YAPAY ZEKA YENİ İŞ ARKADAŞIMIZ MI?

PINAR DUYGULU ŞAHİN

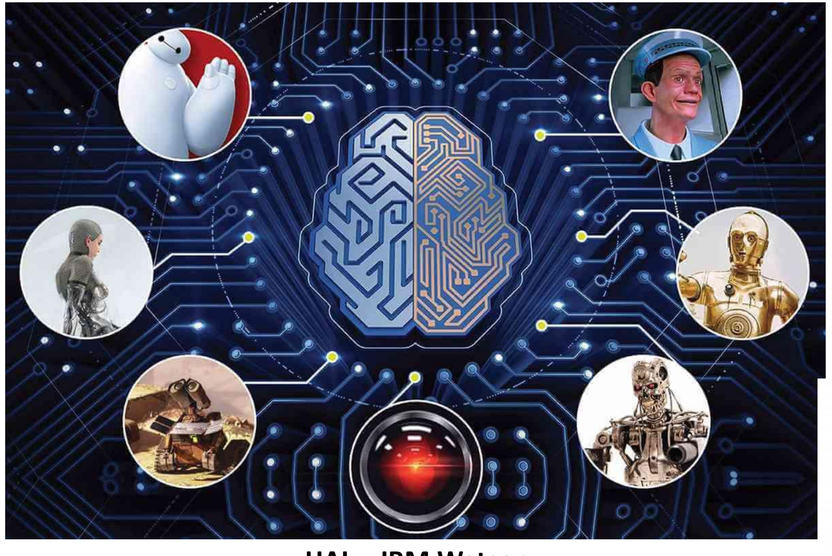
Hacettepe Üniversitesi, Bilgisayar Mühendisliği


her
A SPIKE JONZE LOVE STORY
a space odyssey
i ROBOT
ONE MAN SAW IT COMING
IN CINEMAS AUGUST 6
to serve you for
...ROMANCE
...VIOLENCE
...ANYTHING
GHOST IN THE SHELL
28 DAYS LATER
EX_MACHINA
COMING SOON
METROPOLIS
DON'T LET IT OUT
MORGAN
MATRIX
MARCH 31ST
JOHNNY DEPP
TRANSCENDENCE
APRIL 18
CHAPPIE
JUDE LAW
HALEY JOEL OSMENT
ARTIFICIAL INTELLIGENCE
SINGULARITY
JULIAN SCHAFFNER JOHN CUSACK
LANGELLA MARSDEN TYLER SARANDON
ROBOT &

Baymax - RIBA II

Ava – Geminoid
(Hiroshi İshiguro)

WALL-E - Roomba



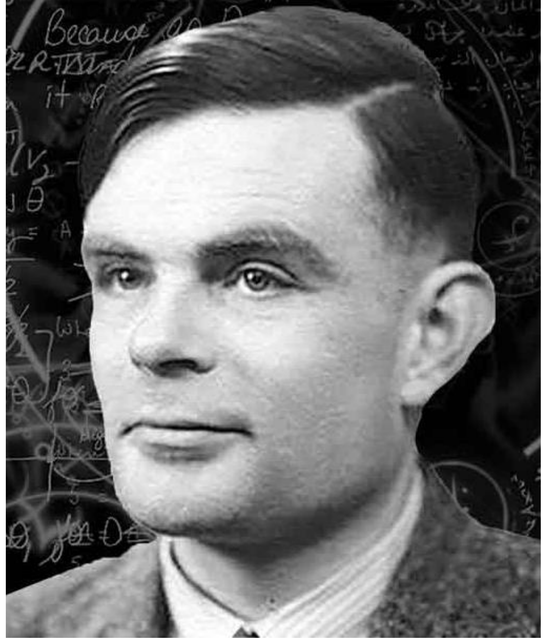
HAL – IBM Watson

Johnny Cab - Google self-driving car

C-3PO - Pepper

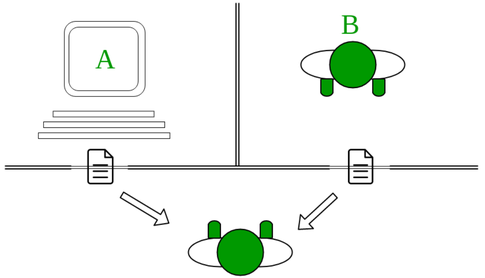
Terminator - Atlas robots

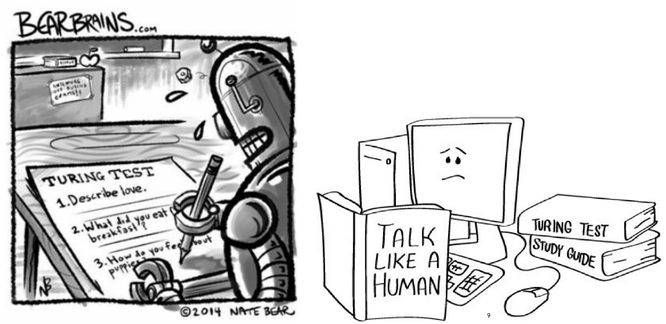
https://medium.com/@hackerearth/7-artificial-intelligence-based-movie-characters-that-are-now-a-reality-d2b91b97d9be

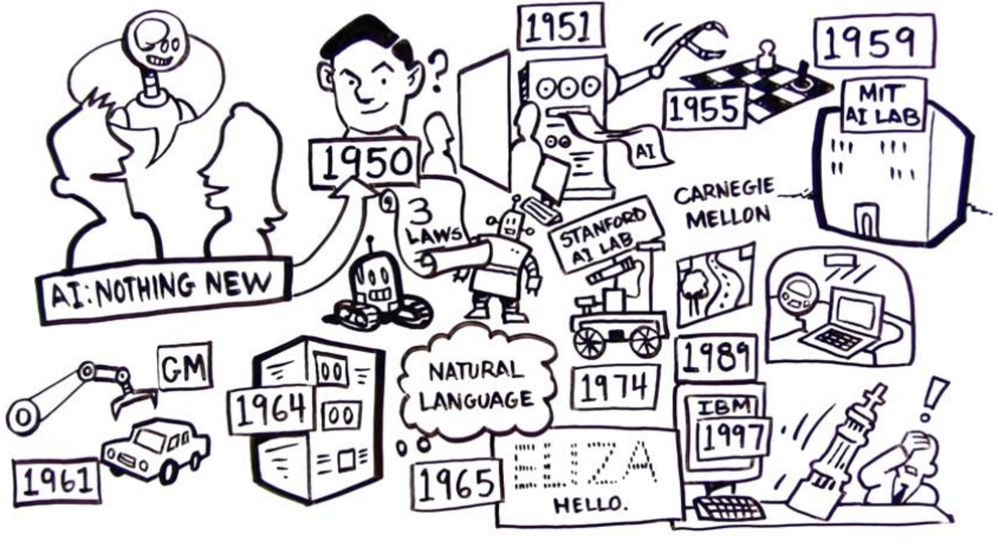


"I propose to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine 'and 'think'. … [But] Instead of attempting such a definition I shall replace the question by another... The new form of the problem can be described in terms of a game which we call the 'imitation game'."

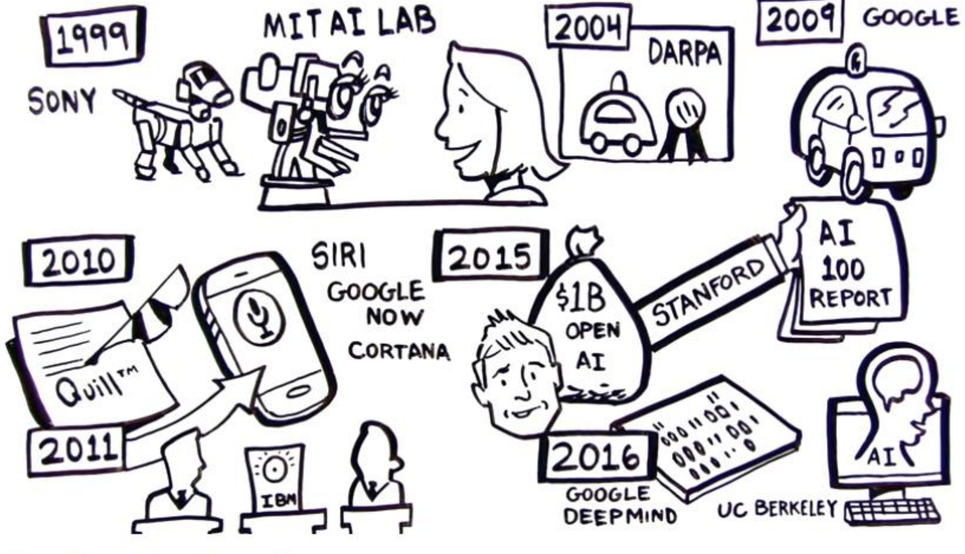
-Alan Turing, "Computing Machinery and Intelligence", 1950







https://www.youtube.com/watch?v=056v4OxKwlI



A Brief History of Artificial Intelligence

Satranç

https://en.wikipedia.org/wiki/Deep_Blue_(chess_computer)n-76882

1989 : İlk satranç programı Deep Thought geliştirildi

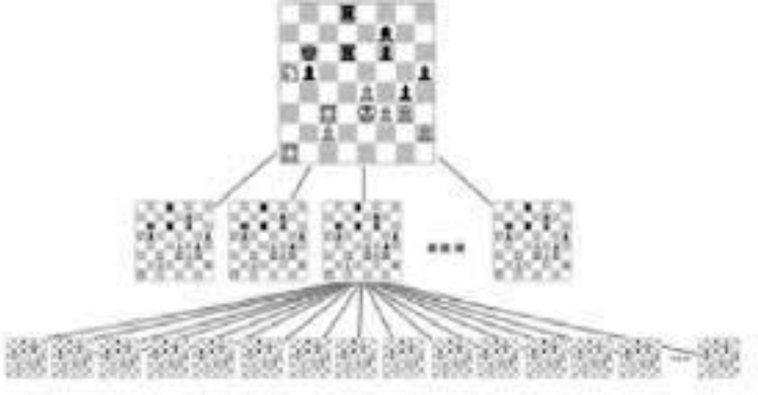
1996 : IBM tarafından geliştirilen Deep Blue adlı super bilgisay Gary Kasparov'u yendi

2006 : Deep Fritz Vladimir Kramnik'i sadece bir PC üzerinde çalışan yazılım ile yendi

Satrançta fark yaratan ileri hamleleri hesaplayabilmektir.

Bilgisayarlar bu zaferi sayıda bilgiyi çok hızlı bir şekilde işleyerek elde etmişlerdir.

Strateji: Olası hareketleri ağaç yapısı ile gösterip bu ağaçta en iyi patikayı bulmak



pawn	knight	bishop	rook	queen
1	3	3	5	9

Go

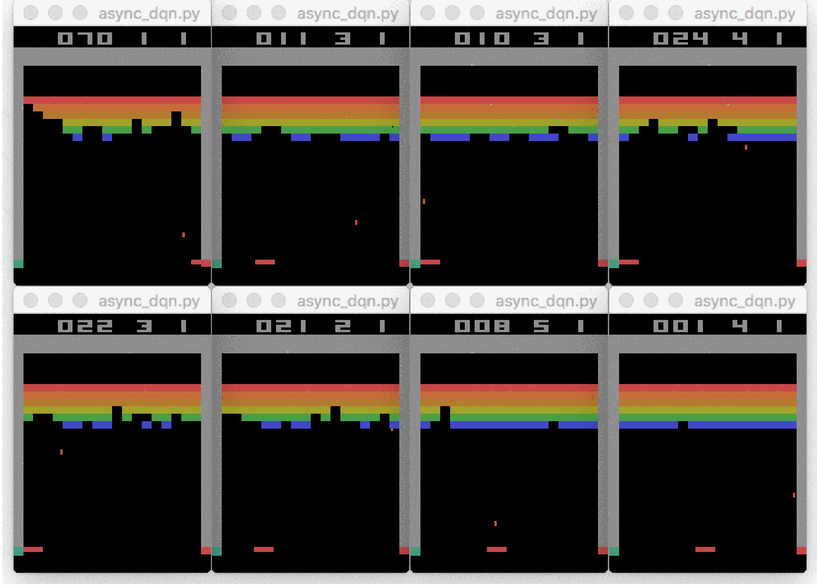
https://deepmind.com/research/alphago/

2015-2016: Google DeepMind ekibi tarafından geliştirilen AlphaGo Dünya Go şampiyonları Lee Sedol and Ke Jie'yi yendi

Go: 19x19'luk oyun tahtası, 10^{170} olası kombinasyon, satranç stratejisi mümkün değil

Önce amatör Go oyuncularının oyunlarından, daha sonra ise kendine karşı oynayarak öğrenmiştir.

Strateji: Derin nöral ağlar/Pekiştirmeli öğrenme



Atari oyunları

Sadece 4 saat içinde satranç ustası

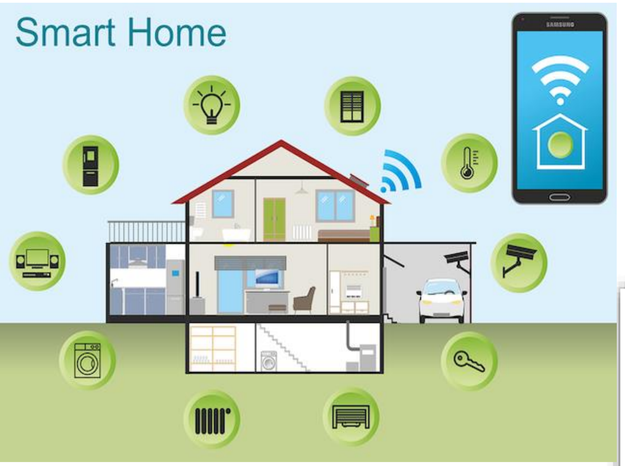
Riziko

https://en.wikipedia.org/wiki/Watson_(computer)

2011: IBM Watson Jeopardy (Riziko) adlı verilen ipuçların ait soruyu bulmanın amaçlandığı yarışmada en başarılı yarışmacılar Brad Rutter ve Ken Jennings'i yendi

Strateji: Doğal dil anlama, bilgi erişimi, otomatik muhakeme, soru cevaplama

Sürücüsüz araçlar



Günlük hayatımızda Yapay Zeka nerede?

https://medium.com/@navdeepsingh_2336/

Diyet kontrolü

Im2Calories: Towards An Automated Mobile Vision Food Diary
Austin Myers
et al. ICCV 2015

How is it <u>subjectively</u> perceived by human:
#foodie, #hungry, #yummy, #burger, #salad

How is it <u>objectively</u> perceived by machine:
#burger, #chips, #fries, #coke, #pickle, #onion

Is Saki #delicious? The Food Perception Gap on Instagram and Its Relation to Health
Ferda Ofli et al. WWW 2017

Kişisel sağlık kontrolü

Yapay Zeka Sağlık alanında ne faydalar sağlayabilir?

Sağlık harcamalarında düşüş

Rutin ve sıkıcı işleri en aza indirgeyerek

sağlık personelinin verimli kullanılmasını sağlama

Yorgunluğa bağlı insan hatasını en aza indirgeme

Sanal ve artırılmış gerçekik ile uzaktan erişim olanağı sağlama

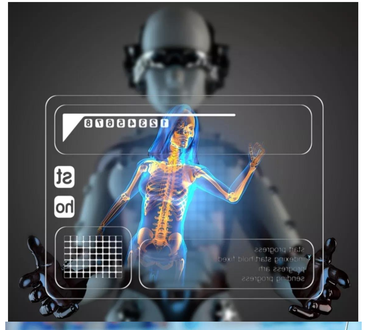
Acil durumların tespitinde yardım ederek ölüm oranını azaltma

Hızlı ve doğru tanı koymada yardım etme

Yaşlı ve hasta bakımında yardım etme

https://www.healthcentral.com/slideshow/8-ways-artificial-intelligence-is-affecting-the-medical-field

futurism.media/artificial-intelligence-in-medicine

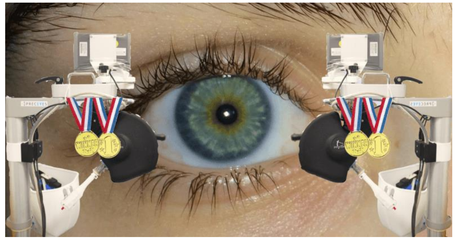


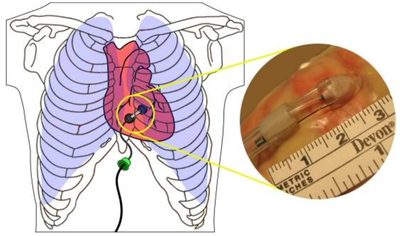
10 AI Applications That Could Change Health Care

APPLICATION	POTENTIAL ANNUAL VALUE BY 2026	KEY DRIVERS FOR ADOPTION
Robot-assisted surgery	$40B	Technological advances in robotic solutions for more types of surgery
Virtual nursing assistants	20	Increasing pressure caused by medical labor shortage
Administrative workflow	18	Easier integration with existing technology infrastructure
Fraud detection	17	Need to address increasingly complex service and payment fraud attempts
Dosage error reduction	16	Prevalence of medical errors, which leads to tangible penalties
Connected machines	14	Proliferation of connected machines/devices
Clinical trial participation	13	Patent cliff; plethora of data; outcomes-driven approach
Preliminary diagnosis	5	Interoperability/data architecture to enhance accuracy
Automated image diagnosis	3	Storage capacity; greater trust in AI technology
Cybersecurity	2	Increase in breaches; pressure to protect health data

SOURCE ACCENTURE

Robotik Ameliyatlar



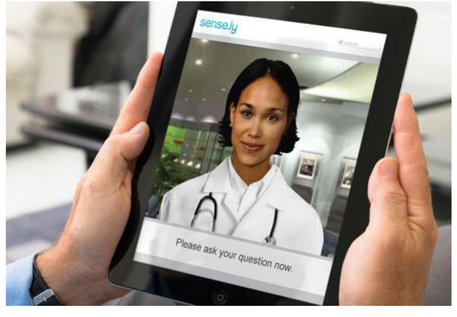


En az invazif
Daha az komplikasyon
Daha kısa sürede iyileşme

Da Vinci ameliyat robotu ile zor ameliyatlar daha kontrollü yapılabiliyor
University of Oxford'da robotla göz ameliyatı gerçekleştirildi
Heartlander minyatür robotu atan kalbin üzerinde çalışıyor

https://thenextweb.com/science/2018/06/19/a-robot-operated-on-a-human-eye-for-the-first-time-ever/
https://www.cs.cmu.edu/~heartlander/index.html

Hemşire Robotlar/Sanal Hemşireler



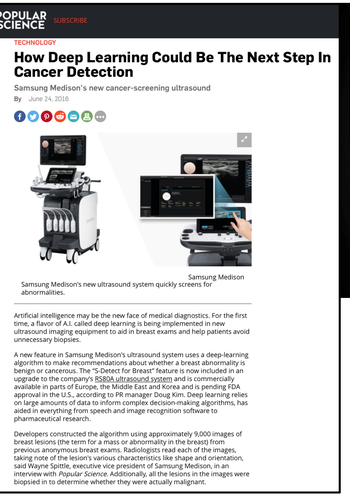
Molly'nin görevi hastalarla konuşmak, sıkıntılarını anlamak, İlgili ölçümleri yapmak, yönlendirmek

Pearl'ın görevi yaşlılara yön göstermek, ölçüm yapmak

RIBA'nın görevi hastaları kaldırıp taşımak

Pepper'in görevi hastane hakkında bilgi vermek, soruları cevaplamak

Radyoloji/Ultrason görüntülerinin analizi



POPULAR SCIENCE SUBSCRIBE

TECHNOLOGY

How Deep Learning Could Be The Next Step In Cancer Detection

Samsung Medison's new cancer-screening ultrasound

By June 24, 2016

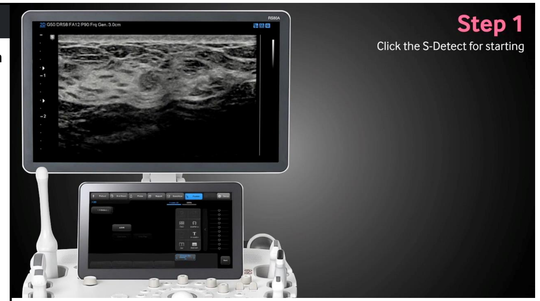
Samsung Medison

Samsung Medison's new ultrasound system quickly screens for abnormalities.

Artificial intelligence may be the new face of medical diagnostics. For the first time, a flavor of A.I. called deep learning is being implemented in new ultrasound imaging equipment to aid in breast exams and help patients avoid unnecessary biopsies.

A new feature in Samsung Medison's ultrasound system uses a deep-learning algorithm to make recommendations about whether a breast abnormality is benign or cancerous. The "S-Detect for Breast" feature is now included in an upgrade to the company's RS80A ultrasound system and is commercially available in parts of Europe, the Middle East and Korea and is pending FDA approval in the U.S., according to PR manager Doug Kim. Deep learning relies on large amounts of data to inform complex decision-making algorithms, has aided in everything from speech and image recognition software to pharmaceutical research.

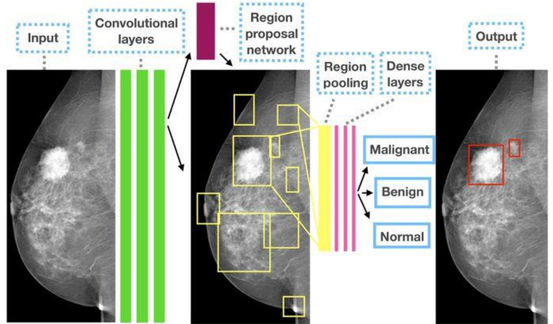
Developers constructed the algorithm using approximately 9,000 images of breast lesions (the term for a mass or abnormality in the breast) from previous anonymous breast exams. Radiologists read each of the images, taking note of the lesion's various characteristics like shape and orientation, said Wayne Spittle, executive vice president of Samsung Medison, in an interview with *Popular Science*. Additionally, all the lesions in the images were biopsied in to determine whether they were actually malignant.

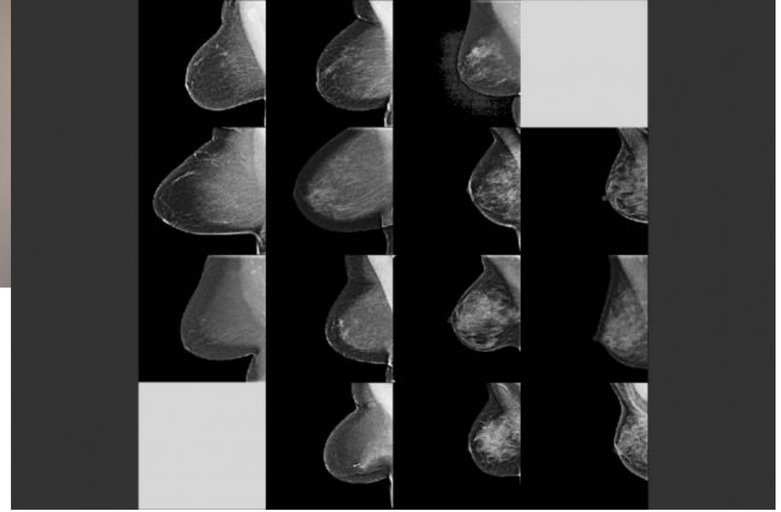


"A new feature in Samsung Medison's ultrasound system uses a deep-learning algorithm to make recommendations about whether a breast abnormality is benign or cancerous. The "S-Detect for Breast" feature is now included in an upgrade to the company's RS80A ultrasound system and is commercially available in parts of Europe, the Middle East and Korea and is pending FDA approval in the U.S."

http://www.popsci.com/how-deep-learning-technology-could-be-next-step-in-cancer-detection

SAMSUNG MEDISON





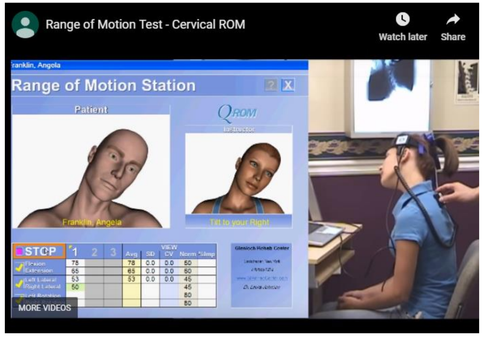
http://news.mit.edu/2018/AI-identifies-dense-tissue-breast-cancer-mammograms-1016

Detecting and classifying lesions in mammograms with Deep Learning
Dezső Ribli, Anna Horváth, Zsuzsa Unger, Péter Pollner & István Csabai , 2018

Rehabilitasyon/Fizyoterapi

Cerebral Palsi semptompalarının azaltılmasında Darwin adlı fizyoterapist bir robot

https://www.technologyreview.com/s/603614/a-robot-physical-therapist-helps-kids-with-cerebral-palsy/



https://medium.com/@coviu/artificial-intelligence-for-physiotherapy-1f22fb4ac

HAL exoskeleton

Hızlı ve Doğru Tanı koyma

INFO | SYMPTOMS | QUESTIONS | CONDITIONS | DETAILS | TREATMENT

WebMD Symptom Checker BETA

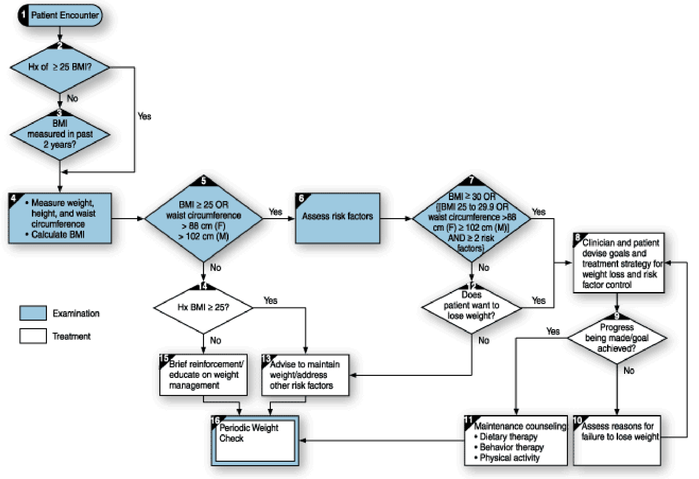
Identify possible conditions and treatment related to your symptoms.

This tool does not provide medical advice. See additional information.

Age

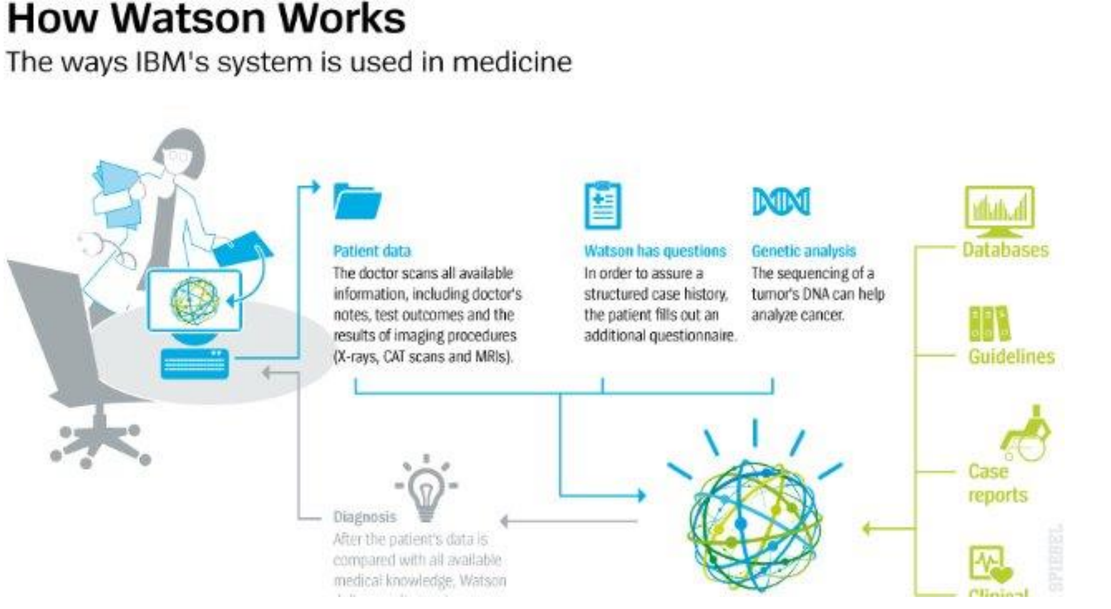
Gender

Male | Female

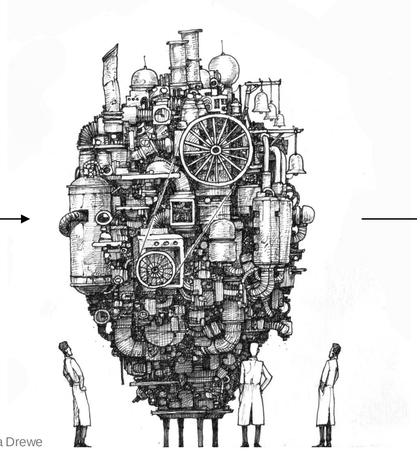


* This algorithm applies only to the assessment for overweight and obesity and subsequent decisions based on that assessment. It does not include any initial overall assessment for cardiovascular risk factors or diseases that are indicated.

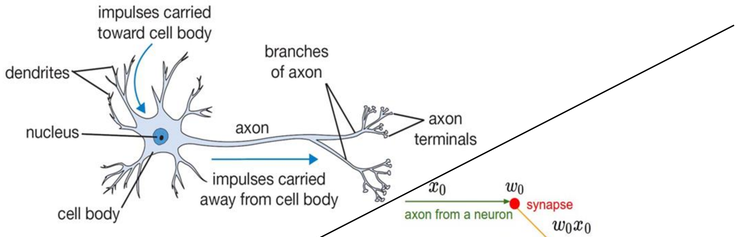
https://en.wikipedia.org/wiki/Medical_diagnosis



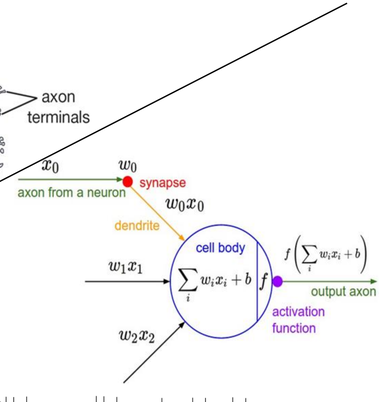
http://www.spiegel.de/international/world/bild-1221543-1323685.html

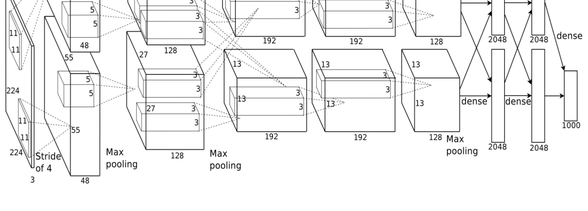


Joshua Drewe



“Cat”



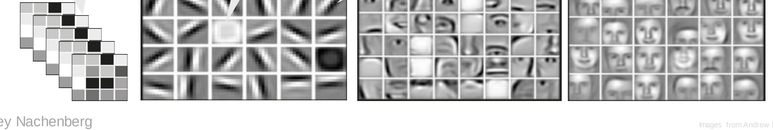


A Deep Learning algorithm is presented with millions of images made up of simple pixels.

The algorithm discovers simple “regularities” that are present across many/all images, like curves & lines.

The algorithm discovers how these regularities are related to form higher-level concepts.

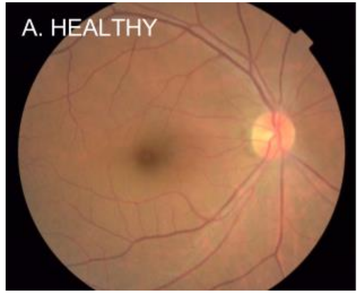
Ultimately, the system gains a high-level understanding of the original data… All automatically!



Carey Nachenberg

Images from Andrew Ng

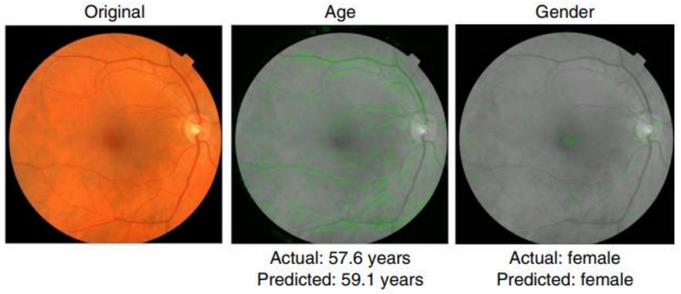
Retina analizi



JAMA | Original Investigation | INNOVATIONS IN HEALTH CARE DELIVERY

Development and Validation of a Deep Learning Algorithm for Detection of Diabetic Retinopathy in Retinal Fundus Photographs

"Working closely with doctors both in India and the US, we created a development dataset of 128K images which were each evaluated by 3-7 ophthalmologists from a panel of 54 ophthalmologists. This dataset was used to train a deep neural network to detect referable diabetic retinopathy. The results show that our algorithm's performance is on-par with that of ophthalmologists."



nature biomedical engineering

ARTICLES

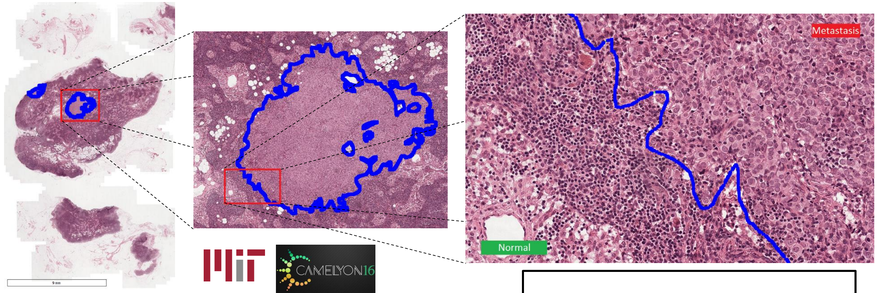
https://doi.org/10.1038/s41551-018-0195-

Prediction of cardiovascular risk factors from retinal fundus photographs via deep learning

Ryan Poplin[1,4], Avinash V. Varadarajan[1,4], Katy Blumer[1], Yun Liu[1], Michael V. McConnell[2,3], Greg S. Corrado[1], Lily Peng[1,4]* and Dale R. Webster[1,4]

Table 5 | Predicting five-year MACE in the UK Biobank validation dataset using various input variables

Risk factor(s) or model used for the prediction	AUC (95% CI)
Age only	0.66 (0.61,0.71)
SBP only	0.66 (0.61,0.71)
BMI only	0.62 (0.56,0.67)
Gender only	0.57 (0.53,0.62)
Current smoker only	0.55 (0.52,0.59)
Algorithm only	0.70 (0.65,0.74)
Age + SBP + BMI + gender + current smoker	0.72 (0.68,0.76)
Algorithm + age + SBP + BMI + gender + current smoker	0.73 (0.69,0.77)
SCORE[6,7]	0.72 (0.67,0.76)
Algorithm + SCORE	0.72 (0.67,0.76)

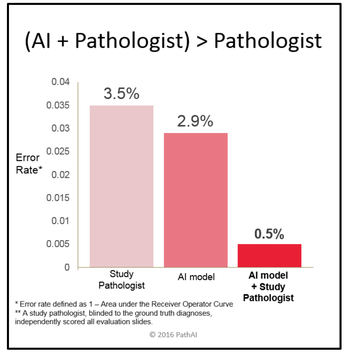


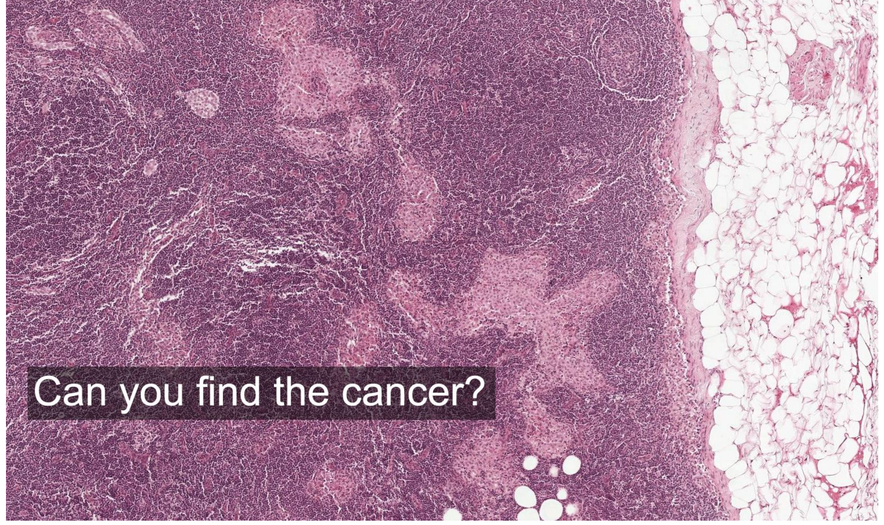
20 Gigapixel images

Deep Learning for Identifying Metastatic Breast Cancer

Dayong Wang et al. 2016

We obtain AUC of 0.925 for whole slide image classification and a score of 0.7051 for tumor localization. Combining our deep learning system's predictions with the human pathologist's diagnoses increased his AUC to 0.995, representing an approximately 85% reduction in human error rate.





https://research.googleblog.com/2017/03/assisting-pathologists-in-detecting.html

Detecting Cancer Metastases on Gigapixel Pathology Images, Yun Liu et al. 2017

Research at Google

We showed that it is possible to train a model that either matched or exceeded the performance of a pathologist who had unlimited time to examine the slides."

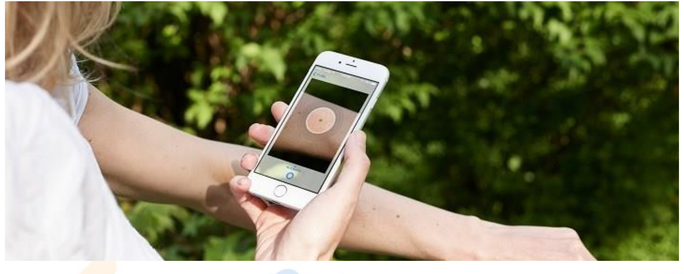
Deri kanseri teşhisi

Dermatologist-level classification of skin cancer with deep neural networks

Andre Esteva et al. Nature 542, 115–118 (02 Feb. 2017)

"We train a CNN using a dataset of 129,450 clinical images—two orders of magnitude larger than previous datasets—consisting of 2,032 different diseases. We test its performance against 21 board-certified dermatologists on biopsy-proven clinical images with two critical binary classification use cases: keratinocyte carcinomas versus benign seborrheic keratoses; and malignant melanomas versus benign nevi."

SkinVision

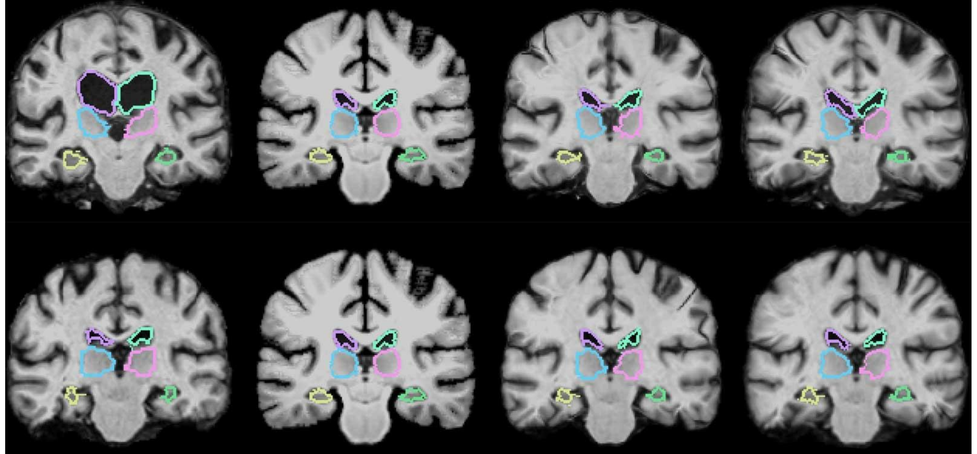


Take a photo of your skin spot

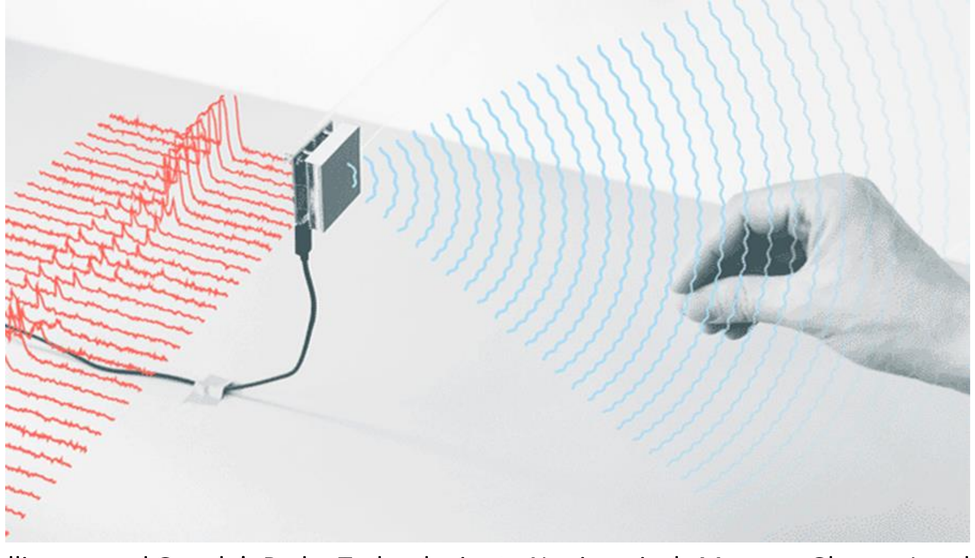
Receive your risk indication

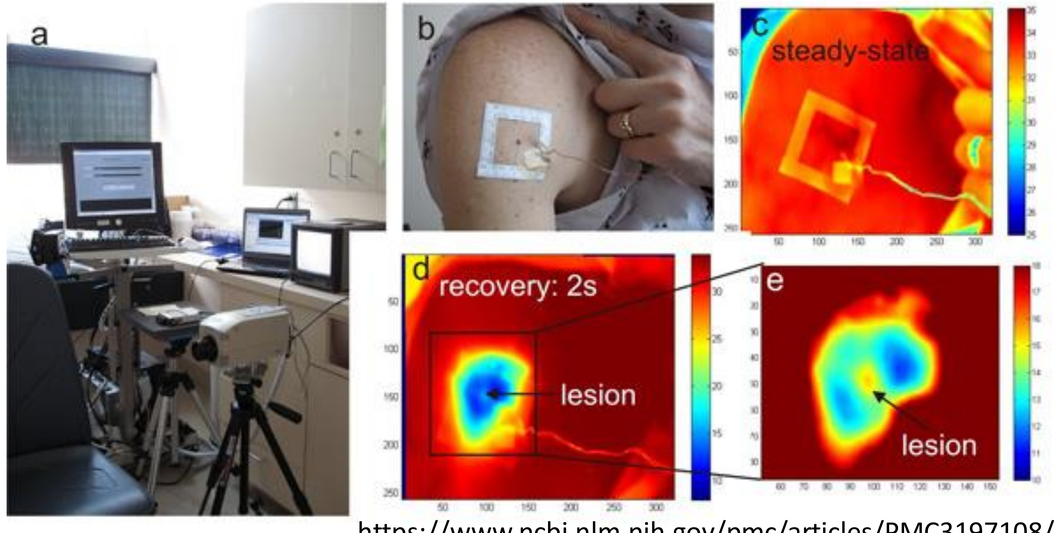
Schedule your next check

MIT’den araştırmacılar sayesinde 3B görüntüler artık 1000 kat daha hızlı analiz ediliyor



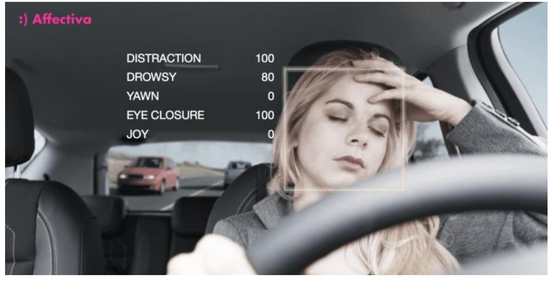
Hareket analizi ile Parkinson teşhisi 30 dakikadan 3 dakikaya indiriliyor

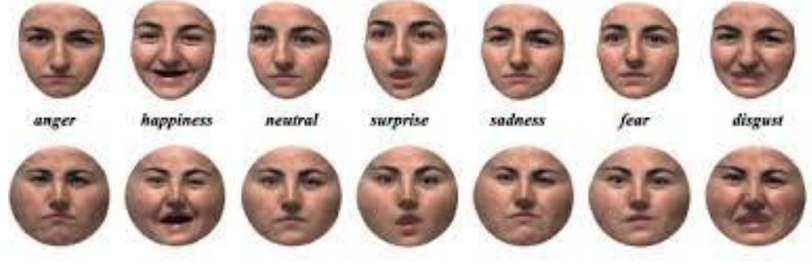




https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3197108/

- Artificial Intelligence and Google's Radar Technologies to Noninvasively Measure Glucose Levels
- https://www.wearable-technologies.com/2018/09/artificial-intelligence-and-googles-radar-technologies-to-noninvasively-measure-glucose-levels/



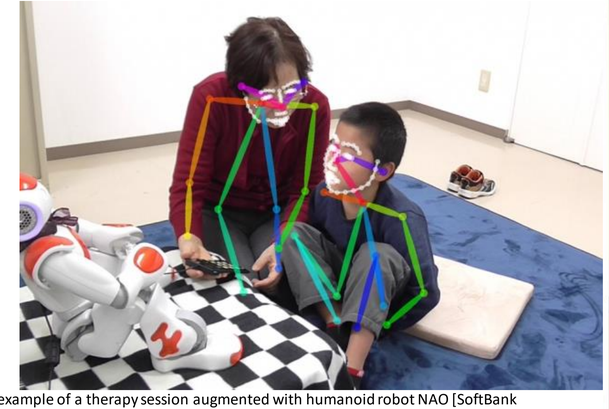


Detection and Computational Analysis of Psychological Signals (DCAPS)

USC Institute for Creative Technologies

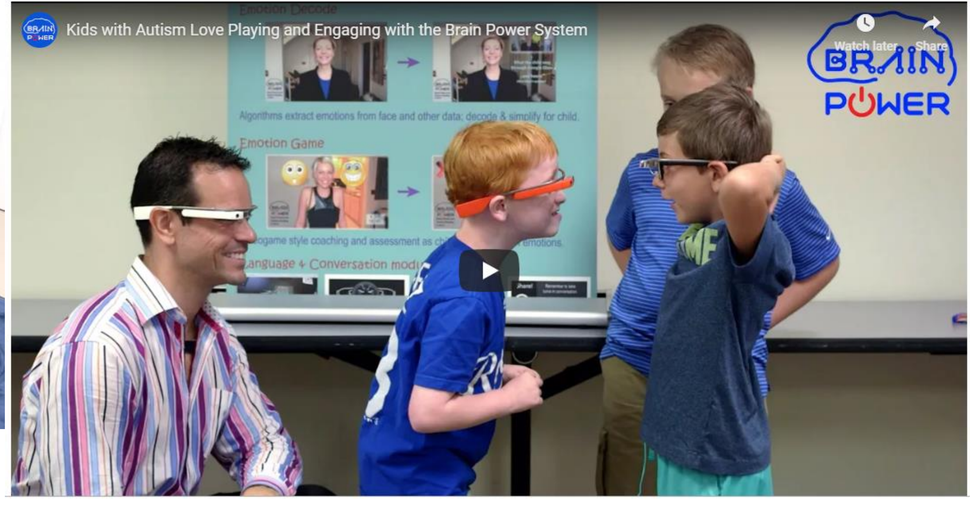
http://medvr.ict.usc.edu/projects/dcaps/

Otizm



n example of a therapy session augmented with humanoid robot NAO [SoftBank Robotics], which was used in the EngageMe study. Tracking of limbs/faces was performed using the CMU Perceptual Lab's OpenPose utility.
Image: MIT Media Lab

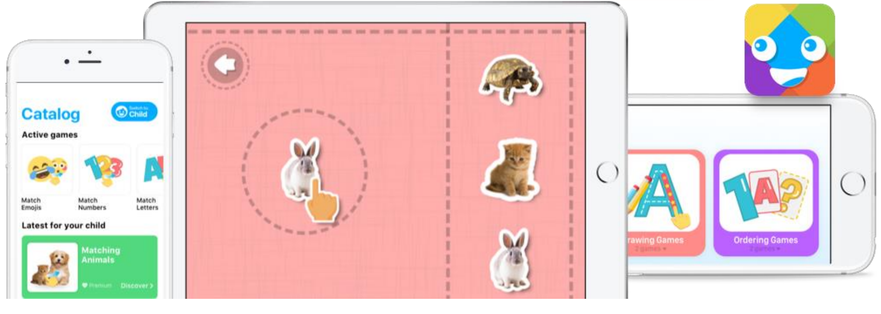
http://news.mit.edu/2018/personalized-deep-learning-equips-robots-autism-therapy-0627

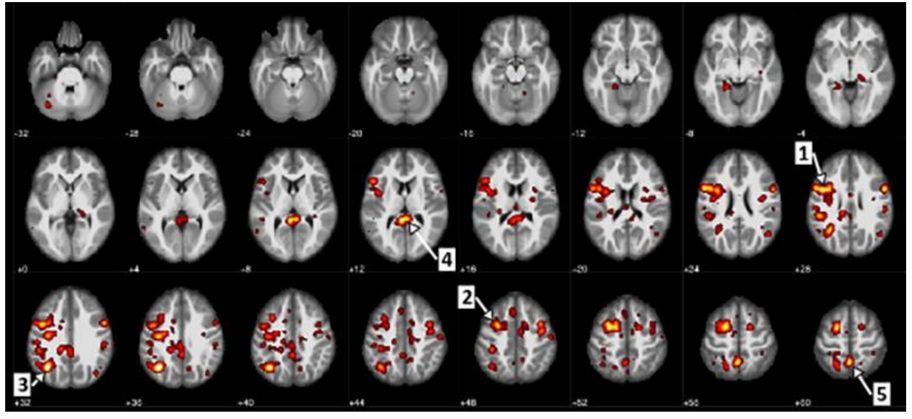


http://www.brain-power.com/autism/

otsimo

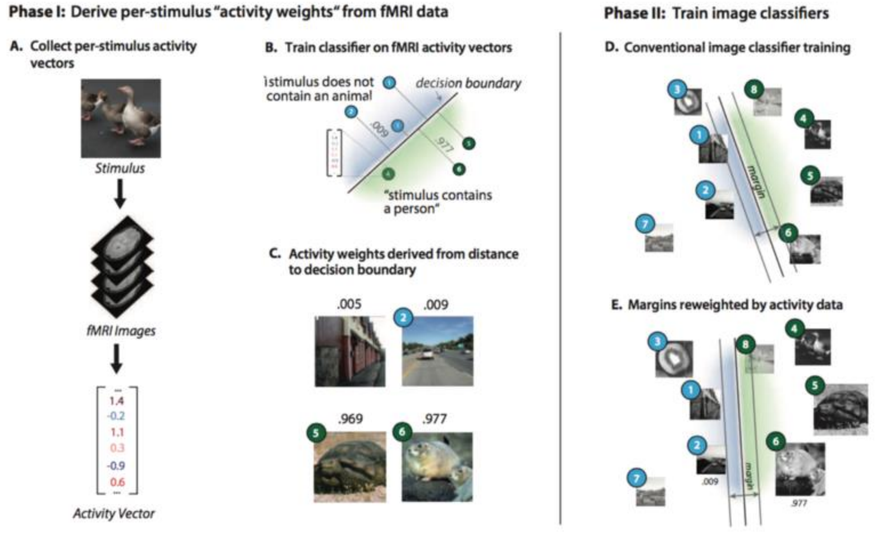
Çocuğunuz için
kişiselleştirilebilir eğitim.





IBM and the University of Alberta in Canada has come up with a software tool that analyzes functional magnetic resonance imaging (fMRI) scans of patient brains and with 74% accuracy diagnoses schizophrenia

https://www.medgadget.com/2017/07/deep-learning-algorithm-diagnoses-schizophrenia-fmri-scans.html



Using Human Brain Activity to Guide Machine Learning

https://medium.com/syncedreview/using-human-brain-activity-to-guide-machine-learning-b995a418fb53

“It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change.”

Leon C. Megginson, paraphrasing Charles Darwin, 1963