

#### Künstliche Intelligenz Bleiben wir schlauer als die Roboter?

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# Ein gutes Gedächtnis ist erlernbar!





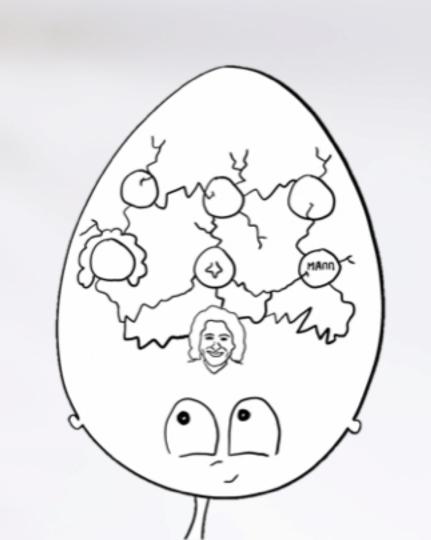


## limbisches System

THALAMUS Gyrus cinculi BALKEN AmyGDALA HiPPO -CAMPUS

Emotionen Gedächtnis











Verändert die Technik unser Denken?



Erste Nervenzellen – 650 Millionen Jahre

Erste Säugetiere – 200 Millionen Jahre

Erste "Menschen" – 8 Millionen Jahre

Moderner Mensch – 0,2 Millionen Jahre

Moderner Mensch - 200.000 Jahre

Einfache Sprache – 100.000 Jahre

Moderne Sprache – 35.000 Jahre

Schrift - 5.000 Jahre

Buchdruck - 500 Jahre



Schwarz-Weiß TV **Tonbandgerät Transistor Schaltkreise Mikroprozessor** PC CD Handy **iPhone Oculus Rift** 

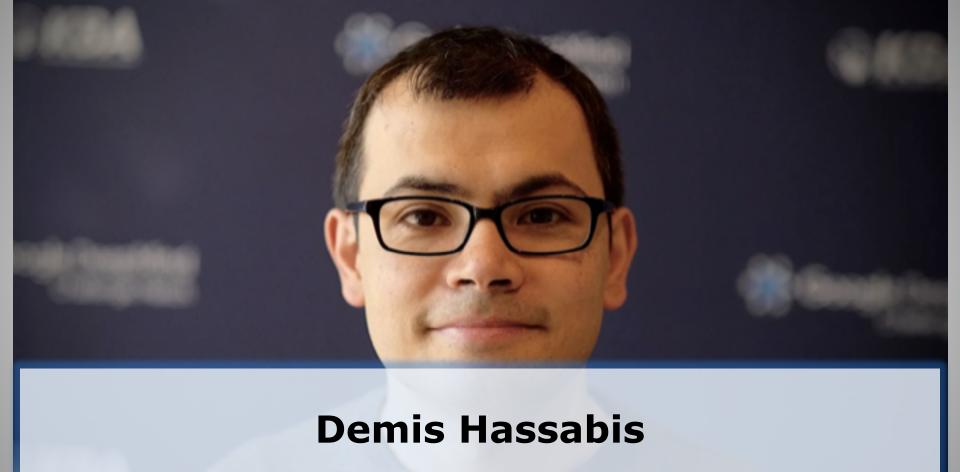




Künstliche Intelligenz







- - 1997 IBM Deep Blue besiegt Gary Kasparov (Schach)
  - 2015 AlphaGO besiegt den europ. Meister im Go
  - März 2016 AlphaGo besiegt den Weltmeister Lee Sedol 4-1
  - Januar 2017 Online: 60/0
  - Dezember 2017 AlphaZero (Go, Schach, Shoqi)
  - 8 Stunden > AlphaGo



Schlägt Go Spieler - Go Spieler lernen davon

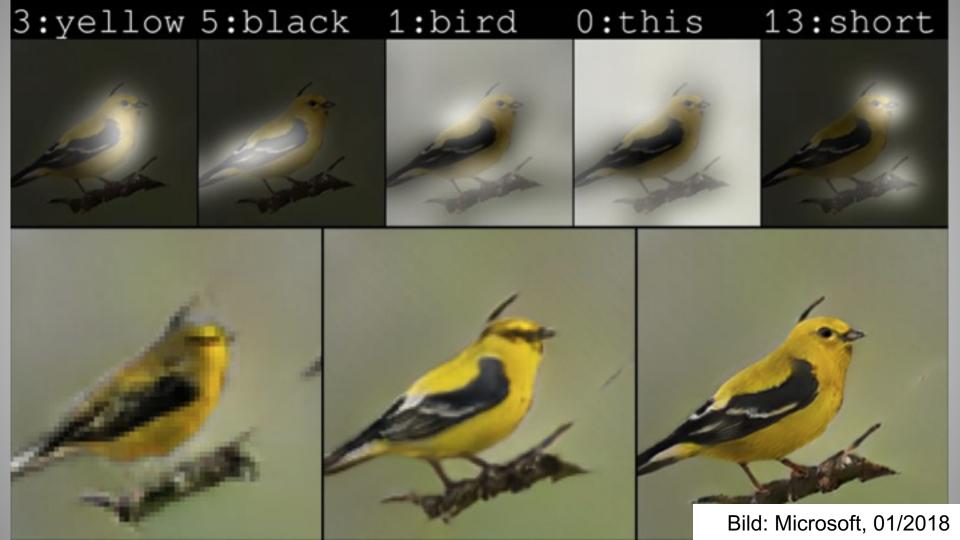
### **LETTER**

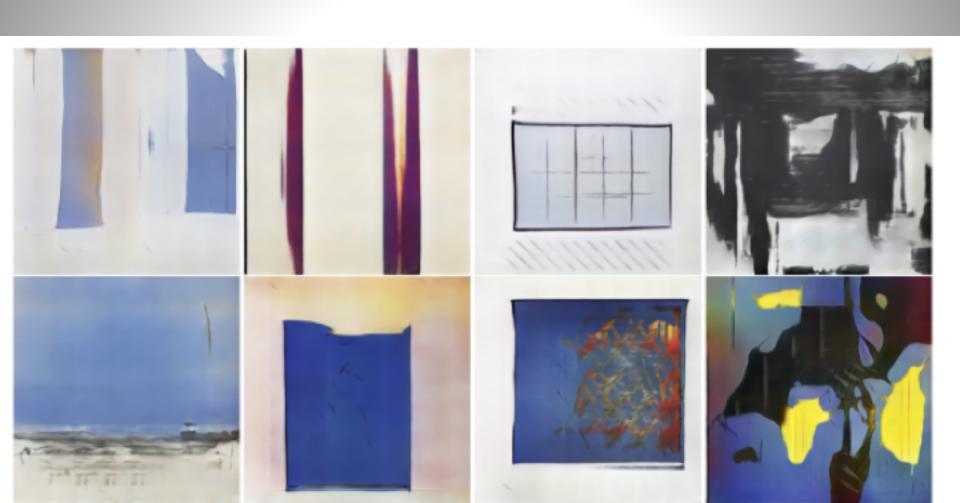
### Dermatologist-level classification of skin cancer with deep neural networks

Andre Esteva<sup>1\*</sup>, Brett Kuprel<sup>1\*</sup>, Roberto A. Novoa<sup>2,3</sup>, Justin Ko<sup>2</sup>, Susan M. Swetter<sup>2,4</sup>, Helen M. Blau<sup>5</sup> & Sebastian Thrun<sup>6</sup>

Skin cancer, the most common human malignancy<sup>1-3</sup>, 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 neural networks (CNNs)<sup>4,5</sup> show potential for general and highly variable tasks across many fine-grained object categories<sup>6-11</sup>. Here we demonstrate classification of skin lesions using a single CNN, trained end-to-end from images directly, using only pixels and disease labels as inputs. We train a CNN using a dataset of 129,450 clinical images—two orders of magnitude larger than previous datasets<sup>12</sup>—consisting of 2,032 different diseases. We test its performance against 21 board-certified dermatologists on

images (for example, smartphone images) exhibit variability in factors such as zoom, angle and lighting, making classification substantially more challenging<sup>23,24</sup>. We overcome this challenge by using a datadriven approach—1.41 million pre-training and training images make classification robust to photographic variability. Many previous techniques require extensive preprocessing, lesion segmentation and extraction of domain-specific visual features before classification. By contrast, our system requires no hand-crafted features; it is trained end-to-end directly from image labels and raw pixels, with a single network for both photographic and dermoscopic images. The existing body of work uses small datasets of typically less than a thousand images of skin lesions<sup>16,18,19</sup>, which, as a result, do not generalize well to new images. We demonstrate generalizable classification with a new dermatologist-labelled dataset of 129,450 clinical images, including







Beispiel Niederlande: Radio Q-Music, Gesichtserkennung + KI in App



Das führt nicht zu einer Zukunft in der Menschen von Killerrobotern versklavt werden. Zumindest nicht in den nächsten Jahren.







#### Danke!

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