen - koncept

AI vs statistik

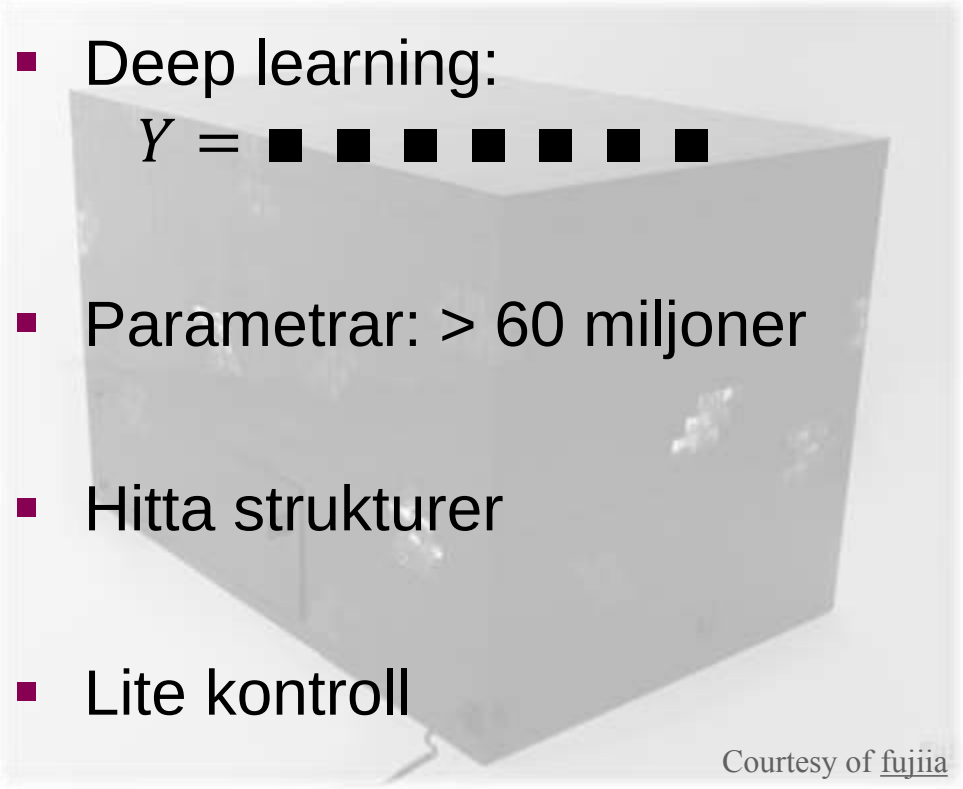
Statistik

- Regression:
  $Y = \beta_0 + \beta_1 * x_1 + \cdots + \beta_n * x_n$
- Parametrar: 1-100
- Hitta faktorer
- Stor kontroll


Courtesy of Trevor Dennis

AI

- Deep learning:
  $Y = \blacksquare\ \blacksquare\ \blacksquare\ \blacksquare\ \blacksquare\ \blacksquare\ \blacksquare$
- Parametrar: > 60 miljoner
- Hitta strukturer
- Lite kontroll


Courtesy of fujiia

Möjligheter

Tack!