Understanding the Role of Artificial Intelligence & Machine Learning in Delivering Legal Services

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1997

Deep Blue Defeats Gary Kasparov

1997

"It may be a hundred years before a computer beats humans at Go — maybe even longer."

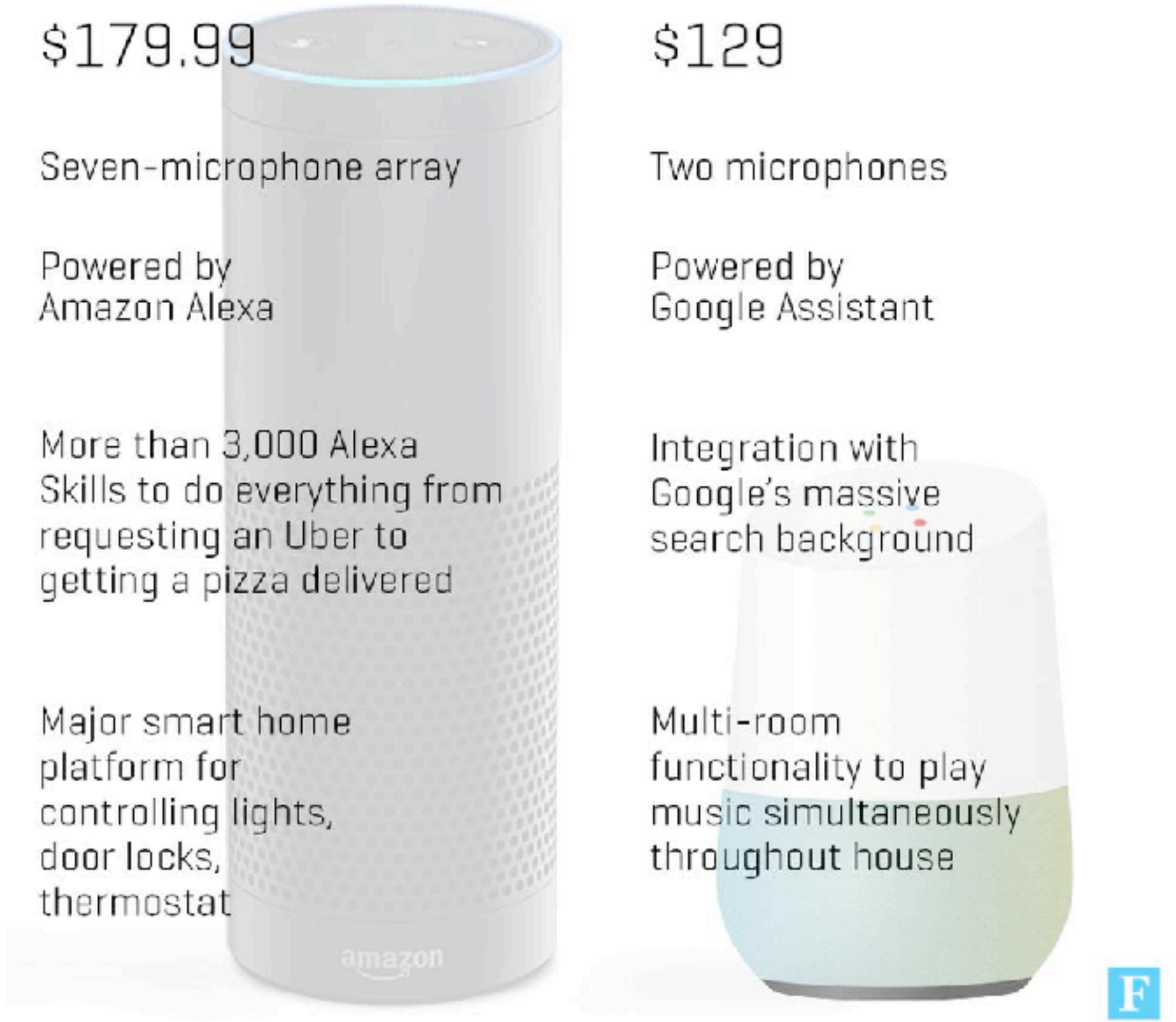
Dr. Piet Hut
Astrophysicist & Go Enthusiast


2016
Google's AI
AlphaGo Defeats
Go Master Lee Sedol

Jim Harris @JimHarris · Jan 4

Today's Smartphone Has More Computing Power Than ALL Of NASA's compute power in 1969 #CES2017 #smartphones #tech

Amazon Echo vs. Google Home



$179.99

Seven-microphone array

Powered by
Amazon Alexa

More than 3,000 Alexa Skills to do everything from requesting an Uber to getting a pizza delivered

Major smart home platform for controlling lights, door locks, thermostat

$129

Two microphones

Powered by
Google Assistant

Integration with Google's massive search background

Multi-room functionality to play music simultaneously throughout house

Baidu's AI Medical Assistant provides medical diagnostic services. Please describe the patient's symptoms.

My baby was born prematurely. His skin looks yellowish and so are his eyes. What is happening?

How old is the patient?

Chinese chatbot uses AI to provide medical diagnosis

China's Baidu has developed a bot that uses natural language processing to interact directly with patients, supporting do speeding up the process of diagnosing.

25 Nov 2016

ELEMENTS

THE CHATBOT WILL SEE YOU NOW

By Nick Romeo December 25, 2016

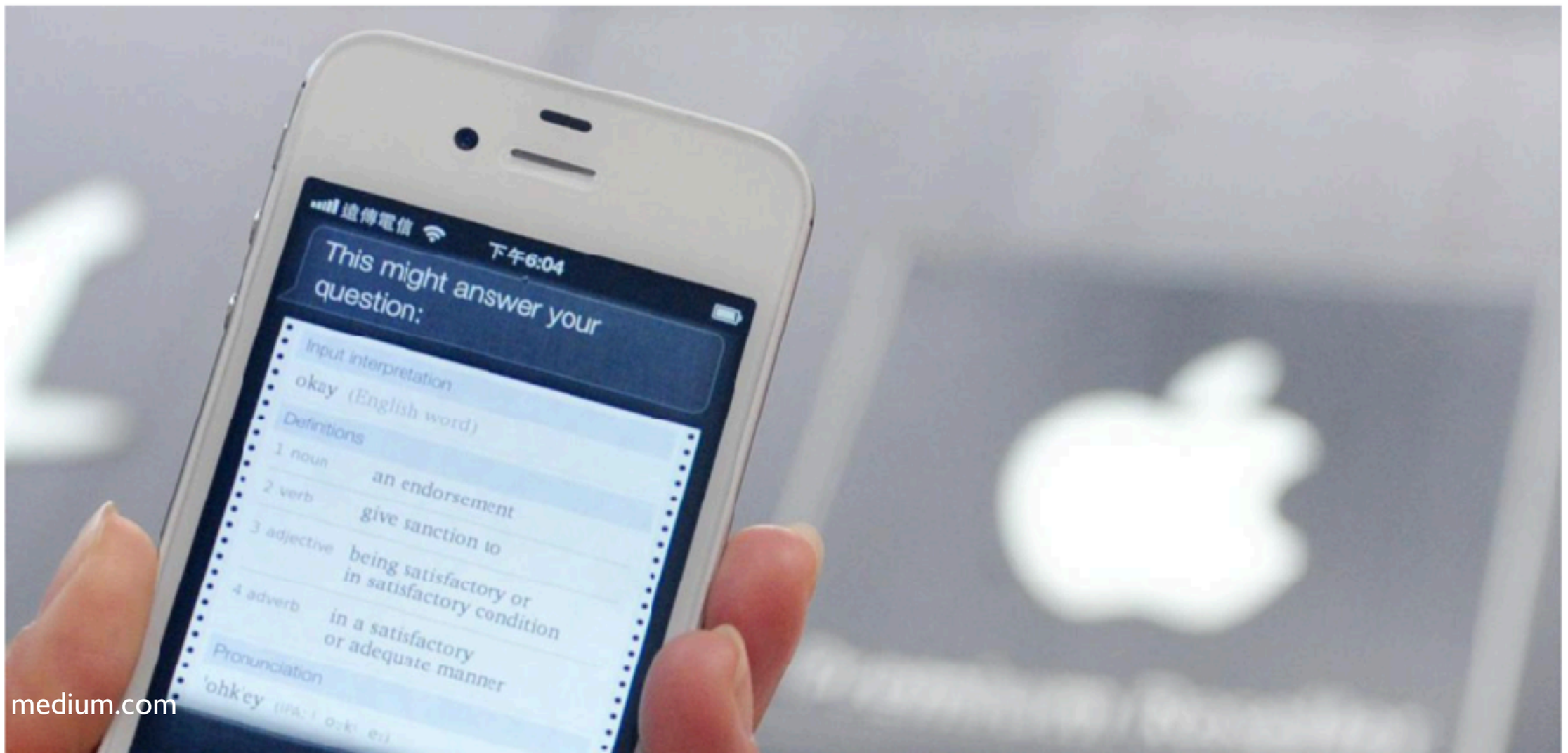
Could artificial intelligence help address the mental-health crisis among Syrian refugees?

Illustration by Eleanor Taylor

Siri saves baby's life by calling ambulance after she stopped breathing

Mother sends personal letter of thanks to Apple for helping rescue one-year-old daughter

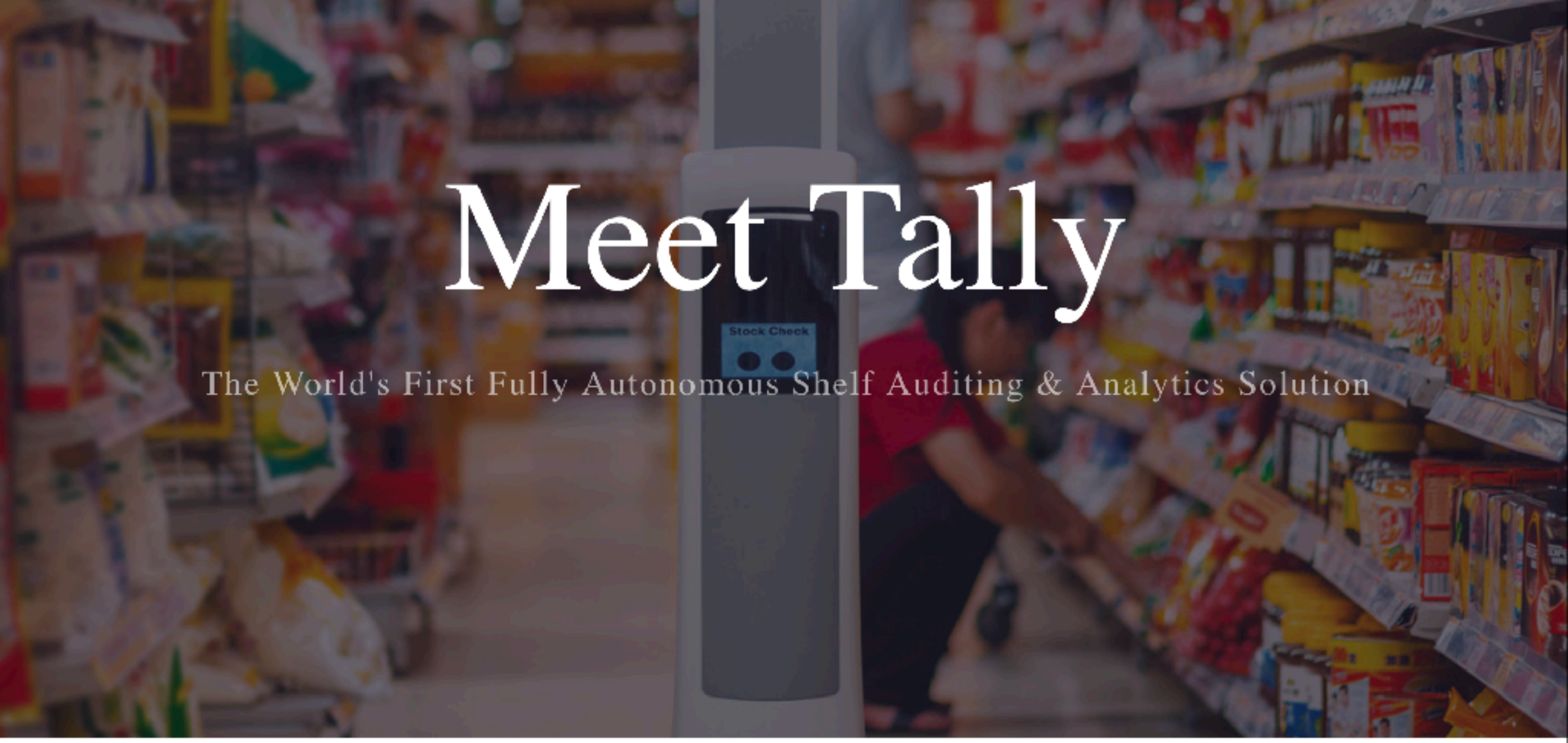
Gabriel Samuels | @gabs_samuels | Wednesday 8 June 2016 | 3 comments



Matt Schlicht Follow
CEO of Octane AI, Founder of Chatbots Magazine, YC Alum, Forbes 30 Under 30, product at Ustrea...
Nov 2, 2016 · 7 min read

How Bots Will Completely Kill Websites and Mobile Apps


ADRIAN
fastbrick
robotics



Meet Tally

The World's First Fully Autonomous Shelf Auditing & Analytics Solution

Automating the most mundane, repetitive tasks in retail execution

Tally performs the repetitive and laborious tasks of auditing shelves for out-of-stock items, low stock items, misplaced items, and pricing errors. Tally operates safely during normal store hours alongside shoppers and employees.

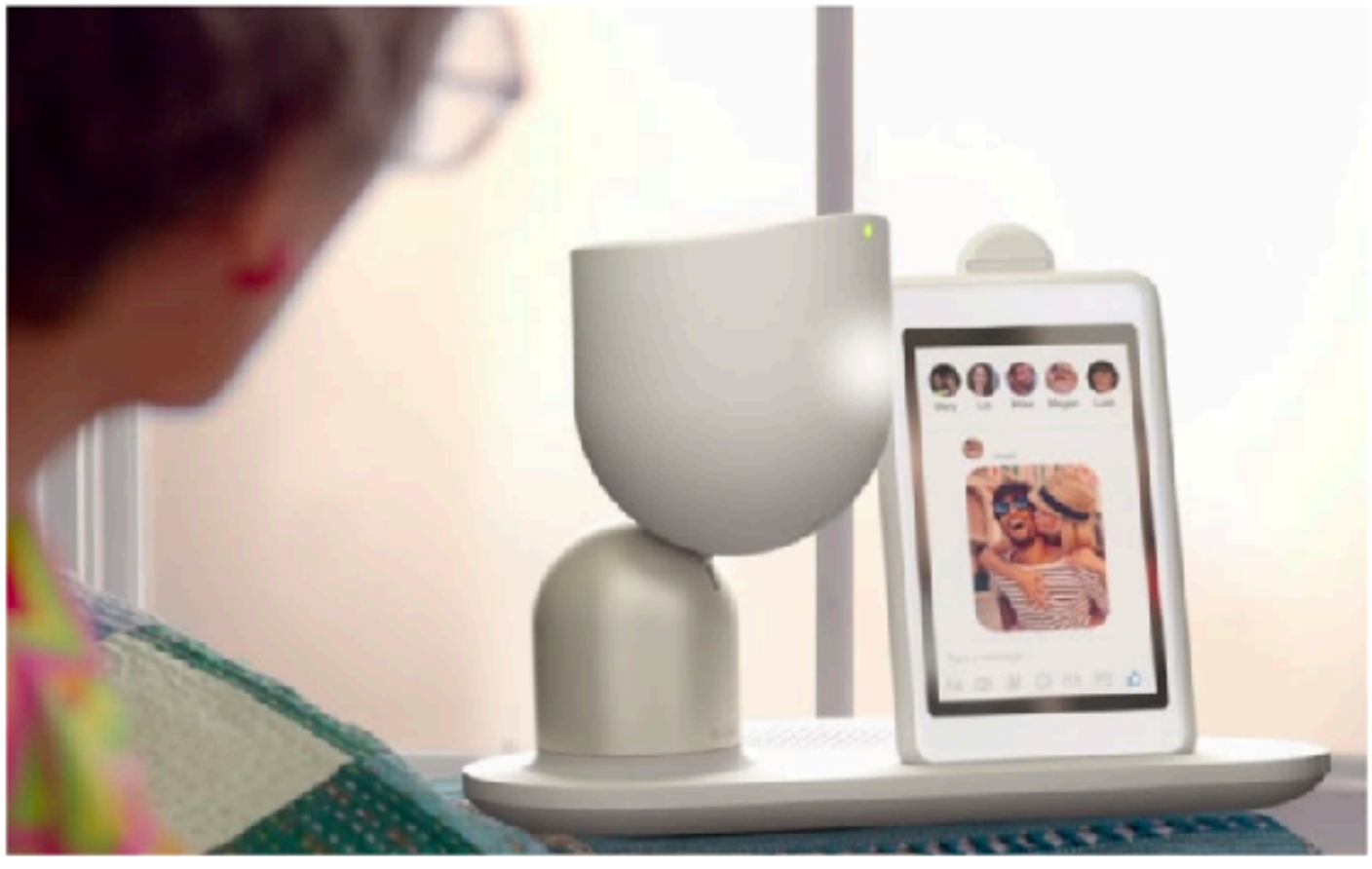
The Pew Trusts @pewtrusts · 28 Dec 2016

Driverless delivery robots are showing up on city sidewalks. Here's what you need to know: pew.org/2gZYzzo

Science

Science

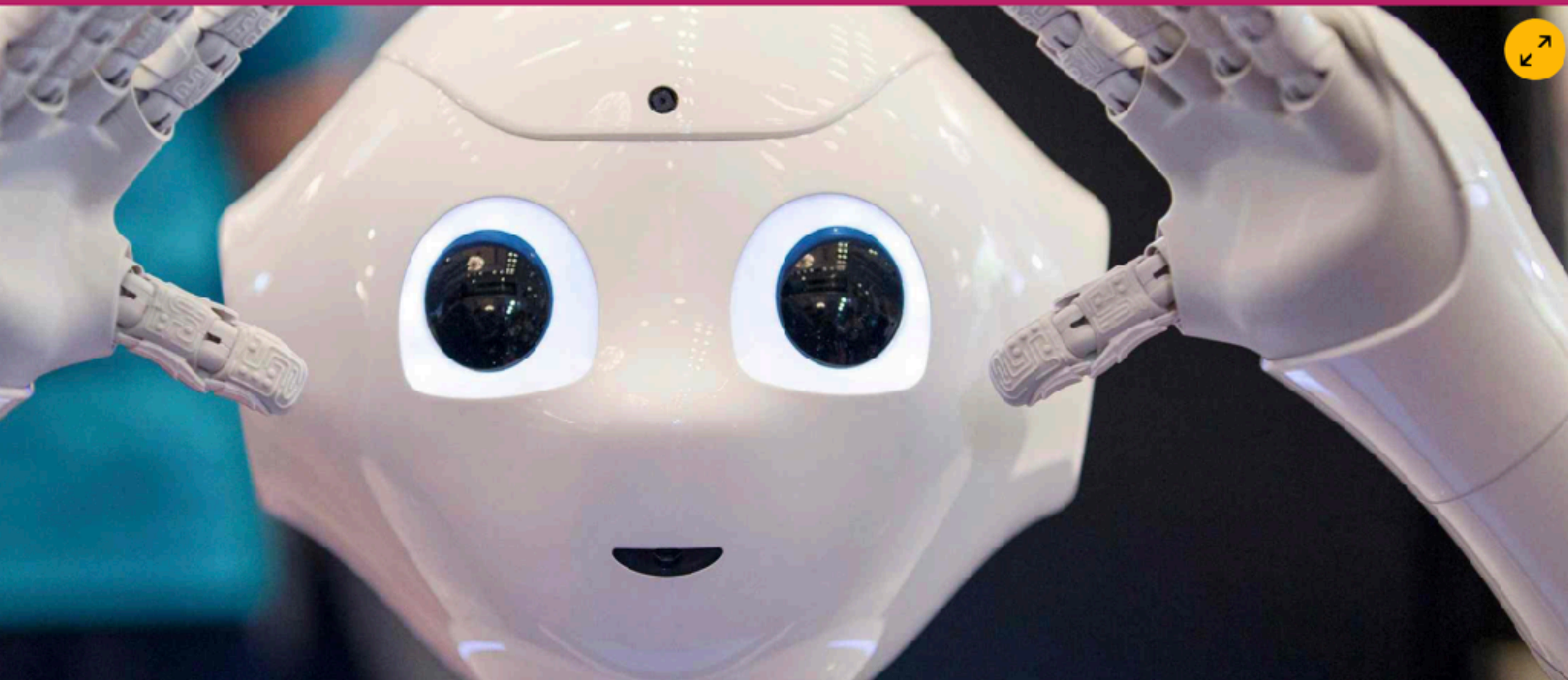
AI robot 'friend' launched to chat and play games with lonely elderly



The robot can sense when new pictures are uploaded by friends and family and ask if its owner wants to see

Robots will destroy our jobs - and we're not ready for it

Two-thirds of Americans believe robots will soon perform most of the work done by humans but 80% also believe their jobs will be unaffected. Time to think again



Star Trek TNG (1988) Episode: Elementary, Dear Data

Robots
Drones
Blockchain
3D-Printing
Virtual Reality
Augmented Reality
Internet of Things
Artificial Intelligence

Big Data

More data will be created in 2017 than the previous 5,000 years of humanity

App Developer Magazine, Dec 23, 2016

Big Data

Open Govt

Non-public data for marketing, business, national Security

Large data from scientific research social media & other non-govt. Sources

Public govt. datasets: Health Census, GPS…

Public data from state, federal, and local

Citizen engagement programs

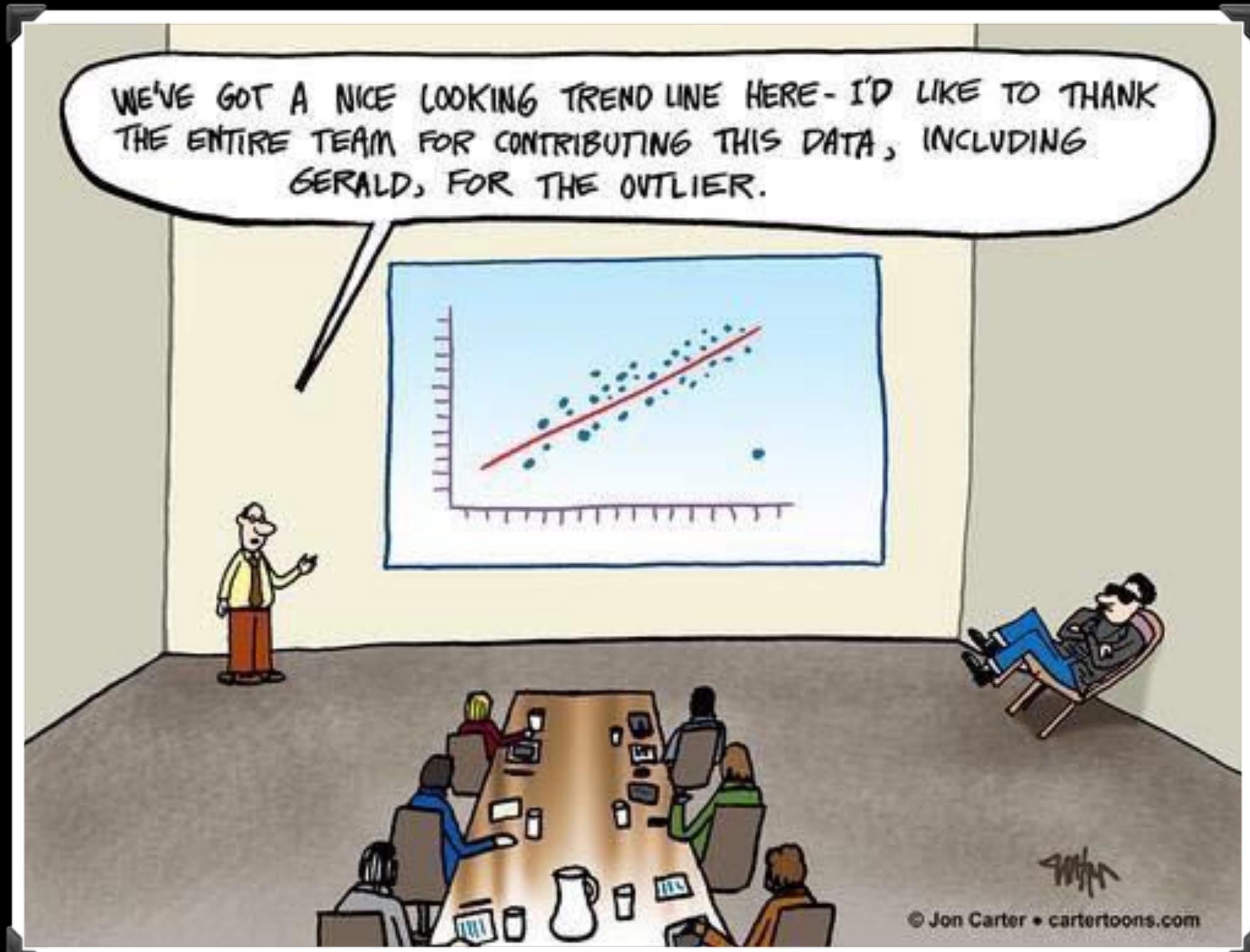
Business reporting
E.g. consumer complaints

Open Data

Dr, Kirk Borne, Booz, Allen, Hamilton

Machine Learning

Machine learning is a statistical process that derives rules from data to gain insights or make predictions.


WE'VE GOT A NICE LOOKING TREND LINE HERE- I'D LIKE TO THANK THE ENTIRE TEAM FOR CONTRIBUTING THIS DATA, INCLUDING GERALD, FOR THE OUTLIER.
© Jon Carter • cartertoons.com


CUSTOMERS WHO BOUGHT THIS ITEM:
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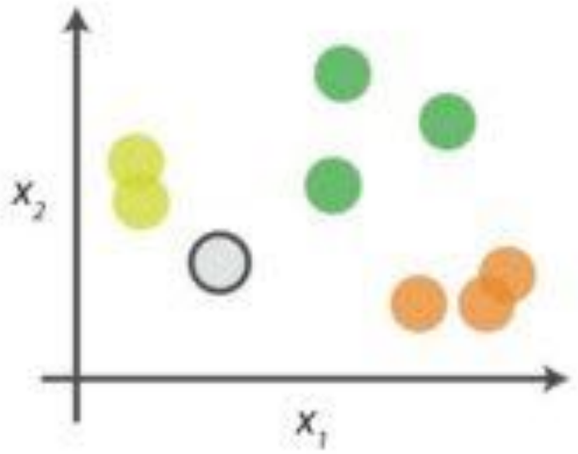
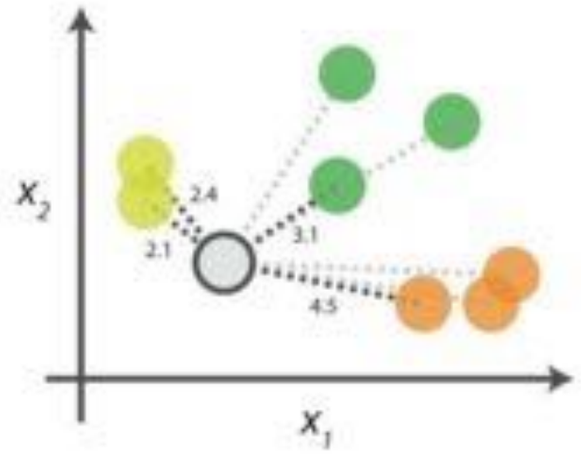
kNN Algorithm

0. Look at the data



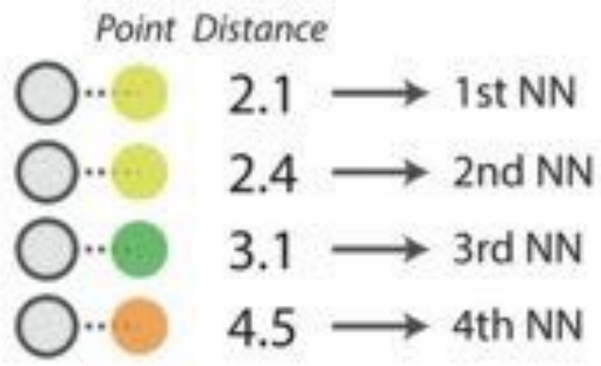
Say you want to classify the grey point into a class. Here, there are three potential classes - lime green, green and orange.

1. Calculate distances



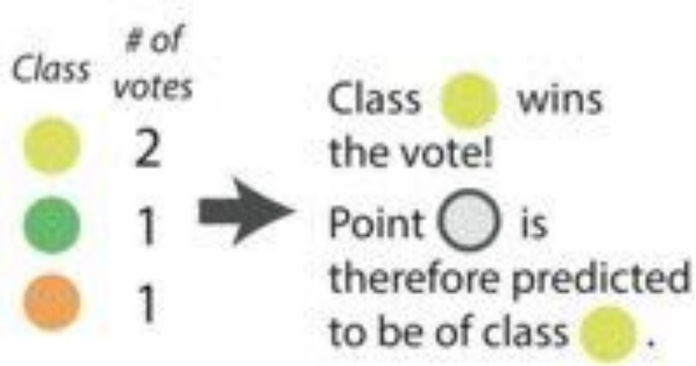
Start by calculating the distances between the grey point and all other points.

2. Find neighbours



Next, find the nearest neighbours by ranking points by increasing distance. The nearest neighbours (NNs) of the grey point are the ones closest in dataspace.

3. Vote on labels



Vote on the predicted class labels based on the classes of the k nearest neighbours. Here, the labels were predicted based on the k=3 nearest neighbours.

the world of machine learning algorithms – a summary

think big data

regression

Ordinary Least Squares Regression (OLSR)
Linear Regression
Logistic Regression
Stepwise Regression
Multivariate Adaptive Regression Splines (MARS)
Locally Estimated Scatterplot Smoothing (LOESS)
Jackknife Regression

bayesian

Naive Bayes
Gaussian Naive Bayes
Multinomial Naive Bayes
Averaged One-Dependence Estimators (AODE)
Bayesian Belief Network (BBN)
Bayesian Network (BN)
Hidden Markov Models
Conditional random fields (CRFs)

regularization

Ridge Regression
Least Absolute Shrinkage and Selection Operator (LASSO)
Elastic Net
Least-Angle Regression (LARS))

decision tree

Classification and Regression Tree (CART)
Iterative Dichotomiser 3 (ID3)
C4.5 and C5.0 (different versions of a powerful approach)
Chi-squared Automatic Interaction Detection (CHAID)
Decision Stump
M5
Random Forests
Conditional Decision Trees

instance based

also called cake-based, memory-based

k-Nearest Neighbour (kNN)
Learning Vector Quantization (LVQ)
Self-Organizing Map (SOM)
Locally Weighted Learning (LWL)

Locally Weighted Learning (LWL)

dimesionality reduction

Principal Component Analysis (PCA)
Principal Component Regression (PCR)
Partial Least Squares Regression (PLSR)
Sammon Mapping
Multidimensional Scaling (MDS)
Projection Pursuit
Discriminant Analysis (LDA, MDA, QDA, FDA)

clustering

Single-linkage clustering
k-Means
k-Medians
Expectation Maximisation (EM)
Hierarchical Clustering
Fuzzy clustering
DBSCAN
OPTICS algorithm
Non Negative Matrix Factorization
Latent Dirichlet allocation (LDA)

deep learning

Deep Boltzmann Machine (DBM)
Deep Belief Networks (DBN)
Convolutional Neural Network (CNN)
Stacked Auto-Encoders

neural networks

Self Organizing Map
Perceptron
Back-Propagation
Hopfield Network
Radial Basis Function Network (RBFN)
Backpropagation
Autoencoders
Hopfield networks
Boltzmann machines
Restricted Boltzmann Machines
Spiking Neural Networks
Learning Vector quantization (LVQ)

associated rule

Apriori
Eclat
FP-Growth

...and others

deep learning

Deep Boltzmann Machine (DBM)
Deep Belief Networks (DBN)
Convolutional Neural Network (CNN)
Stacked Auto-Encoders

associated rule

Apriori
Eclat
FP-Growth

ensemble

Logit Boost (Boosting)
Bootstrapped Aggregation (Bagging)
AdaBoost
Stacked Generalization (blending)
Gradient Boosting Machines (GBM)
Gradient Boosted Regression Trees (GBRT)
Random Forest

neural networks

Self Organizing Map
Perceptron
Back-Propagation
Hopfield Network
Radial Basis Function Network (RBFN)
Backpropagation
Autoencoders
Hopfield networks
Boltzmann machines
Restricted Boltzmann Machines
Spiking Neural Networks
Learning Vector quantization (LVQ)

...and others

Support Vector Machines (SVM)
Evolutionary Algorithms
Inductive Logic Programming (ILP)
Reinforcement Learning (Q-Learning, Temporal Difference, State-Action-Reward-State-Action (SARSA))
ANOVA
Information Fuzzy Network (IFN)
Page Rank
Conditional Random Fields (CRF)

Artificial Intelligence

Newsweek

TECH & SCIENCE

HOW ARTIFICIAL INTELLIGENCE AND ROBOTS WILL RADICALLY TRANSFORM THE ECONOMY

BY KEVIN MANEY ON 11/30/16 AT 8:10 AM

The world's top tech companies are in a race to build the best AI and capture that massive market, which means the technology will get better fast—and come at us as fast.

Newsweek

TECH & SCIENCE

HOW ARTIFICIAL INTELLIGENCE AND ROBOTS WILL RADICALLY TRANSFORM THE ECONOMY

BY KEVIN MANEY ON 11/30/16 AT 8:10 AM

IBM/Watson, Amazon/Alexa,
Apple/Siri, Salesforce/Einstein

Google, Facebook and Microsoft are devoting their research labs to AI and robotics.

PREPARING FOR THE FUTURE OF ARTIFICIAL INTELLIGENCE

Executive Office of the President
National Science and Technology Council
Committee on Technology

October 2016

"AI's central economic effect in the short term will be the automation of tasks that could not be automated before. This will likely increase productivity and create wealth, but it may also affect particular types of jobs in different ways."

Preparing for the Future of Artificial Intelligence (Oct 2016)
Executive Office of the President of the United States
National Science and Technology Council National Science & Technology Council Committee on Technology

"…the negative effect of automation will be greatest on lower-wage jobs, and that there is a risk that AI-driven automation will increase the wage gap between less-educated and more- educated workers."

Preparing for the Future of Artificial Intelligence (Oct 2016)
Executive Office of the President of the United States
National Science and Technology Council National Science & Technology Council Committee on Technology

"One area of great optimism about AI and machine learning is their potential to improve people's lives by helping to solve some of the world's greatest challenges and inefficiencies."

Preparing for the Future of Artificial Intelligence (Oct 2016)
Executive Office of the President of the United States
National Science and Technology Council National Science & Technology Council Committee on Technology

Image Recognition Challenge Error Rate:

AI in 2011 26.0%

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Image Recognition Challenge Error Rate:

AI in 2011 26.0%

Humans 5.0%

Preparing for the Future of Artificial Intelligence (Oct 2016)
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Image Recognition Challenge Error Rate:

AI in 2011 26.0%

Humans 5.0%

AI in 2015 3.5%

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Executive Office of the President of the United States
National Science and Technology Council National Science & Technology Council Committee on Technology

Artificial Intelligence

AI

Intelligence Automation

IA

Analyzing Lymph Node Cells to Detect Cancer

AI 7.5%

Preparing for the Future of Artificial Intelligence (Oct 2016)

Executive Office of the President of the United States

National Science and Technology Council National Science & Technology Council Committee on Technology

Analyzing Lymph Node Cells to Detect Cancer

AI 7.5%

Pathologist 3.5%

Preparing for the Future of Artificial Intelligence (Oct 2016)
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National Science and Technology Council National Science & Technology Council Committee on Technology

Analyzing Lymph Node Cells to Detect Cancer

AI	7.5%
Pathologist	3.5%
AI + Pathologist	0.5%

Preparing for the Future of Artificial Intelligence (Oct 2016)
Executive Office of the President of the United States
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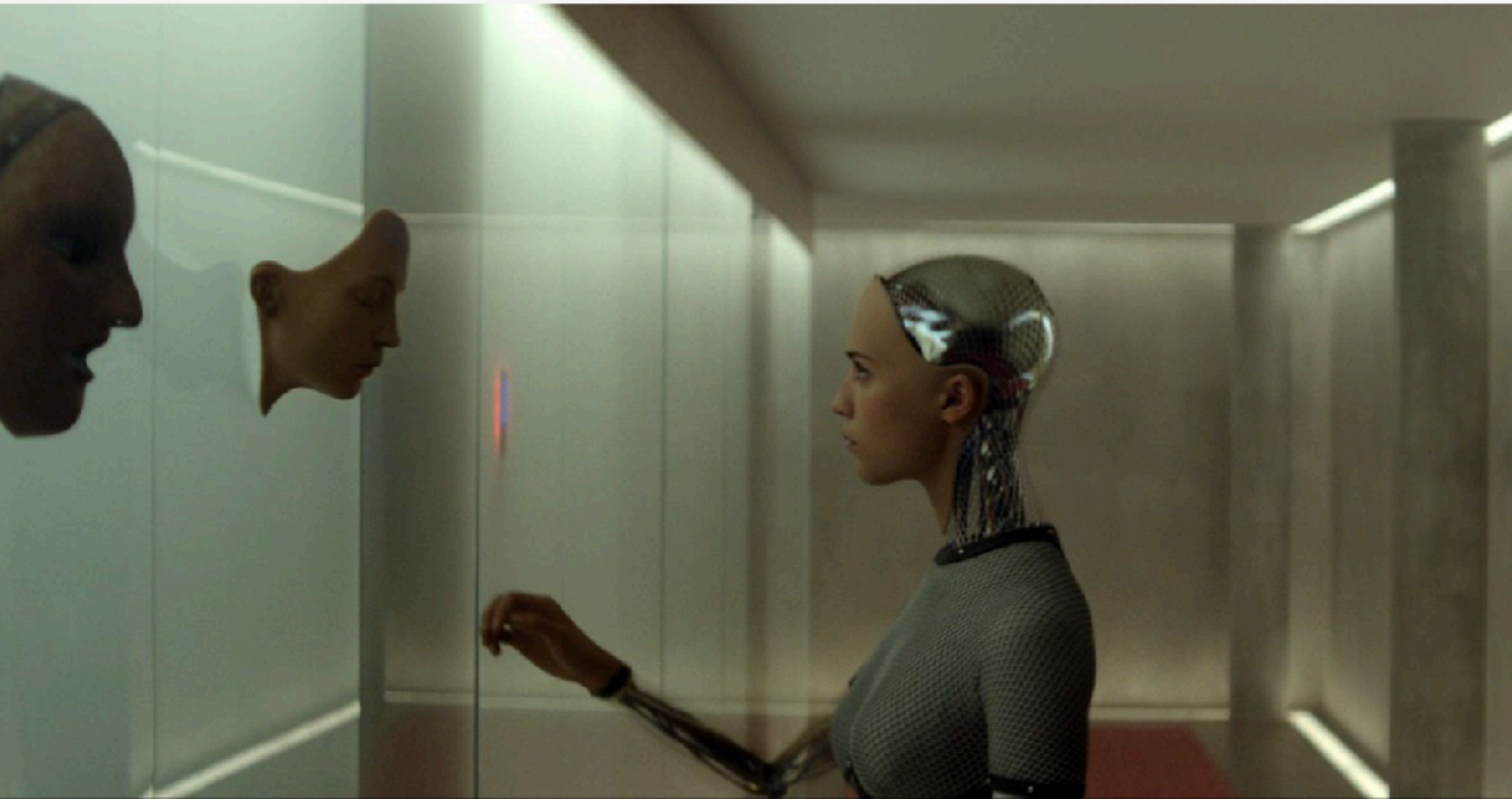
TECH TALK

Companies are hiring playwrights and poets to create meaningful AI



Q&A Alexa may be listening, but will she tell on you?

The Bentonville Police Department in Arkansas has issued a warrant to Amazon requesting data an Amazon Echo seized from a home in connection with a homicide investigation.

By Agatha French . Contact Reporter

JANUARY 5, 2017, 3:00 AM

Amazon's Internet-connected home assistant devices can turn on your TV, read you the news and order you an Uber. Law enforcement officials in Arkansas hope an Amazon Echo can help them crack a murder case.

When Bentonville police found the body of Victor Collins inside James Andrew Bates'

https://www.propublica.org/series/machine-bias

Bias in Criminal Risk Scores Is Mathematically Inevitable

Facebook Doesn't Tell Users Everything It Really Knows About

Facebook Lets Advertisers Exclude Users by Race

Breaking the Black Box: How Machines Learn to Be Racist

Making Algorithms Accountable

“The future is already here - it’s just not very evenly distributed.”

William Gibson

Abhijeet Chavan

Chief Technology Officer
Urban Insight

openadvocate.org

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