

Artificial Intelligence for Law Enforcement



Quick poll

<http://bit.ly/2Y8MTi2>





Programme

Section 1:	Overview of Artificial Intelligence (45 mins)
Section 2:	Different types of learning (Machine Learning, Deep Learning, Reinforcement learning) (45 mins)
Section 3:	Technology Hands-on (30 mins)
	Lunch Break
Section 4:	Use cases sharing (30 mins)
Section 5:	AI Services (30 mins)
Section 6:	Hands-on/Demo anomaly detection (45 hour)
Section 7:	Hands-on/Demo Graphs (45 hour)



Resources

- Goto <http://bit.ly/35RvShu>
 - Download pdf (this presentation deck)
 - Links to other resources. Save you the typing!





Introduction of trainer



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What is Artificial Intelligence?

- The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision making, and translation between languages.” – Google



DATA MINING



GAME SOLVING



AUTOMATION



ARTIFICIAL
INTELLIGENCE



PATTERN
RECOGNITION

MACHINE LEARNING



ALGORITHM



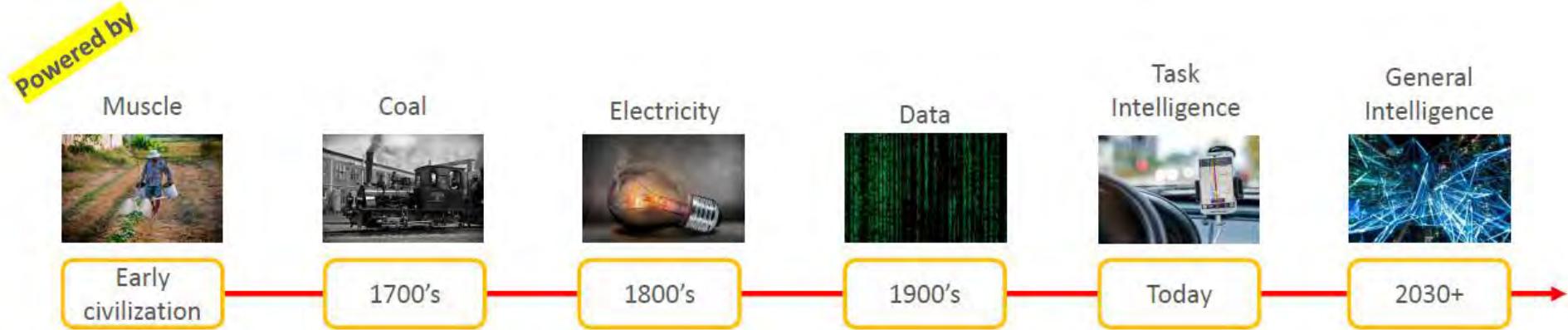
NEURAL
NETWORKS



AI is the new electricity

"About 100 years ago, electricity transformed every major industry. AI has advanced to the point where it has the power to transform" every major sector in coming years.—

Andrew Ng





History of AI

A.I. TIMELINE

1950

TURING TEST

Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

1955

A.I. BORN

Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

1961

UNIMATE

First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line



1964

ELIZA

Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans



1966

SHAKY

The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions



A.I.

WINTER

Many false starts and dead-ends leave A.I. out in the cold

1997

DEEP BLUE

Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov



1998

KISMET

Cynthia Breazeal at MIT introduces Kismet, an emotionally intelligent robot insofar as it detects and responds to people's feelings



1999

AIBO

Sony launches first consumer robot pet dog AIBO (AI robot) with skills and personality that develop over time



2002

ROOMBA

First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes



2011

SIRI

Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S



2011

WATSON

IBM's question answering computer Watson wins first place on popular \$1M prize television quiz show Jeopardy



2014

EUGENE

Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human



2014

ALEXA

Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks



2016

TAY

Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments



2017

ALPHAGO

Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number (2^{170}) of possible positions





DATA IS CRITICAL TO ARTIFICIAL INTELLIGENCE

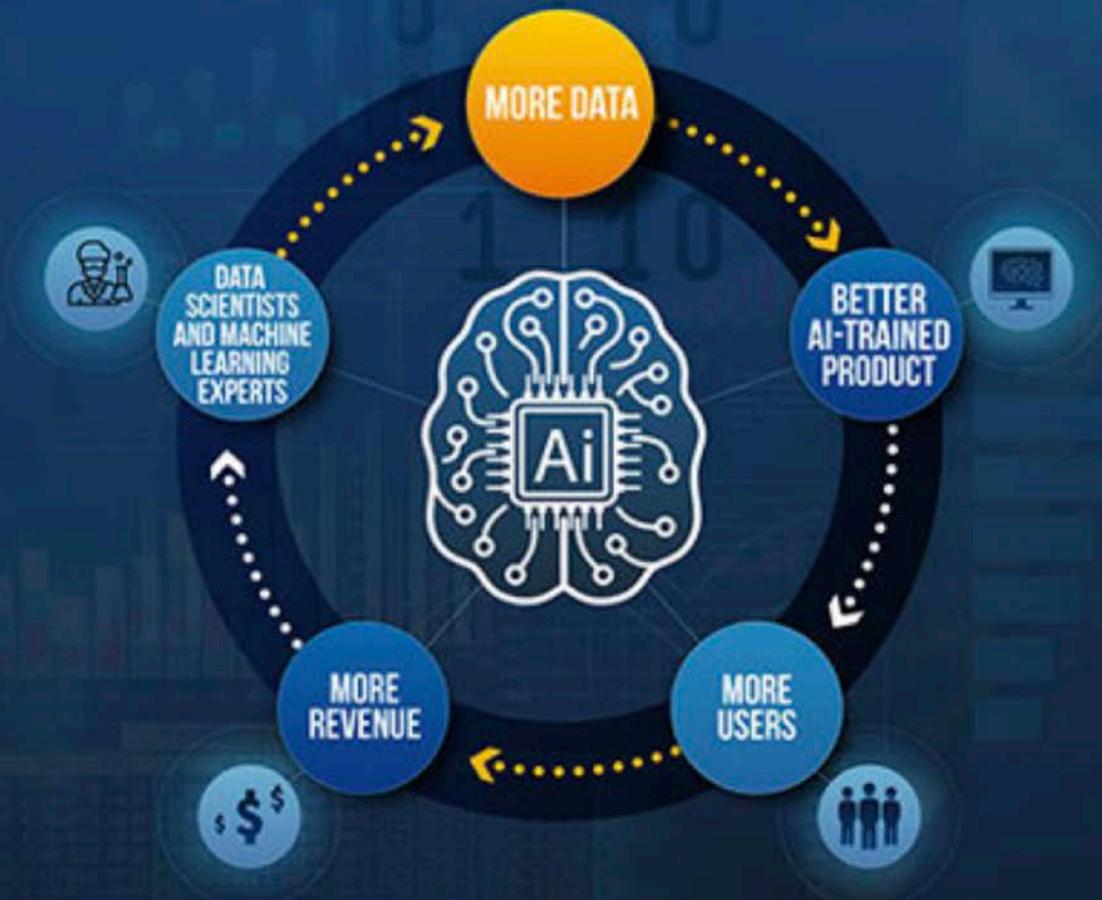


Image source: Kai-Fu Lee, Sinovation Ventures

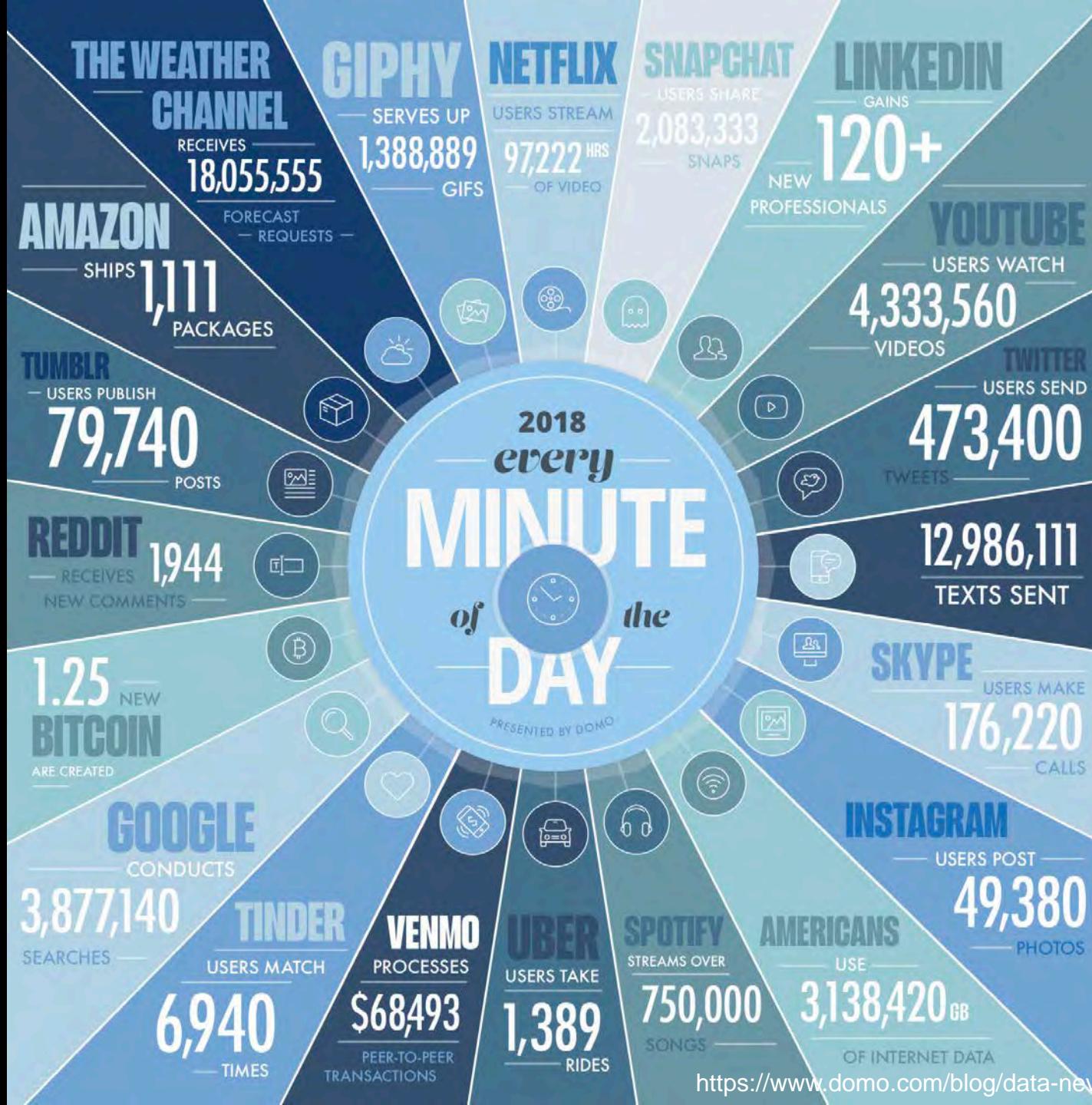


Bigger Datasets

In 2020, it is expected that:

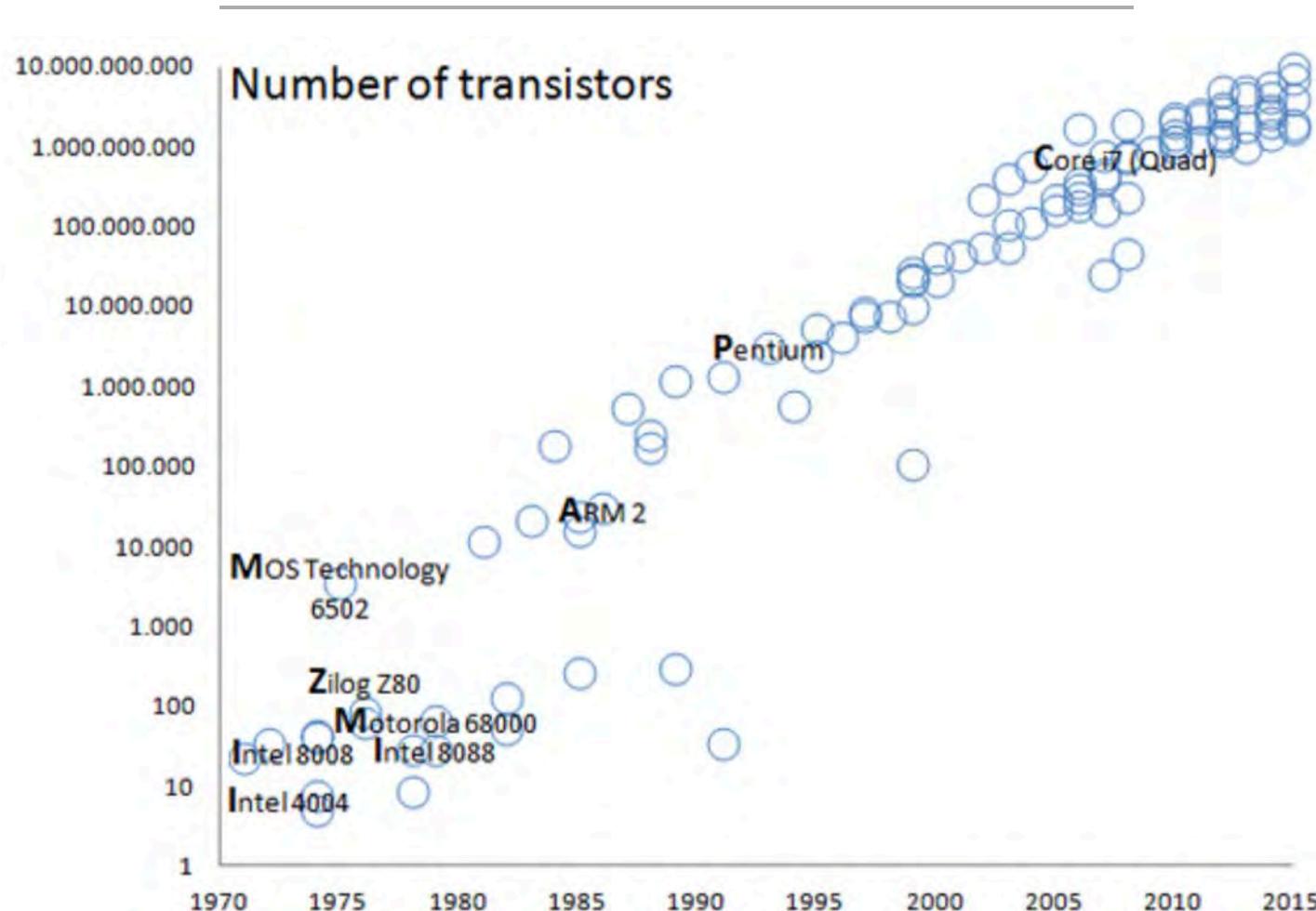
- The average internet user will generate ~1.5 GB of traffic per day.
- A smart hospital will generate 3,000 GB/day.
- Self-driving cars are each generating over 4,000 GB/day.
- Connected planes will generate 40,000 gigabytes per day.
- A connected factory will generate 1 million gigabytes per day.







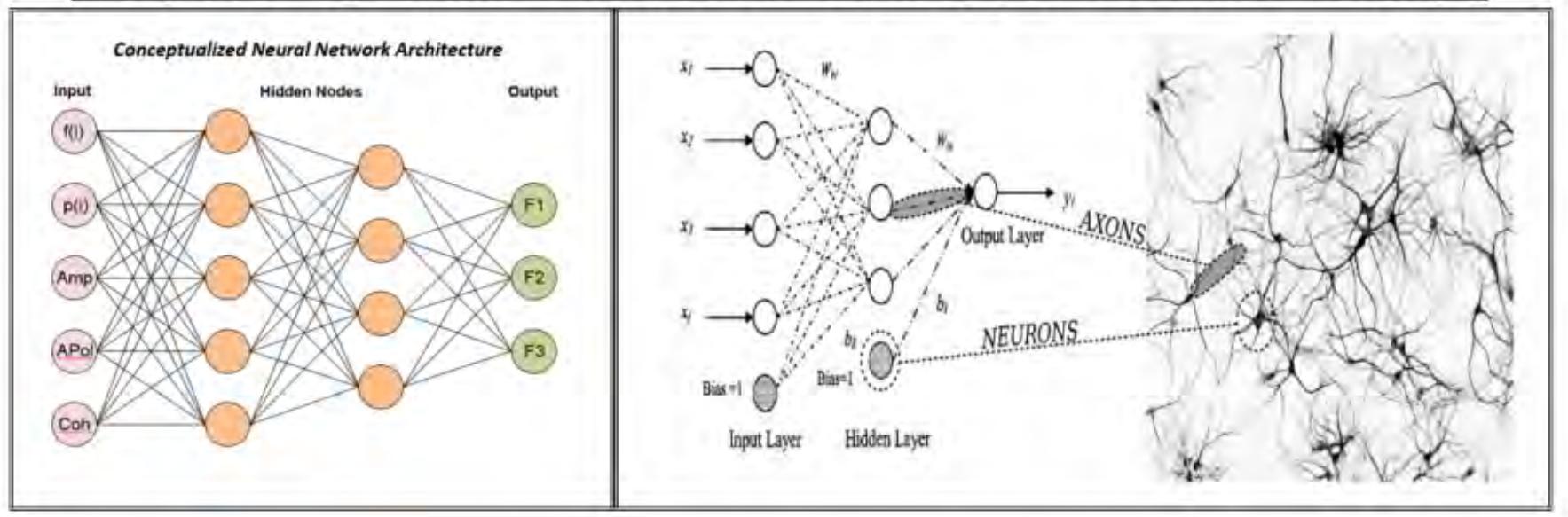
Moore's Law





Neural Network

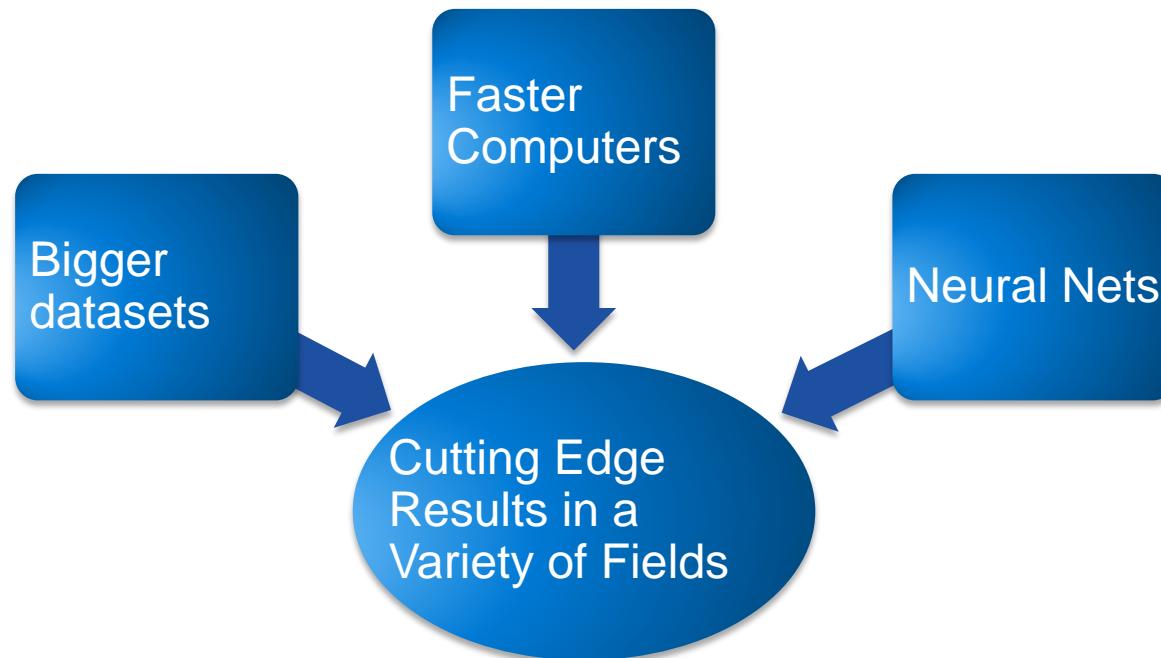
Comparison of Neural Network Architecture (L) vs the Human Brain (R)





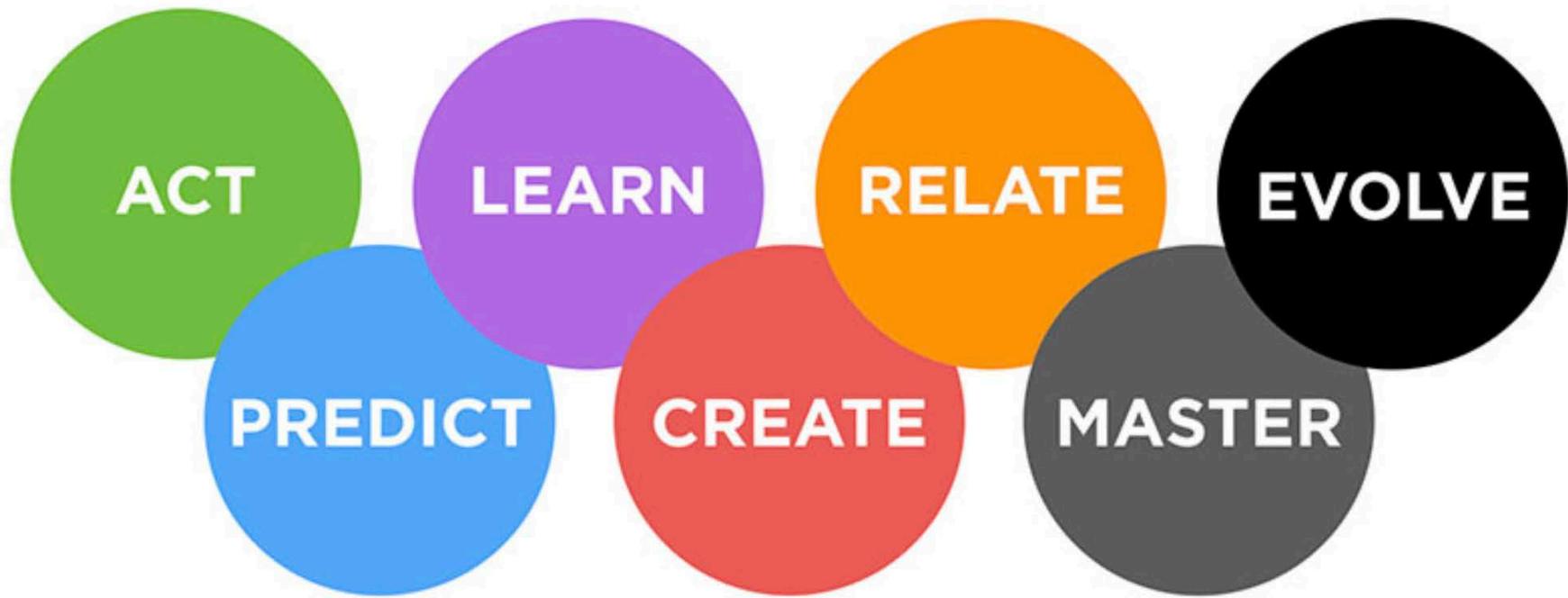
AI Hardware

Faster hardware is one of the key areas driving the modern era of AI.





MACHINE INTELLIGENCE CONTINUUM



The MIC represents a continuum from simple, scripted automation to superhuman intelligence and highlights the functional capabilities of different levels of machine intelligence.



Systems that Acts





Systems that Predicts

Hillary Clinton has an
85% chance to win.

Last updated Tuesday, November 8 at 10:20 PM ET

CHANCE OF WINNING



85%

Hillary Clinton



15%

Donald J. Trump



Systems that Learns





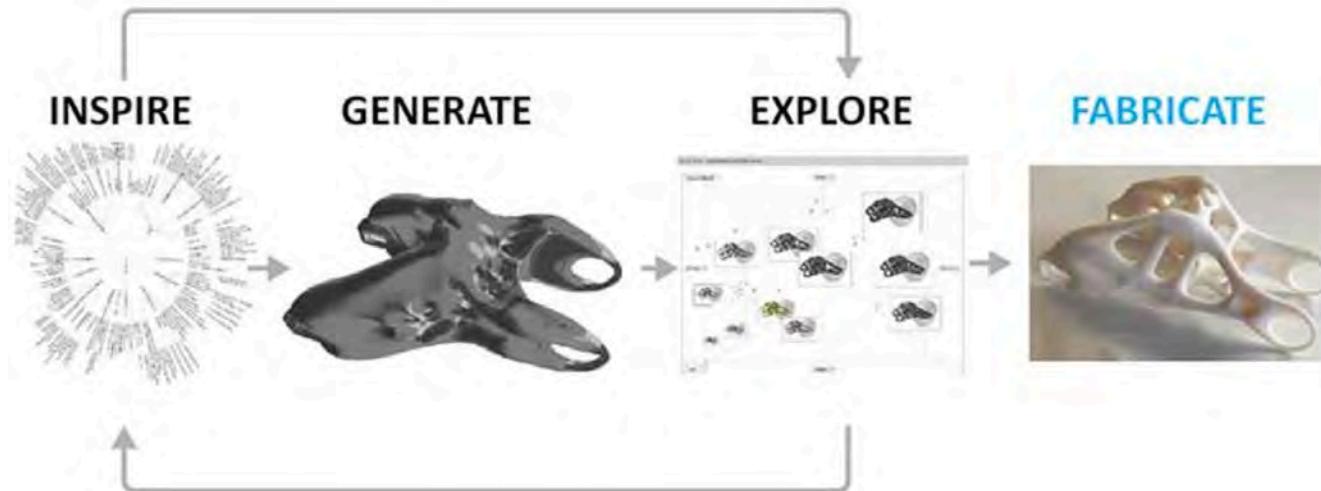
Systems that Create



Generated story about image
Model: Romantic Novels

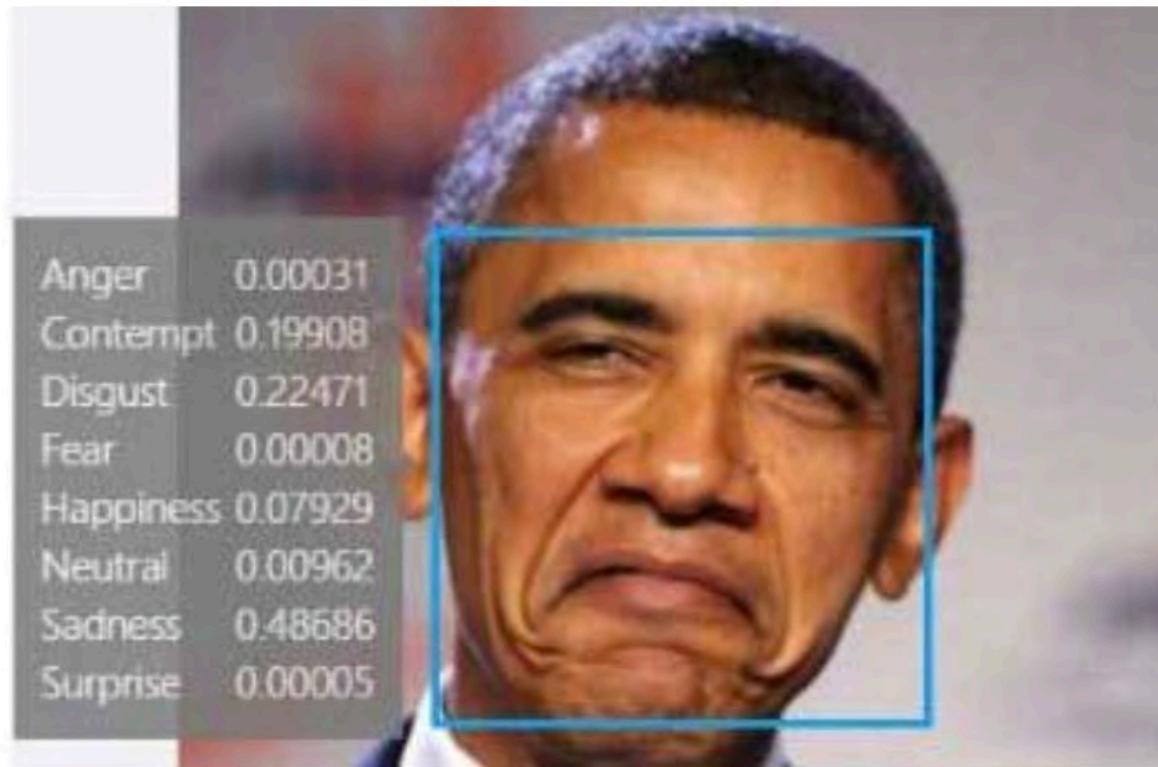
"He was a shirtless man in the back of his mind, and I let out a curse as he leaned over to kiss me on the shoulder.

"He wanted to strangle me, considering the beautiful boy I'd become wearing his boxers."





Systems that Relate



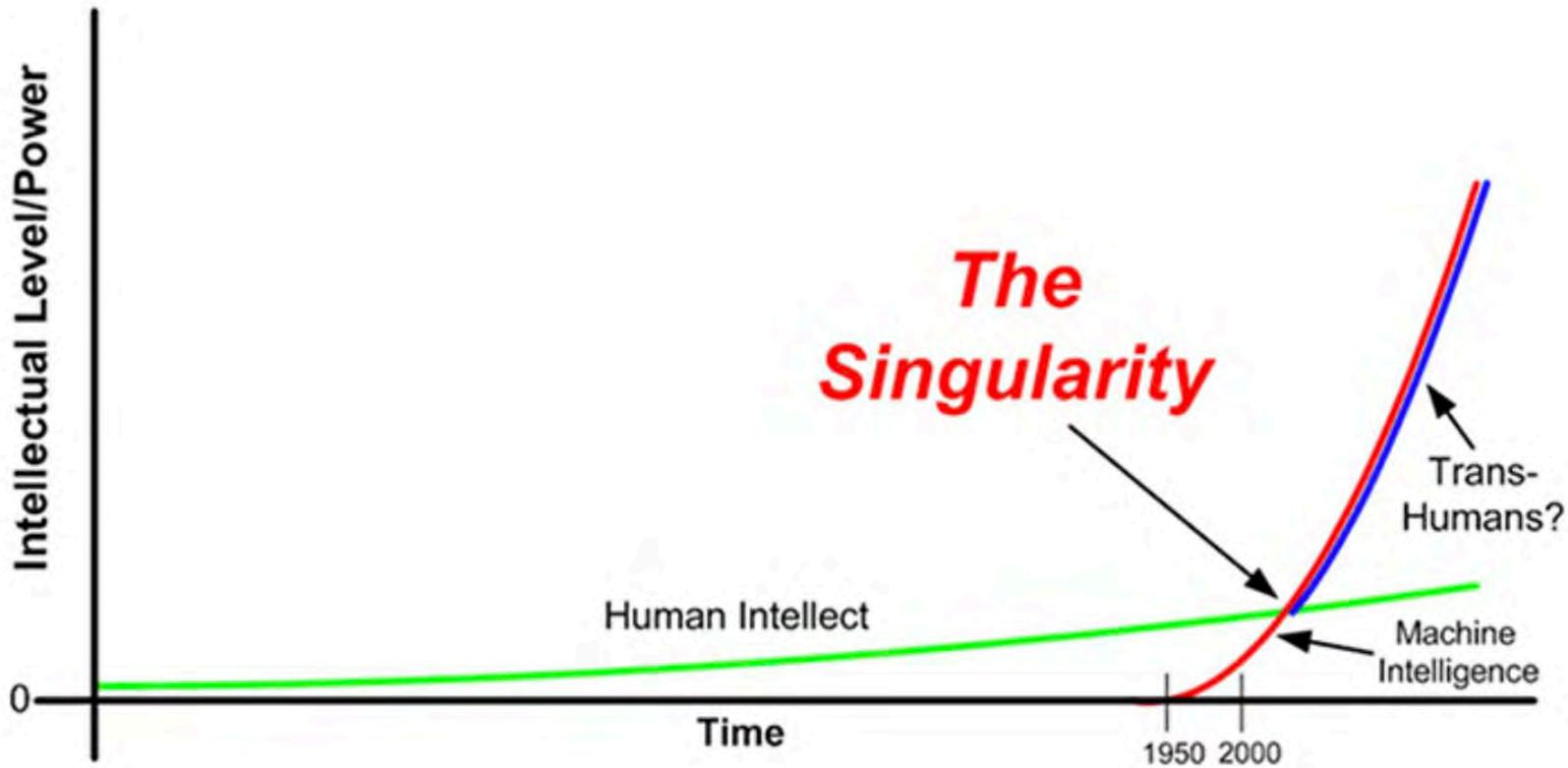


Systems that Master





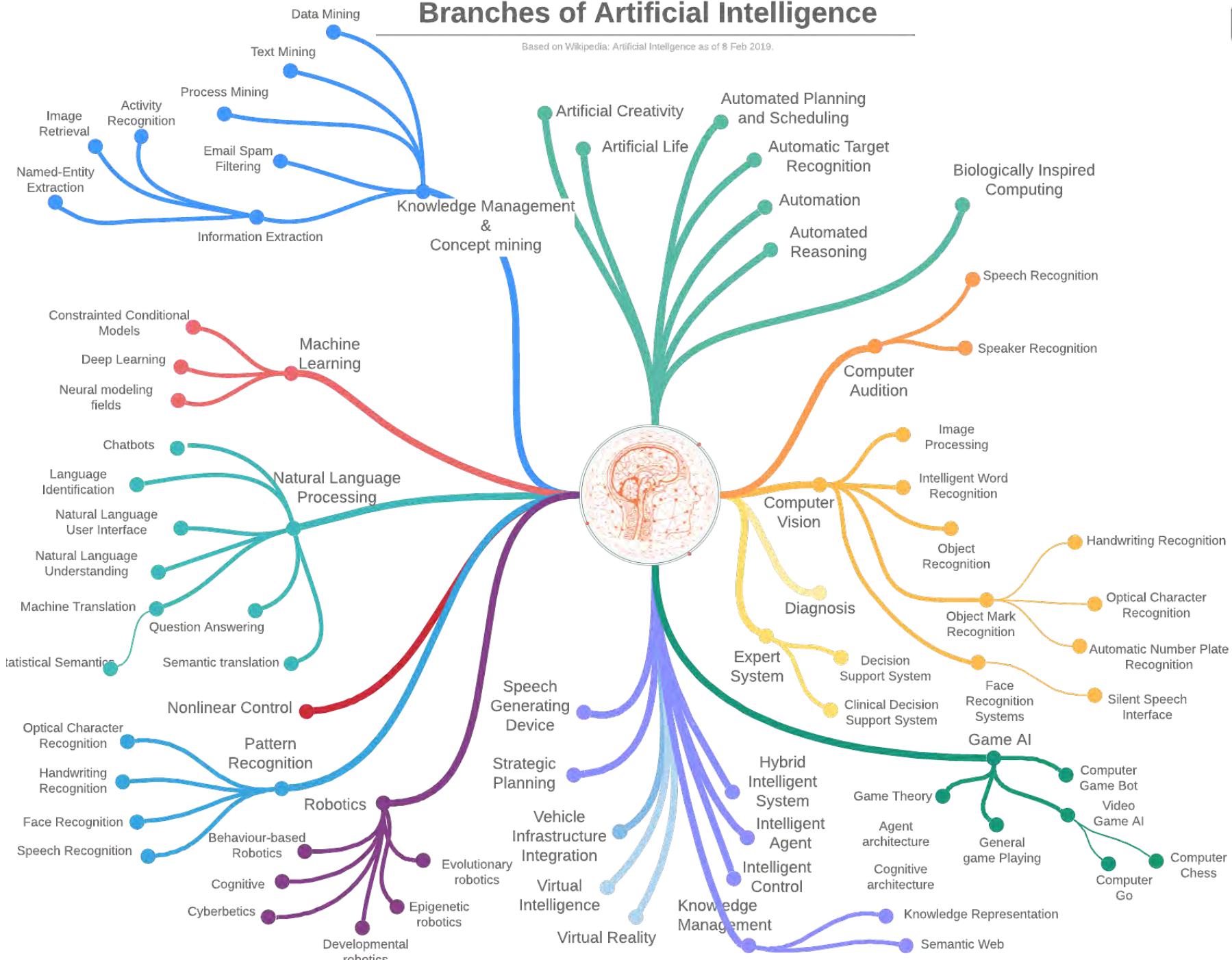
Systems that Evolve



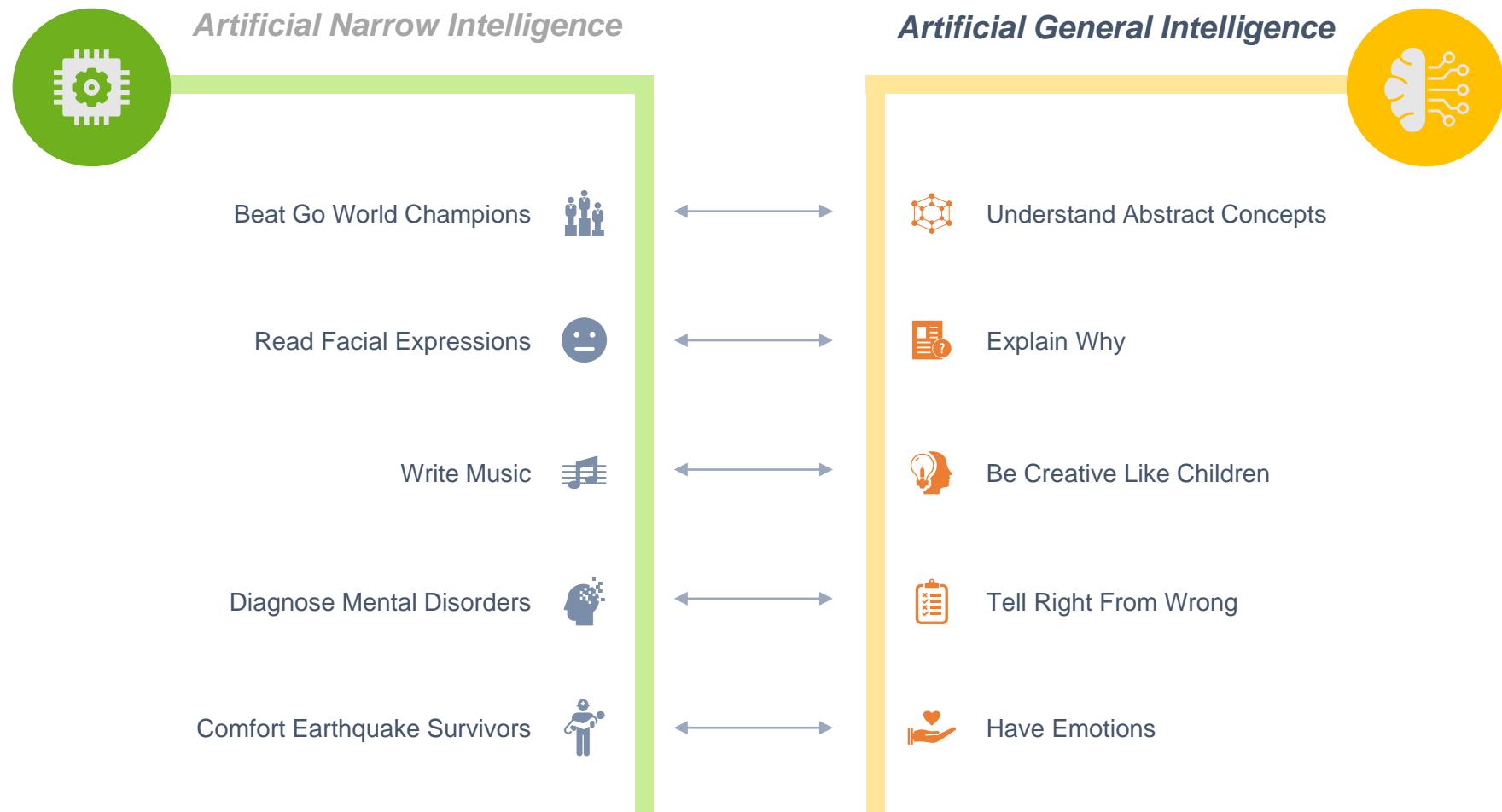


Branches of Artificial Intelligence

Based on Wikipedia: Artificial Intelligence as of 8 Feb 2019.

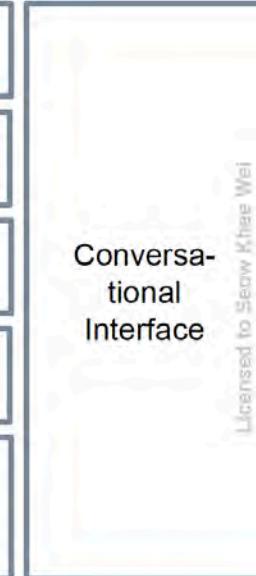


Artificial Narrow Intelligence vs Artificial General



Mapping Human Perceptions to AI-enabled Capabilities

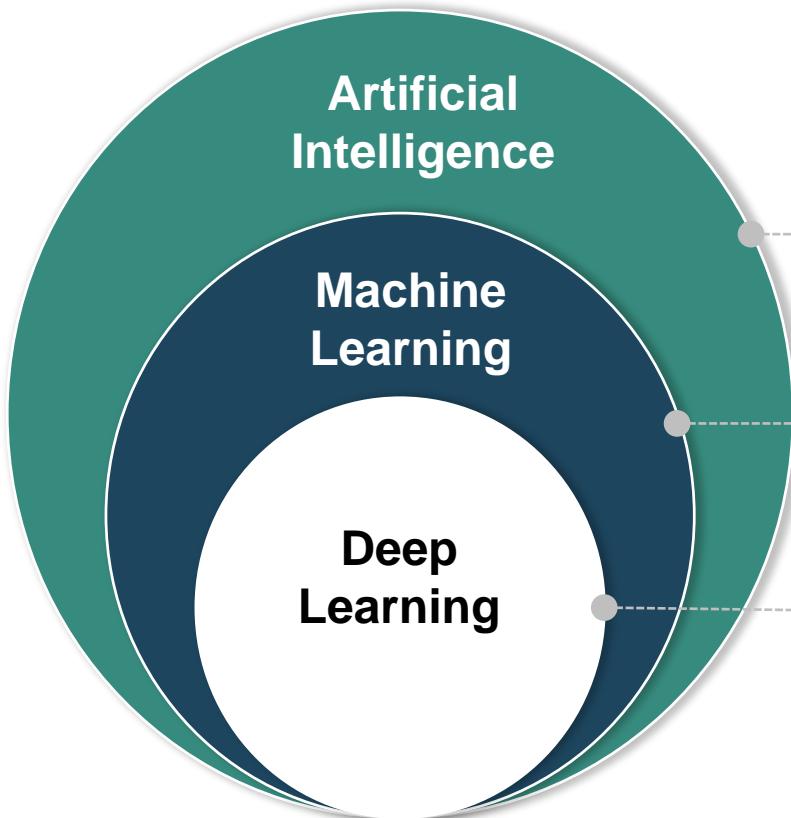


Vision	Computer Vision	Conversational Interface 
Hearing	Speech Recognition / Audio Recognition	
Understanding	Natural Language Processing	
Speaking	Text to Speech, Speech to Text, Voice (Tone and Accent) Imitation	
Feeling	Emotion AI (detection and analysis of complex human emotions is currently conducted through diverse mechanisms such as natural language processing (NLP), voice patterns, facial expressions, and physiology)	
Smelling	The data of smell are relatively seldom and more difficult to collect compared to visual, text, or voice datasets. The development of an electronic nose to recognize smell has been long researched, but its development with AI techniques is still in an early stage	
Touching	Robot	

Licensed to Seaw Khae Wei
FPT Univer. - FPT University



Definitions



Artificial Intelligence

Any technique which enables computers to sense, reason, act and adapt



Machine Learning

Subset of AI techniques which use statistical methods to enable machines to improve with experiences.

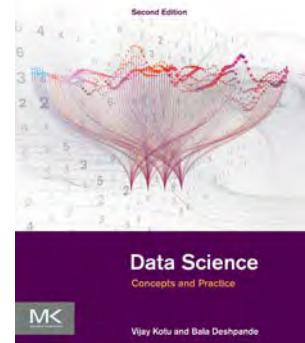
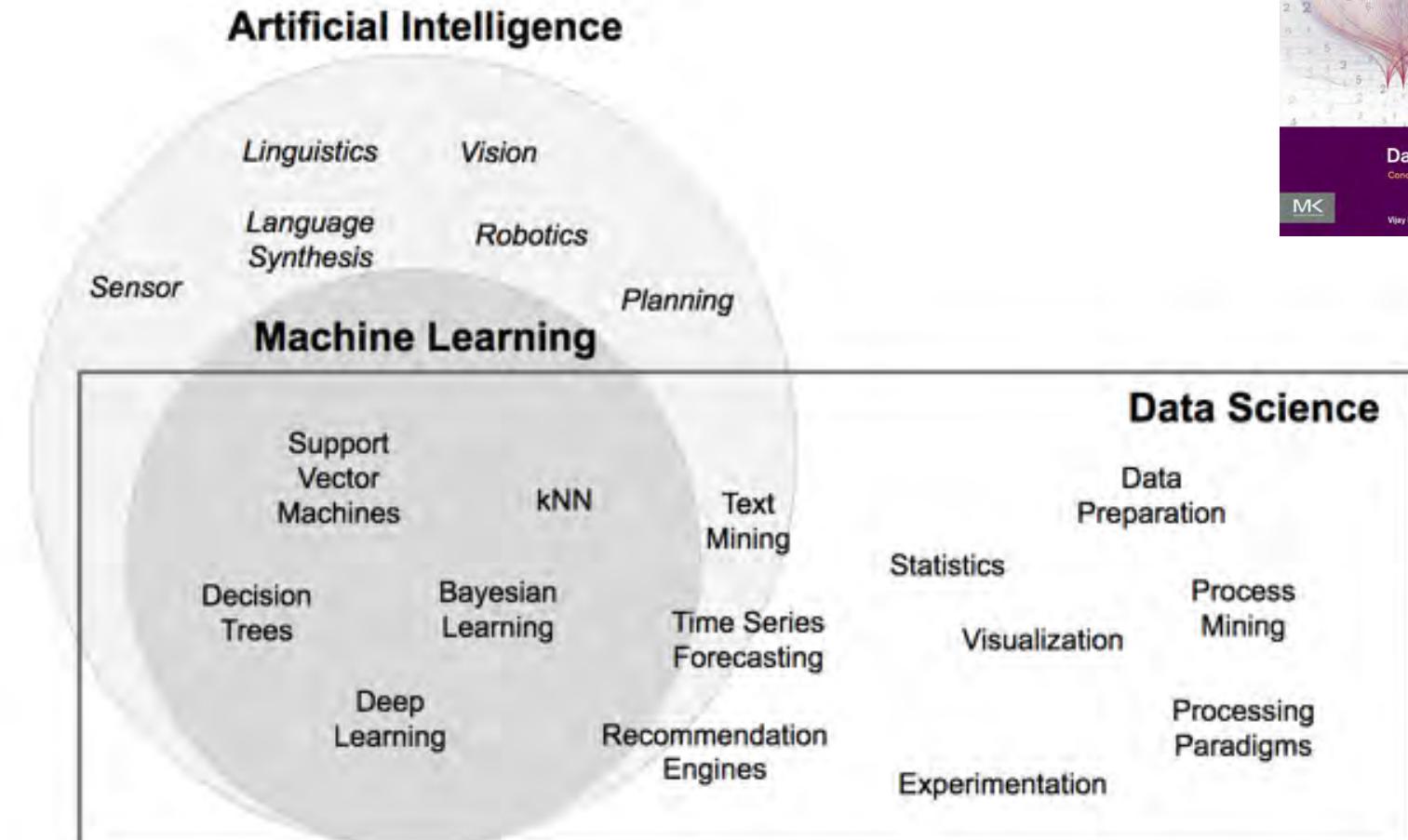


Deep Learning

A subset of machine learning in which multilayered neural networks learn from vast amount of data.

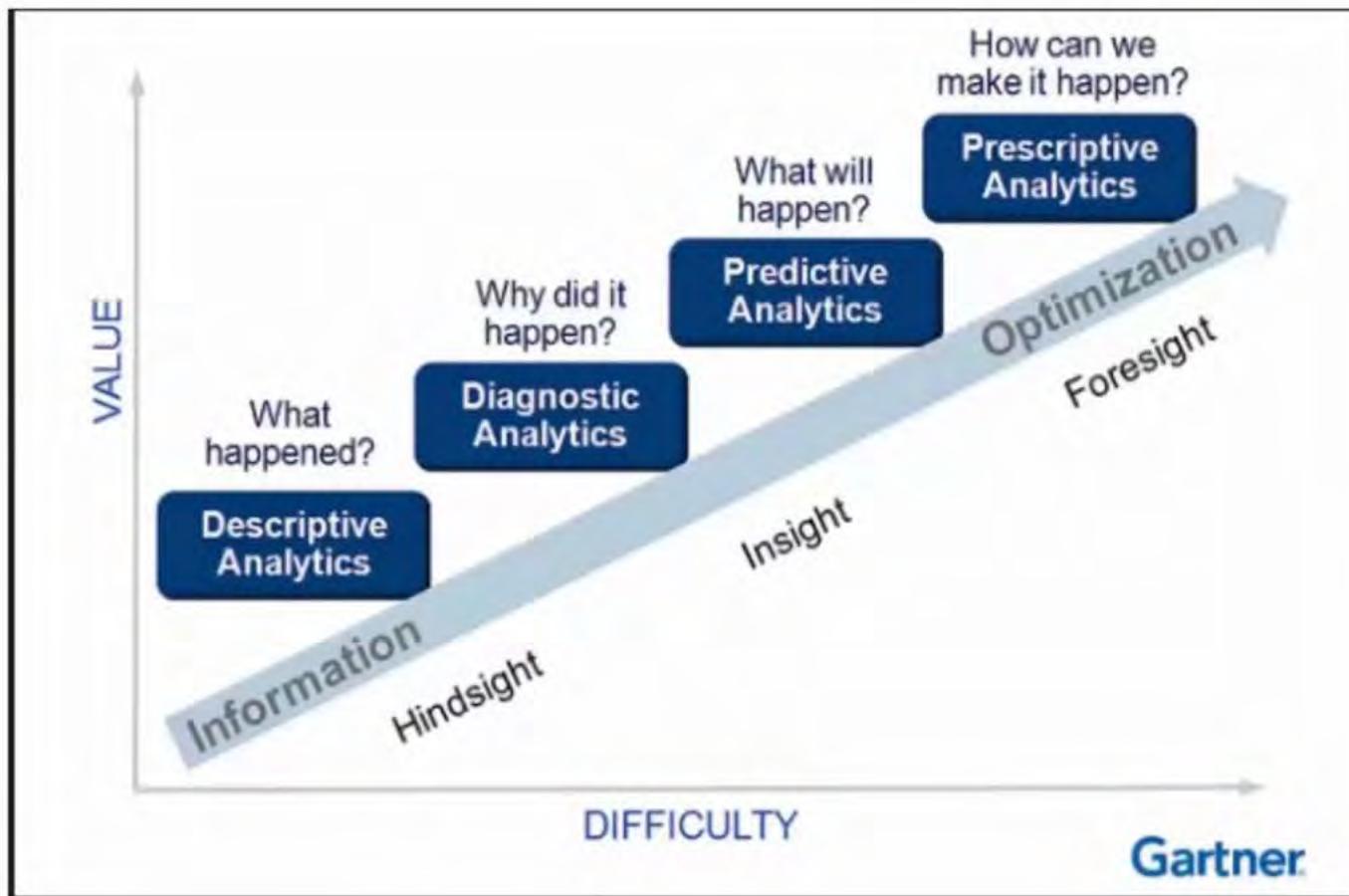


AI vs ML vs DS





Gartner Analytic Continuum



5 questions data science answers



Is this weird?
(Anomaly detection)



Is this pressure gauge reading normal?
Is this message from the internet typical?

Is this A or B?
(Classification)



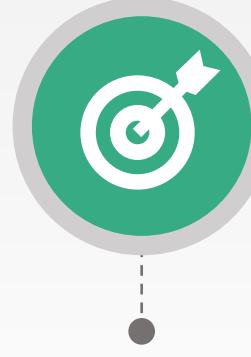
Will this tire fail in the next 1,000 miles: Yes or no?
Which brings in more customers: a \$5 coupon or a 25% discount?

How many?
How Much?
(Regression)



What will the temperature be next Tuesday?
What will my fourth quarter sales be?

How is this organized?
(Clustering)



Which viewers like the same types of movies?
Which printer models fail the same way?

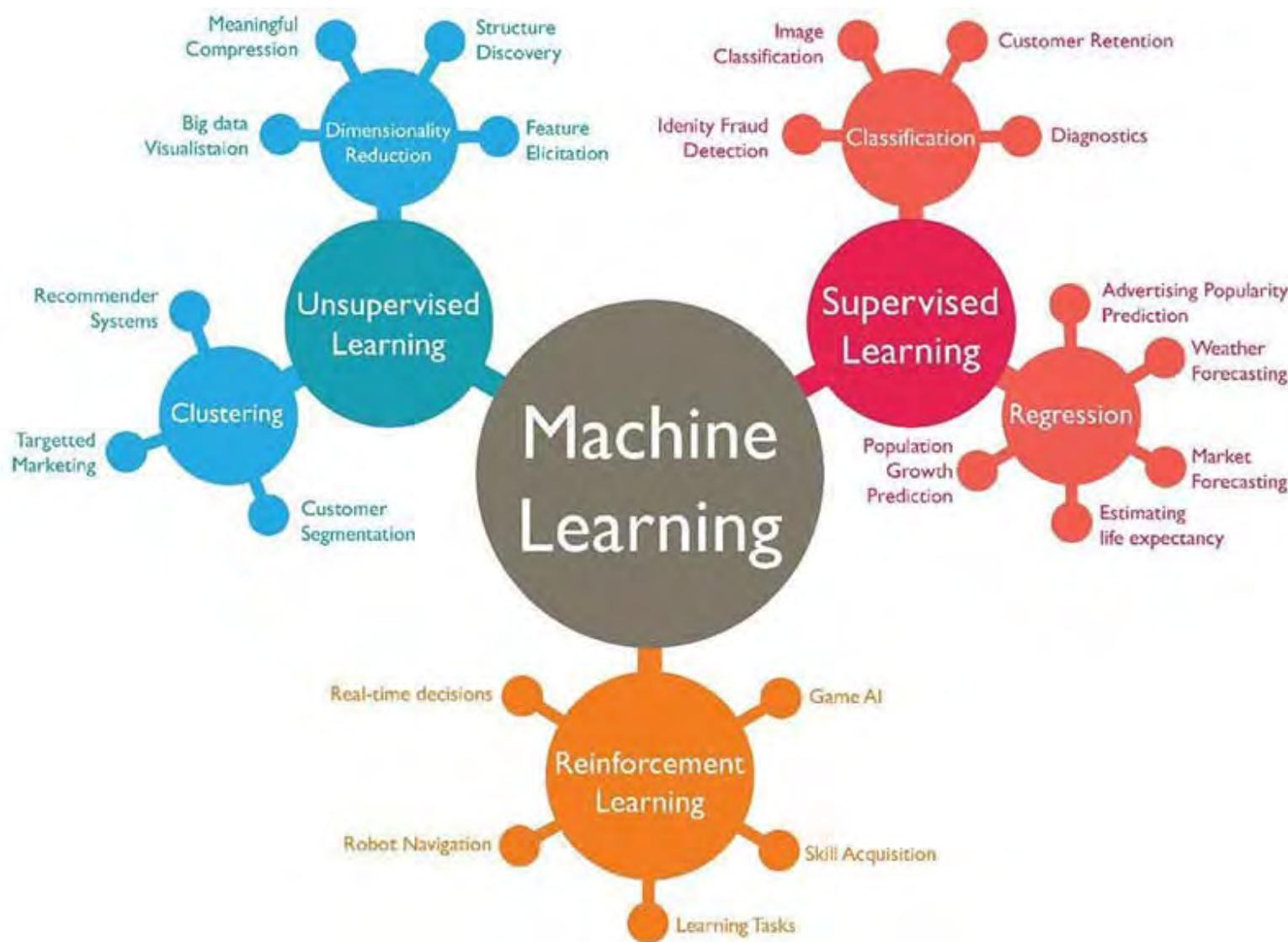
What should I do?
(Reinforce Learning)



If I'm a self-driving car: At a yellow light, brake or accelerate?
For a robot vacuum: Keep vacuuming, or go back to the charging station?



Types of Machine Learning



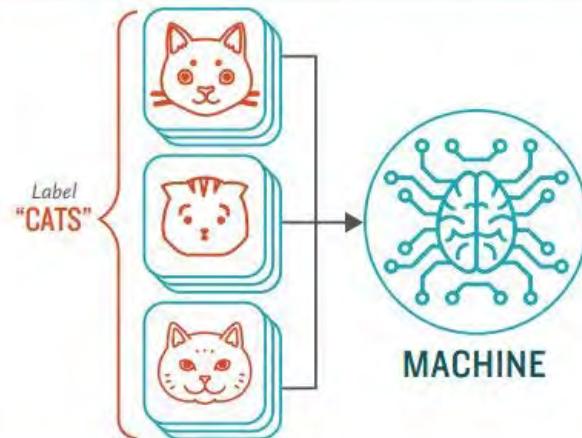


Supervised Learning

How **Supervised** Machine Learning Works

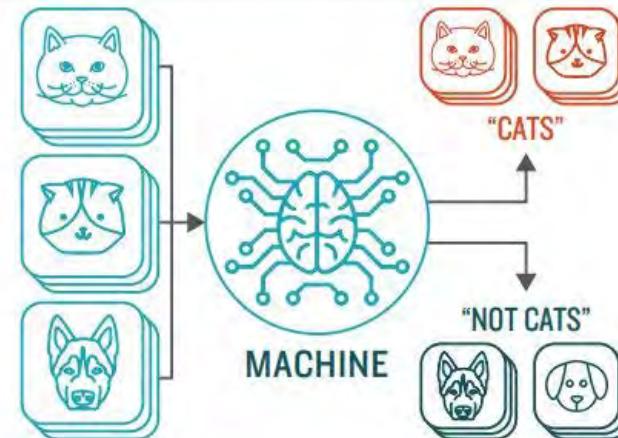
STEP 1

Provide the machine learning algorithm categorized or "labeled" input and output data from to learn

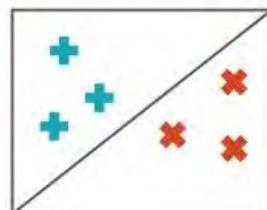


STEP 2

Feed the machine new, unlabeled information to see if it tags new data appropriately. If not, continue refining the algorithm

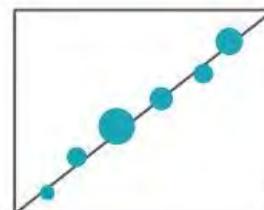


TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLASSIFICATION

Sorting items into categories



REGRESSION

Identifying real values (dollars, weight, etc.)

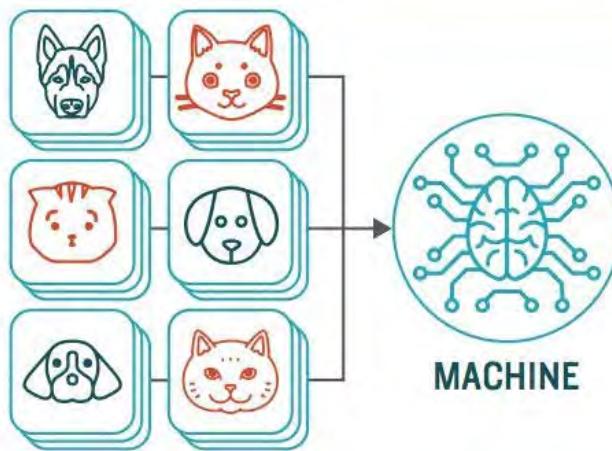


Unsupervised Learning

How **Unsupervised** Machine Learning Works

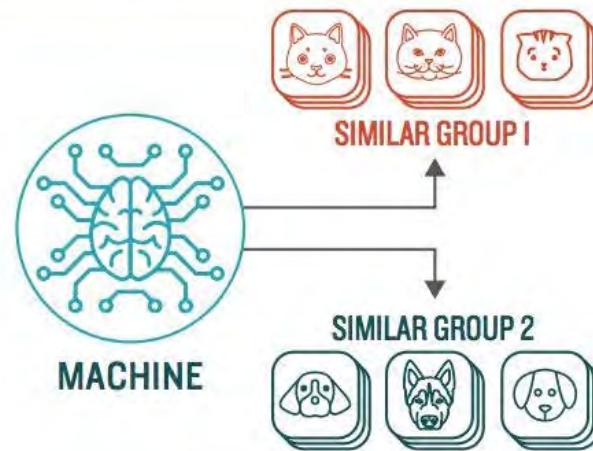
STEP 1

Provide the machine learning algorithm uncategorized, unlabeled input data to see what patterns it finds

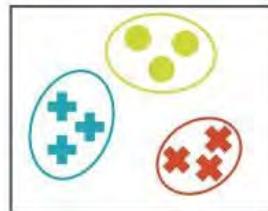


STEP 2

Observe and learn from the patterns the machine identifies



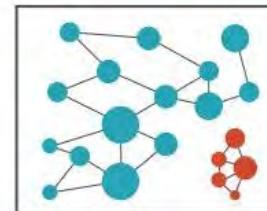
TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLUSTERING

Identifying similarities in groups

For Example: Are there patterns in the data to indicate certain patients will respond better to this treatment than others?



ANOMALY DETECTION

Identifying abnormalities in data

For Example: Is a hacker intruding in our network?



Machine Learning Example

- Suppose you wanted to identify fraudulent credit card transactions.
- You could define features to be:
 - Transaction time
 - Transaction amount
 - Transaction location
 - Category of purchase
- The algorithm could learn what feature combinations suggest unusual activity.





Machine Learning Limitations

- Suppose you wanted to determine if an image is of a cat or a dog.
- What features would you use?
- This is where **Deep Learning** can come in.



Dog and cat recognition

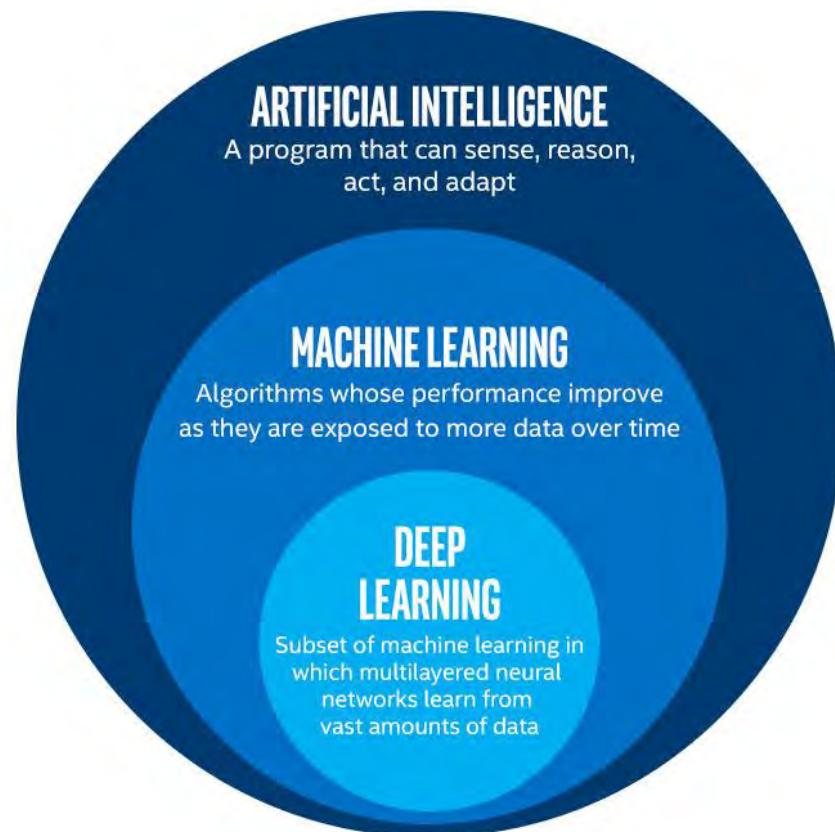


What is deep learning?

Deep Learning

“Machine learning that involves using very complicated models called “deep neural networks”.”
(Intel)

Models determine best representation of original data; in classic machine learning, humans must do this.

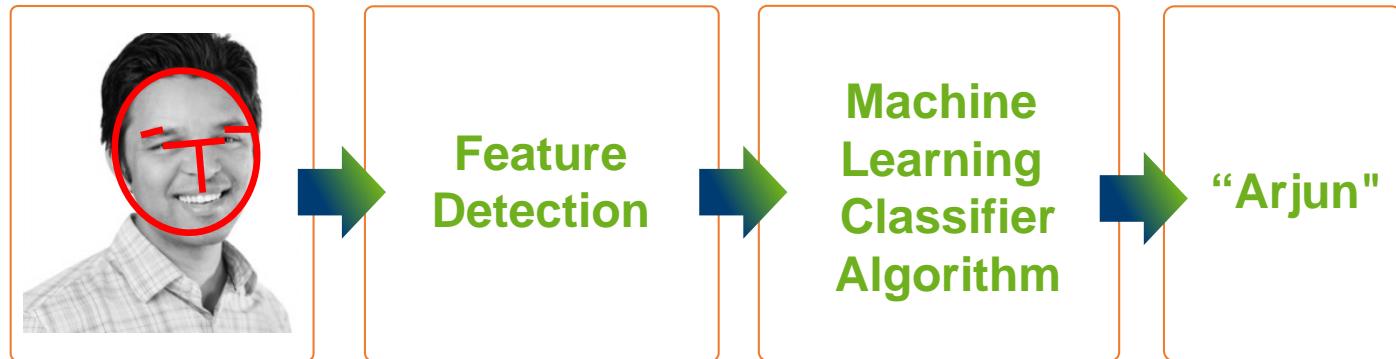




Deep Learning Example

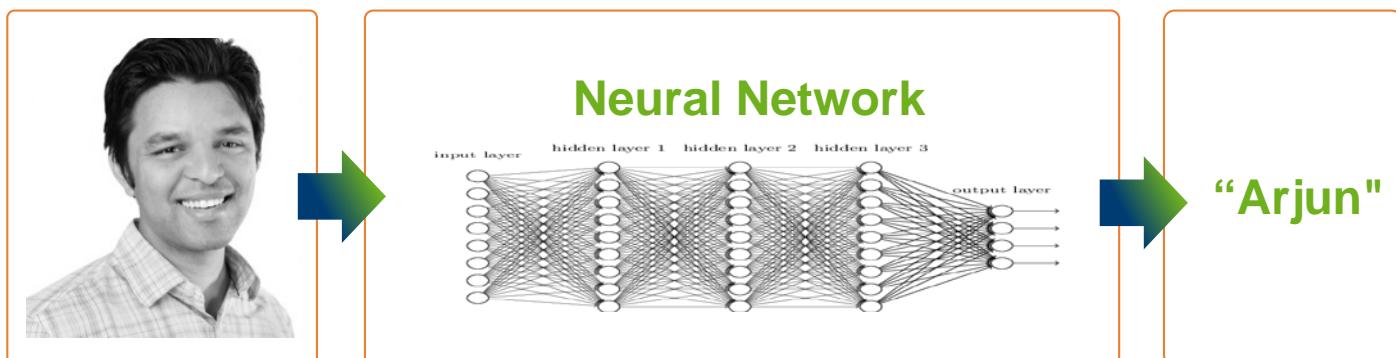
Classic Machine Learning

Step 1: Determine features.
Step 2: Feed them through model.



Deep Learning

Steps 1 and 2 are combined into 1 step.



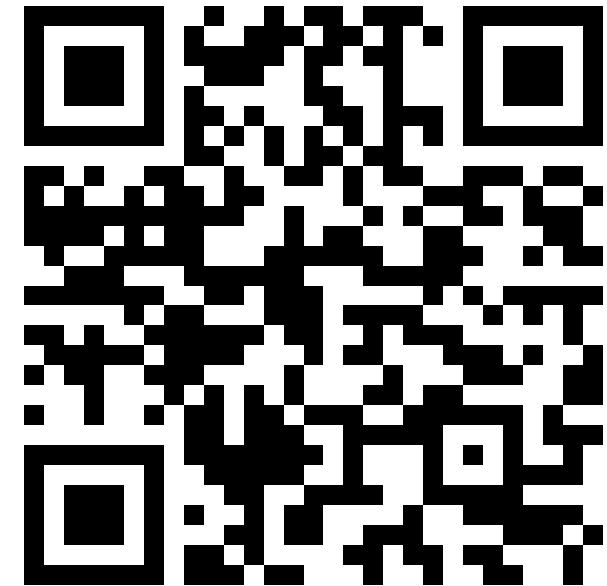
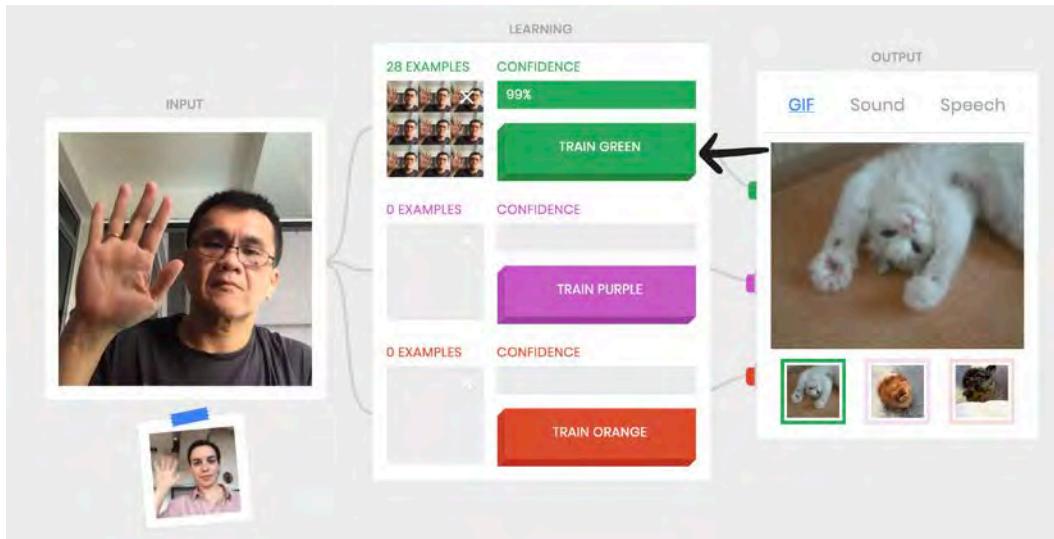


What is neural network?



Deep Learning in Action

<https://teachablemachine.withgoogle.com/>





Reinforcement Learning

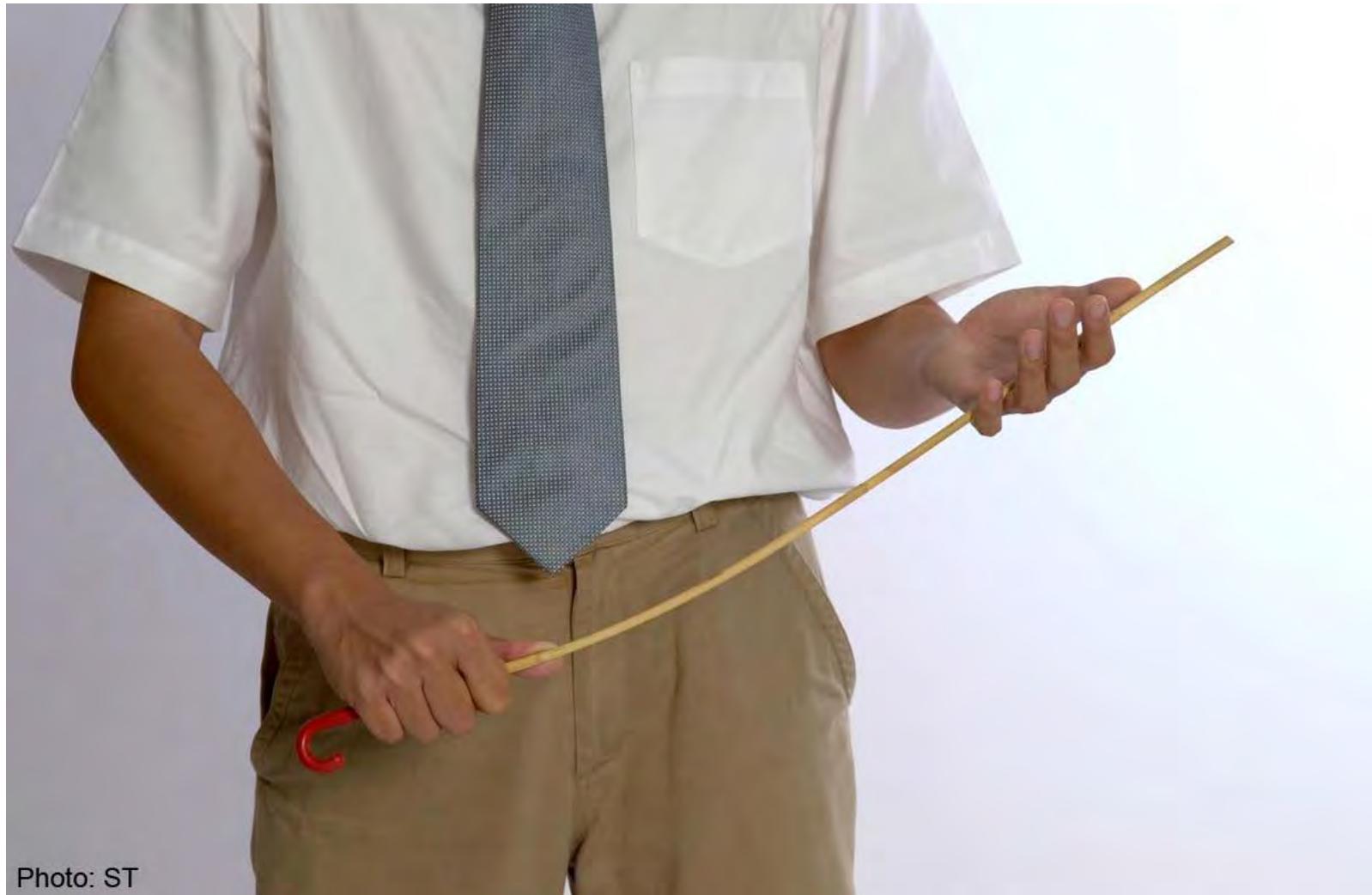


Photo: ST



Reinforcement Learning

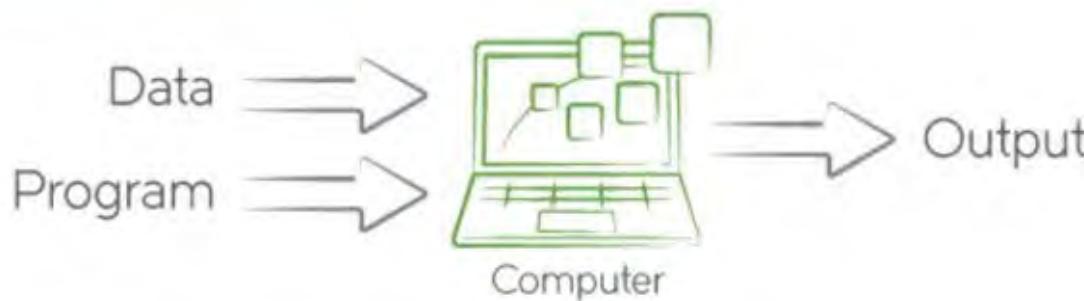




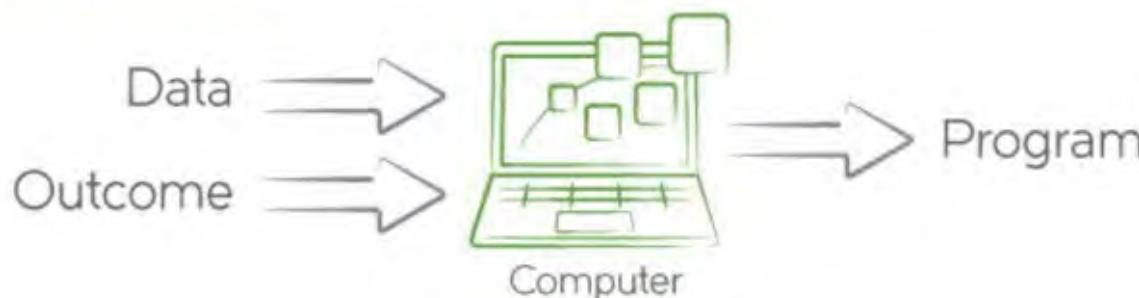


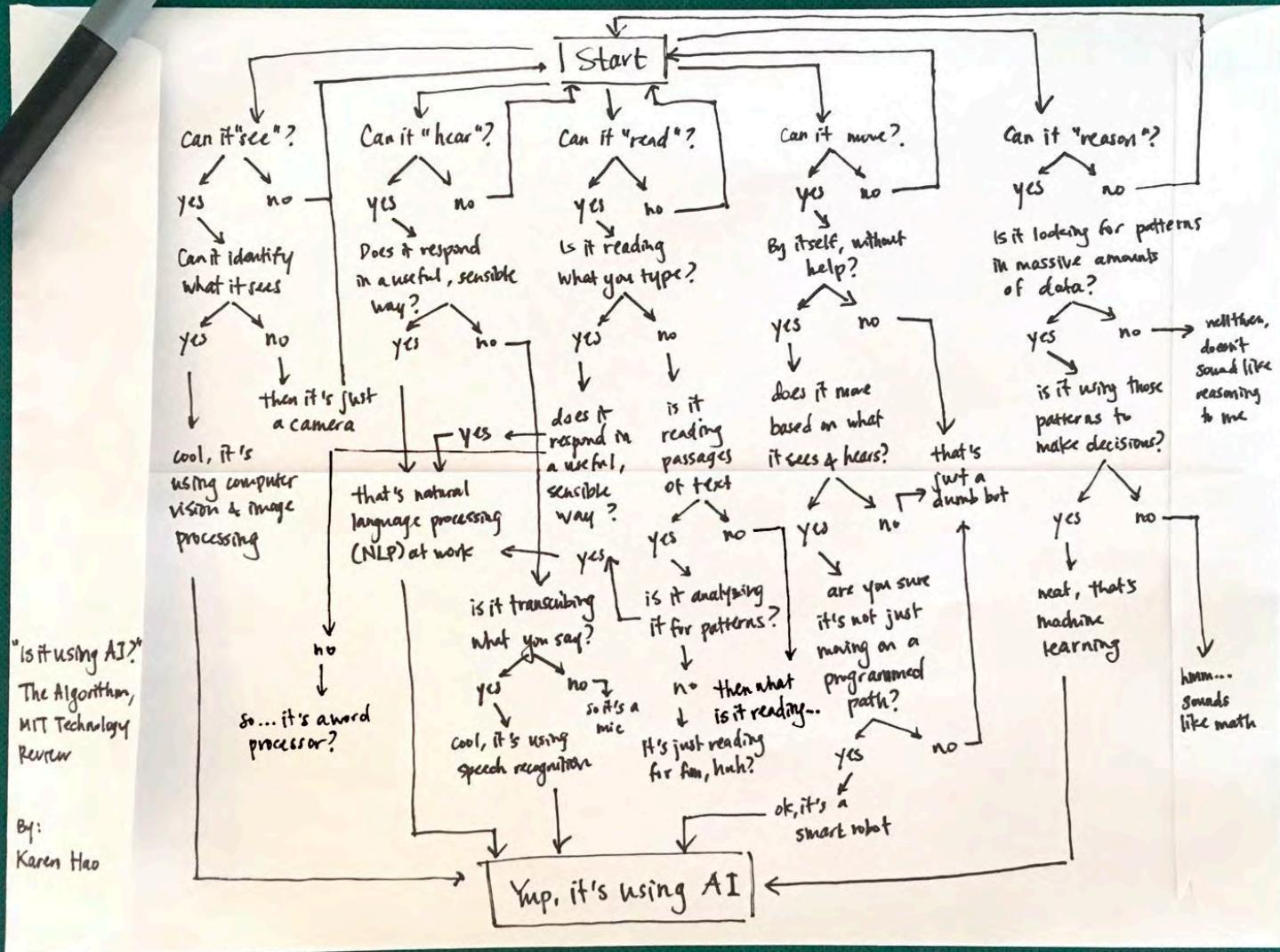
Traditional Programming vs Machine Learning

Traditional Programming



Machine Learning

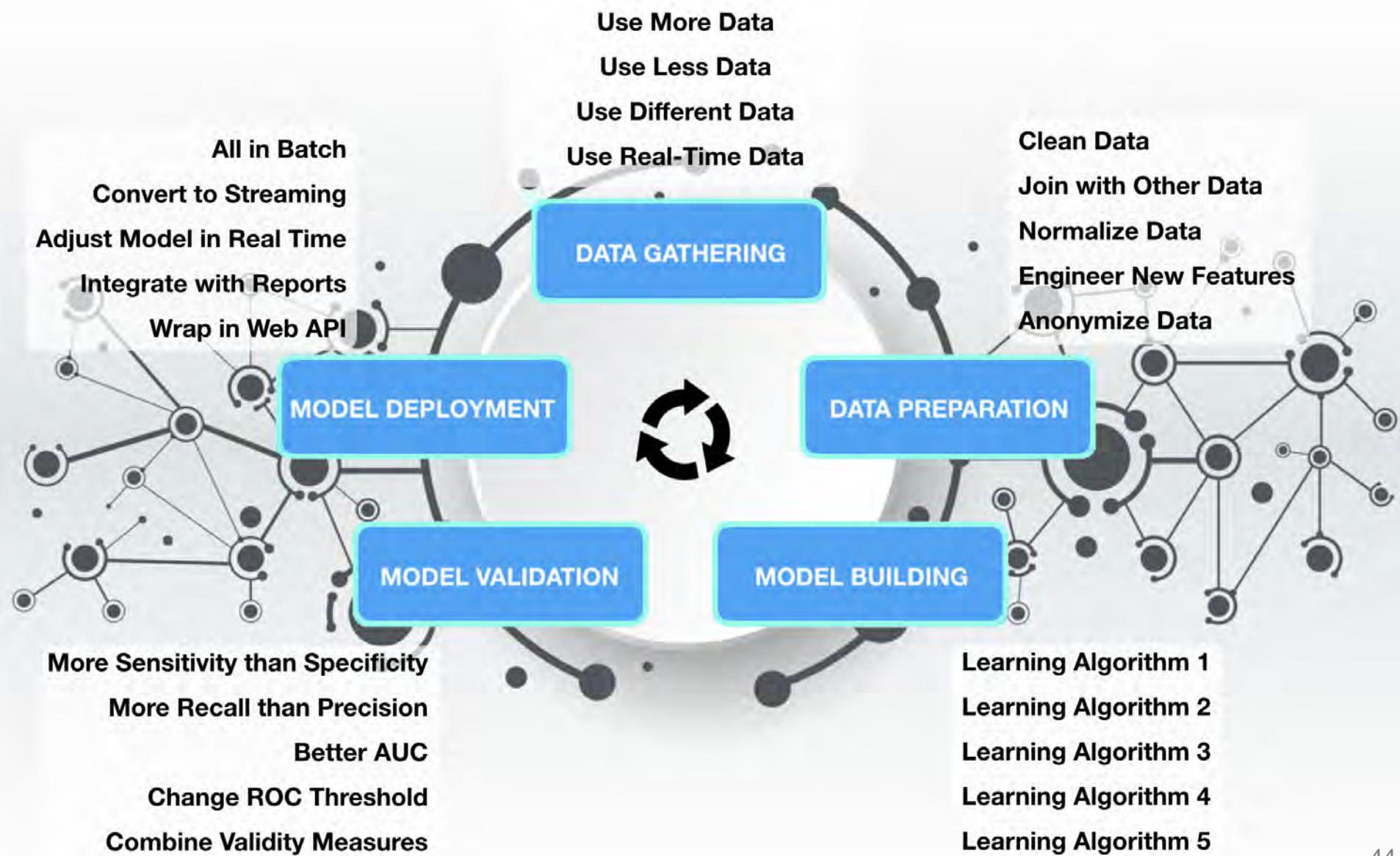




<https://www.technologyreview.com/s/612404/is-this-ai-we-drew-you-a-flowchart-to-work-it-out/>



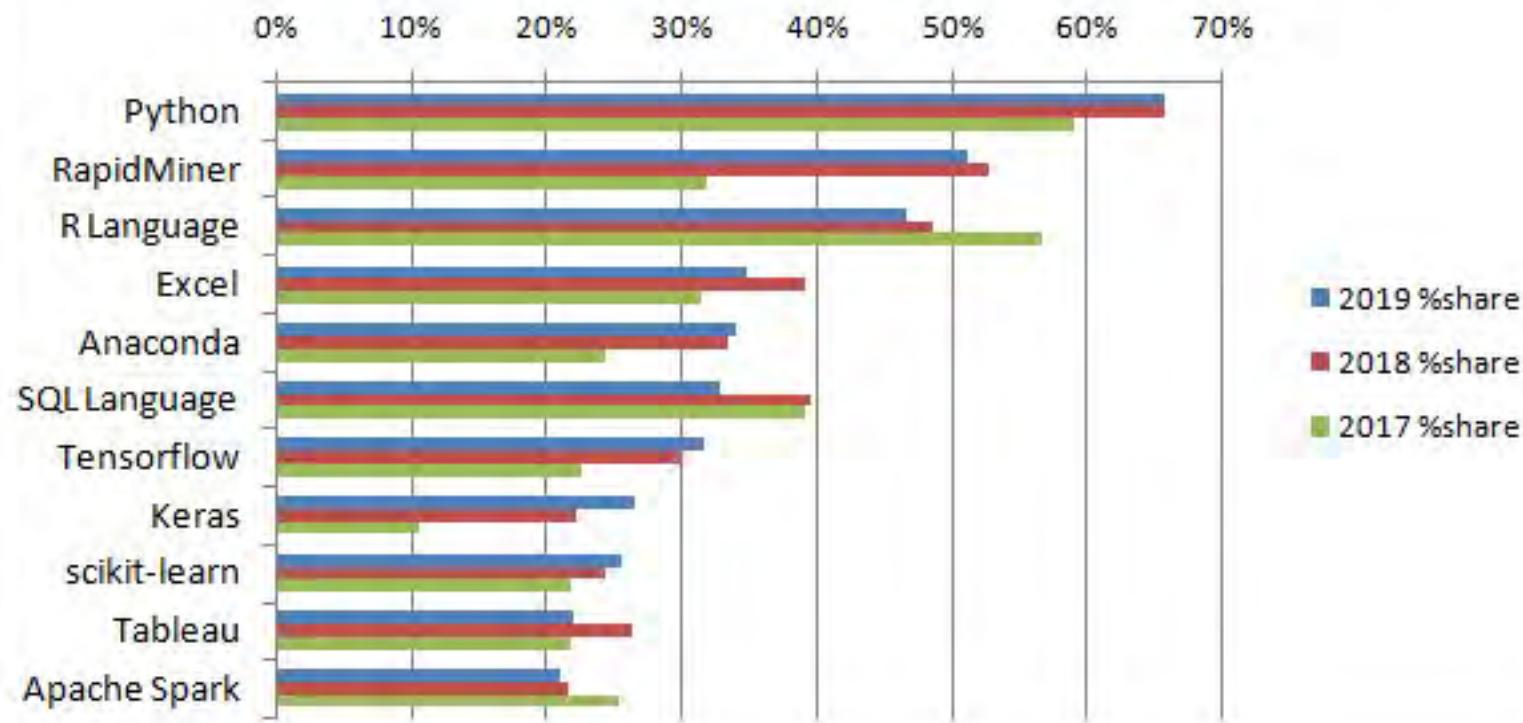
AI/ML Workflow





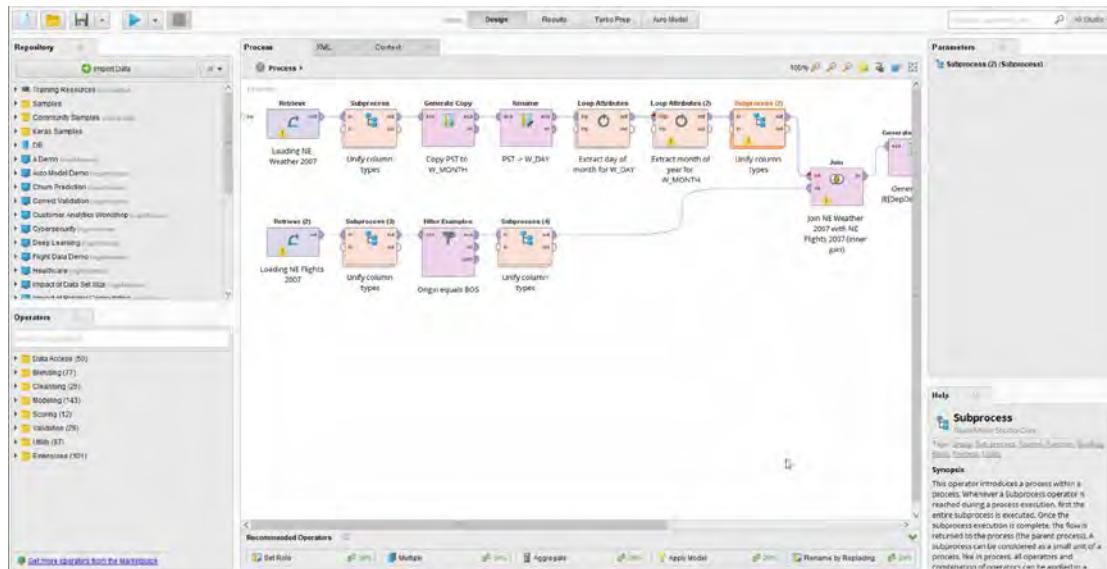
What are the popular tools?

Top Analytics, Data Science, Machine Learning Software 2017-2019, KDnuggets Poll

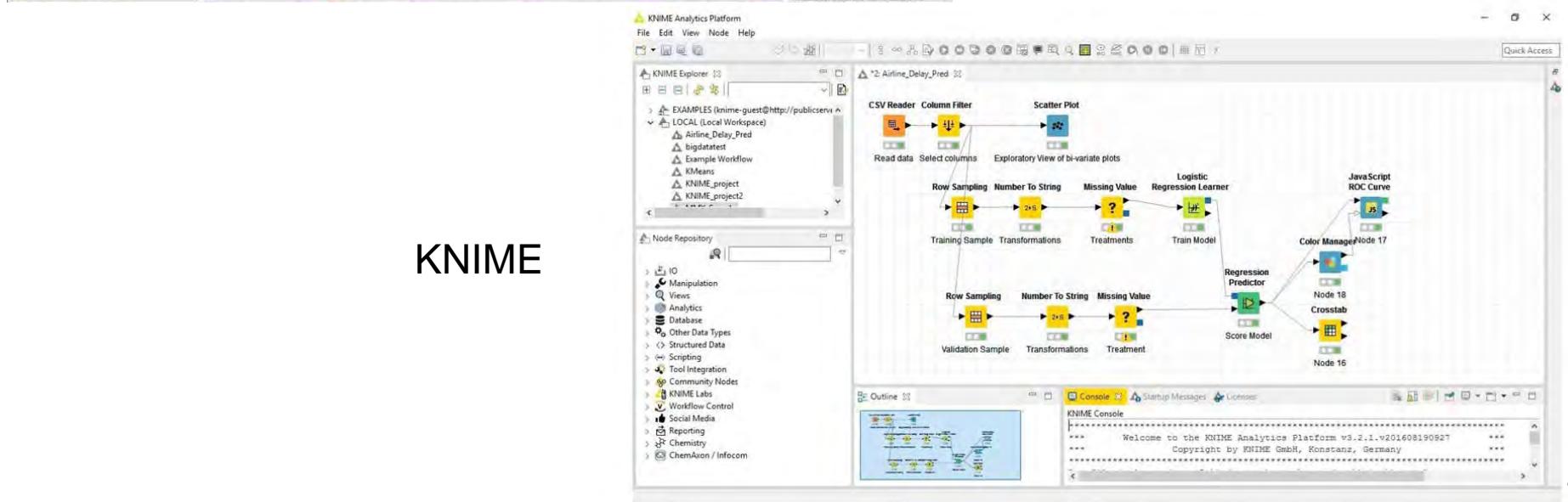




Graphical Tools (ML/DS)



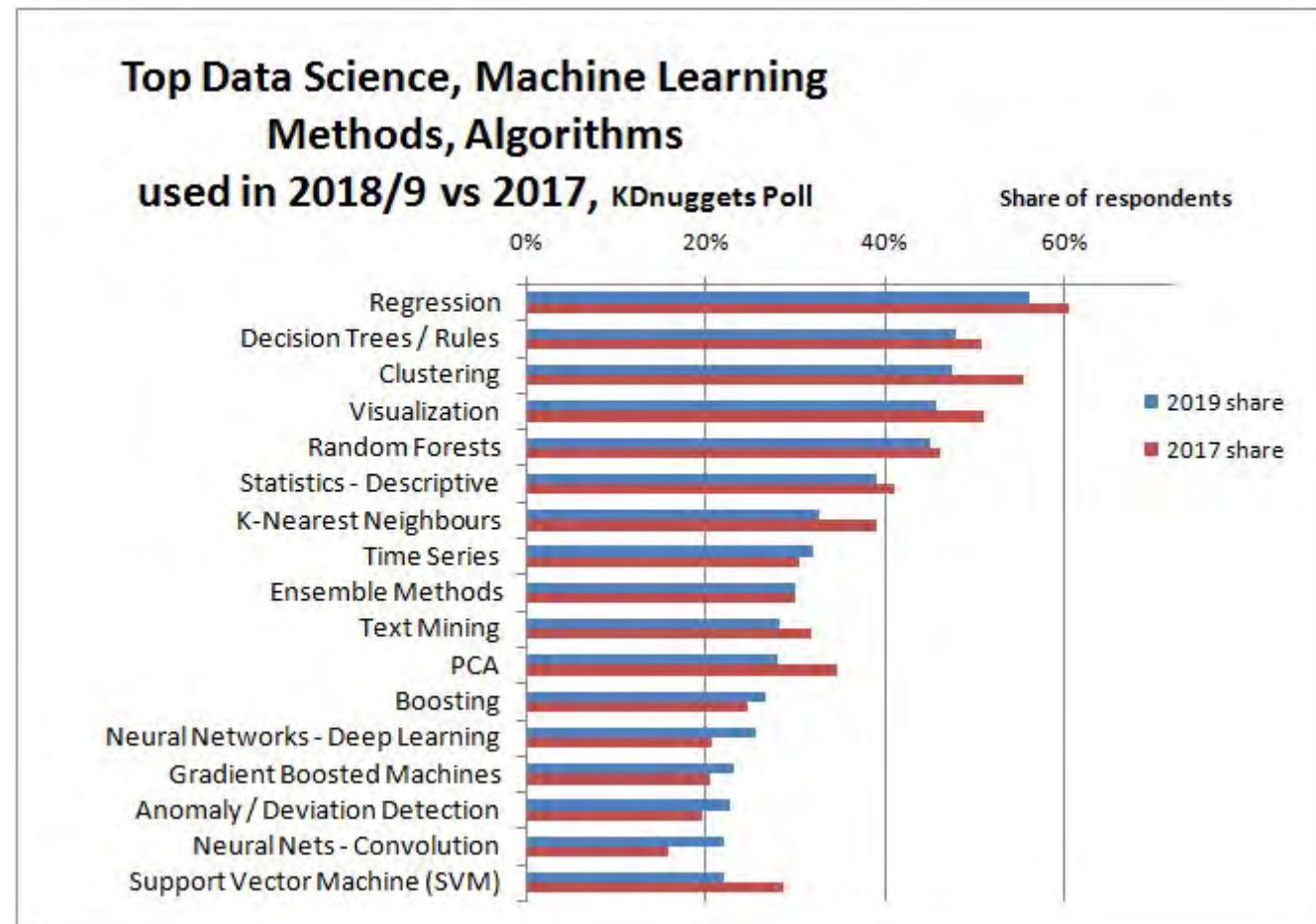
RapidMiner



KNIME

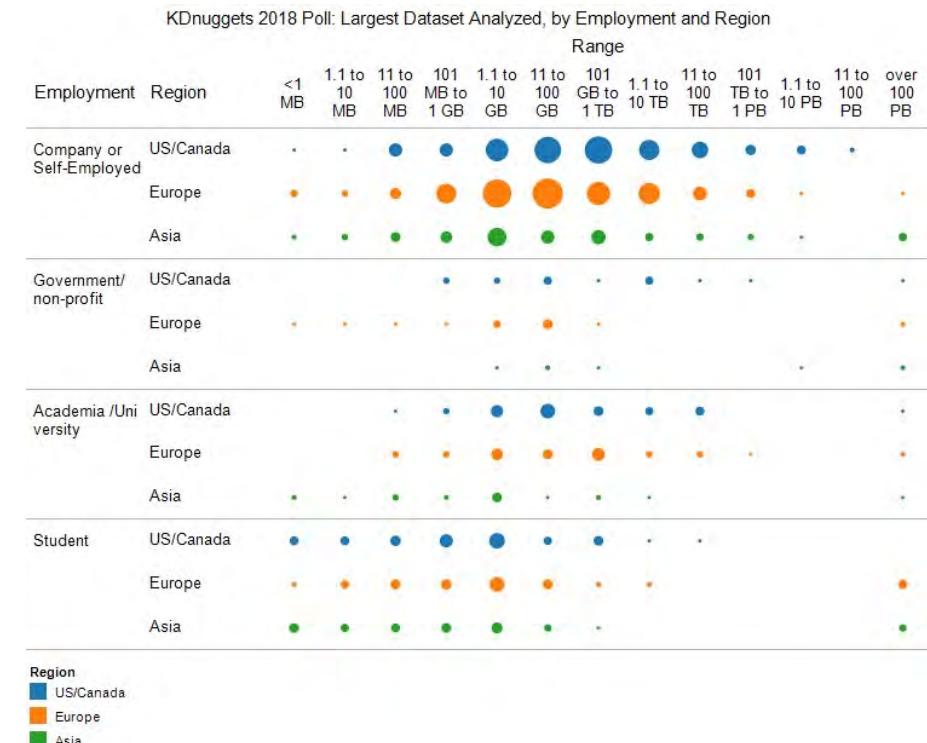
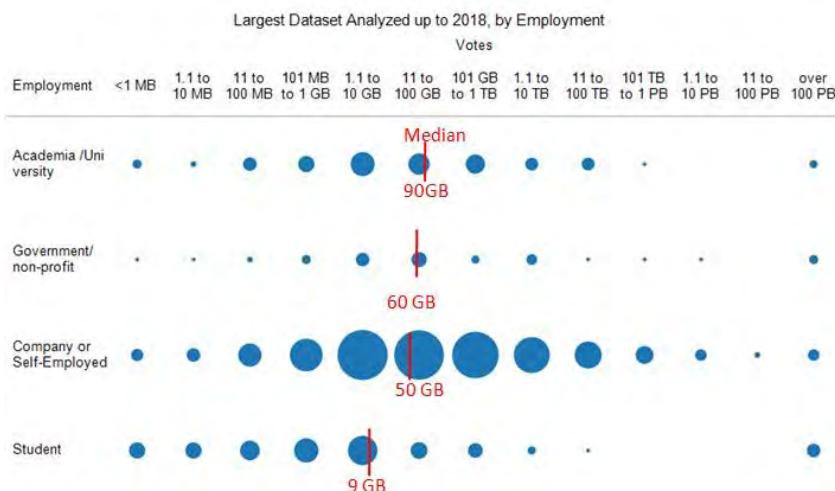
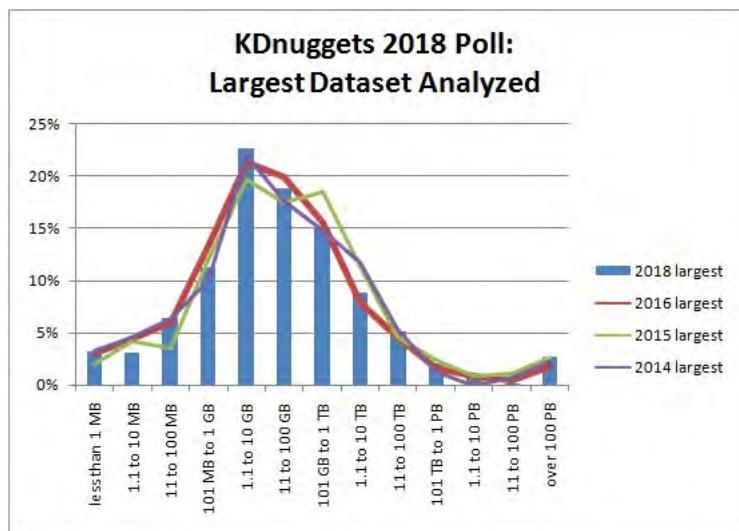


Top Methods/algorithms





Datasets size





Hands on AI

Meet LUIS

Otherwise known as Language Understanding Intelligent Service.

Luis is a service that interprets normal human language and understands what the desired outcomes and relevant pieces of information are. It's fast and easy to deploy, it learns and adapts as it interacts, and with very little training it can gain insights and trigger actions based on real user-inputs and contextual information.



Text Analytics

Step #1: Enter Your Message

Next Step >

Step #2: Sentiment & Key Phrases

This API analyzes your text to identify the keywords and discern the sentiment.



Step #3: Entity Linking

This API ascertains which of the key words are entities and links them in Wikipedia.

Step #4: Bing Entity Search

This API provides a summary of relevant information in the form of a card for each entity.



Computer Vision

Microsoft AI - for a richer experience across a variety of visual mediums.

Analyze and describe images

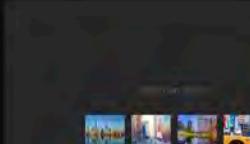
This feature will identify and tag the content of an image, give a written description, and give you confidence ratings on the results. It also identifies racy or adult content allowing easy moderation.

Next Feature >

Read text in imagery

Read handwriting in imagery

Recognize celebrities & landmarks



Face and Emotion Recognition

Facial recognition can be a great security tool. See how Microsoft AI is able to quickly analyze and compare photos. Upload or take two photos and we will use our Face API to tell you if the photos are of the same person. We'll also provide the approximate age, gender, and emotion. Really test the system by making different faces or getting a friend involved to take one of the photos.

Add Photo 1

Add Photo 2





Using AI to make video content better.

Otherwise known as Language Understanding Intelligent Service.

A machine learning-based service to build natural language into apps, bots, and IoT devices.

Quickly create enterprise-ready, custom models that continuously improve.



[See it in action >](#)

<https://aidemos.microsoft.com/luis>





Text Analytics

Step #1: Enter Your Message

Saturn is the sixth planet from the Sun and the second-largest in the Solar System, after Jupiter. It is a gas giant with an average radius about nine times that of Earth.

[Next Step >](#)

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[Next Step](#)

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[Next Step](#)

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[Start Over](#)[Learn to code](#)

<https://aidemos.microsoft.com/text-analytics>



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Next Step

Read text in imagery

Read handwriting in imagery

Recognize celebrities & landmarks

Select an image





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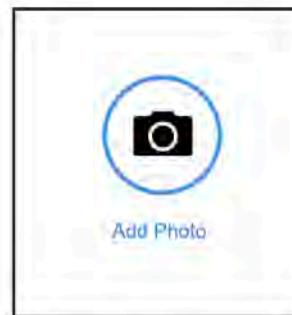


PHOTO 1



PHOTO 2



Speech Authentication

Voices are not always easy to decipher, but a critical piece of our identity. Test out our speech recognition capabilities, built using our Speech API, by recording a phrase three times. Try mixing it up by having someone else record their voice.

I am going to make him an offer he cannot refuse ▾

Record

RECORDING 1

RECORDING 2

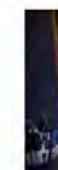


<https://aidemos.microsoft.com/speech-authentication>



Using AI to make video content better.

Microsoft AI tracks and identifies who appears in a video, it transcribes and translates what they're saying, it understands the topics discussed, and detects changes in both scene and sentiment. After processing all of this data it provides the controls to allow the viewer to consume content in a more intuitive & desirable way.



Select one of the videos above to see it in action





Tone Analyzer

IBM Watson Developer Cloud

Tone Analyzer

This service uses linguistic analysis to detect joy, fear, sadness, anger, analytical, confident and tentative tones found in text.

*This system is for demonstration purposes only and is not intended to process Personal Data. No Personal Data is to be entered into this system as it may not have the necessary controls in place to meet the requirements of the General Data Protection Regulation (EU) 2016/679.

Sample use cases

Choose an example to learn how you can adjust the tone of your content to change people's perceptions, or improve its effectiveness.

[Learn more](#).

Tweets Online Review Email message Product Review in French Your own text

Analyzing Customer Engagement Data? Try out the [Tone Analyzer Customer Engagement Endpoint](#).

Choose Language: English French

Analyze



<http://bit.ly/2TLD0Vb>



Discovery

Watson

Discovery / Discovery Demo

Discovery

Unlock hidden value in data to find answers, monitor trends and surface patterns, with the world's most advanced cloud-native insight engine.

[Get Started](#) [API Reference](#) [Documentation](#) [Fork on GitHub](#) [Start for free in IBM Cloud](#)

What company are you interested in?

Quickly find insights in the Watson Discovery service by specifying a company name or a collection of recent news articles. Each article contains information about a company's:

- Top stories over the last two months
- Top entities (people, topics, companies) mentioned in those articles
- Trend of public sentiment in news
- Anomalous periods of high press coverage
- Trend of most commonly paired entities (co-mentioned)

Watson Discovery also lets you do the same analysis with your own data. Learn more [here](#)



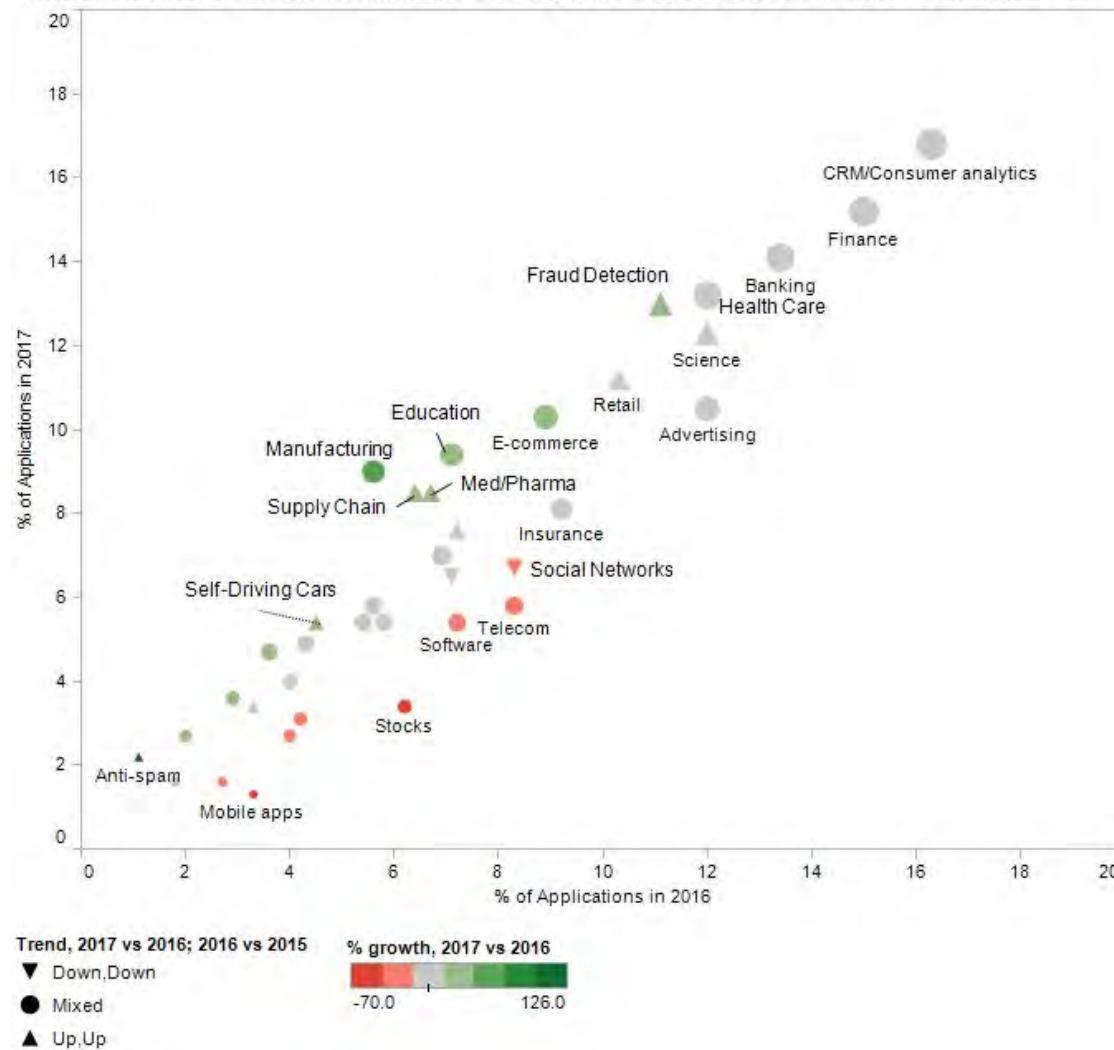
SCAN ME

<http://bit.ly/2HZ9n0B>



Where is AI applied?

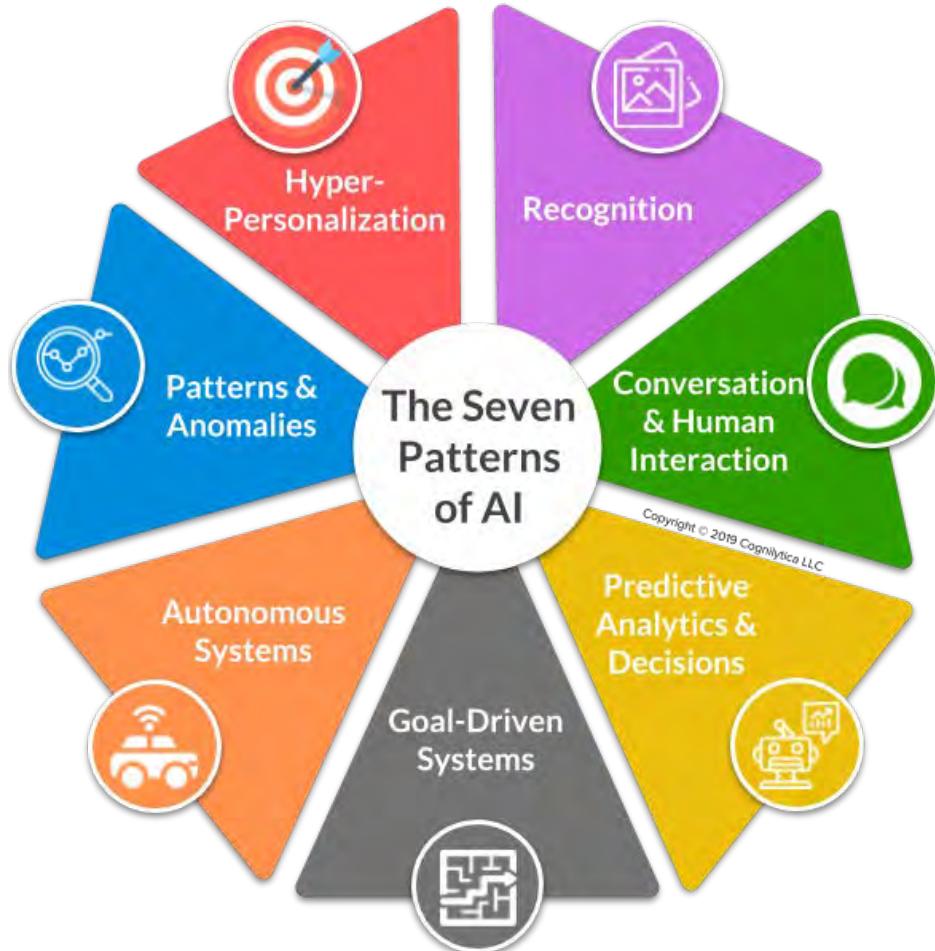
Where Analytics, Data Science, Machine Learning were applied in 2016 and 2017 - KDnuggets Poll



<https://www.kdnuggets.com/2018/04/poll-analytics-data-science-ml-applied-2017.html>



The Seven Patterns of AI



Any AI project or implementation falls within one or more of these 7 patterns that Cognilytica has identified (in no particular order).

HYPERPERSONALIZATION

 Using ML to learn and build individual profiles for deep personalization.
Example use cases: Personalized content, personalized recommendations, behavior profiling.

AUTONOMOUS SYSTEMS

 Systems that are able to accomplish a task, achieve a goal, interact with surroundings with minimal or any human involvement.
Example use cases: Autonomous vehicles, automatic knowledge generation, cobots, self-driving decisions.

PREDICTIVE ANALYTICS & DECISION SUPPORT

 Helping humans make better decisions through models that help predict future data and behavior.
Example use cases: Assisted search and retrieval, predicting a value, behavior, or failure, Guided assistance.

CONVERSATIONAL/HUMAN INTERACTION

 Machines interacting with humans through natural conversation and interaction including voice, text, images, and written forms.
Example use cases: Chatbots, voice assistants, content generation, sentiment analysis, machine translation.

PATTERNS & ANOMALIES

 Using ML to identify patterns in data and learn higher-order connections between information to provide insight and spot outliers.
Example use cases: Fraud & risk detection, discovering patterns among data, surfacing insights in data, automatic error detection / correction, predictive text.

RECOGNITION

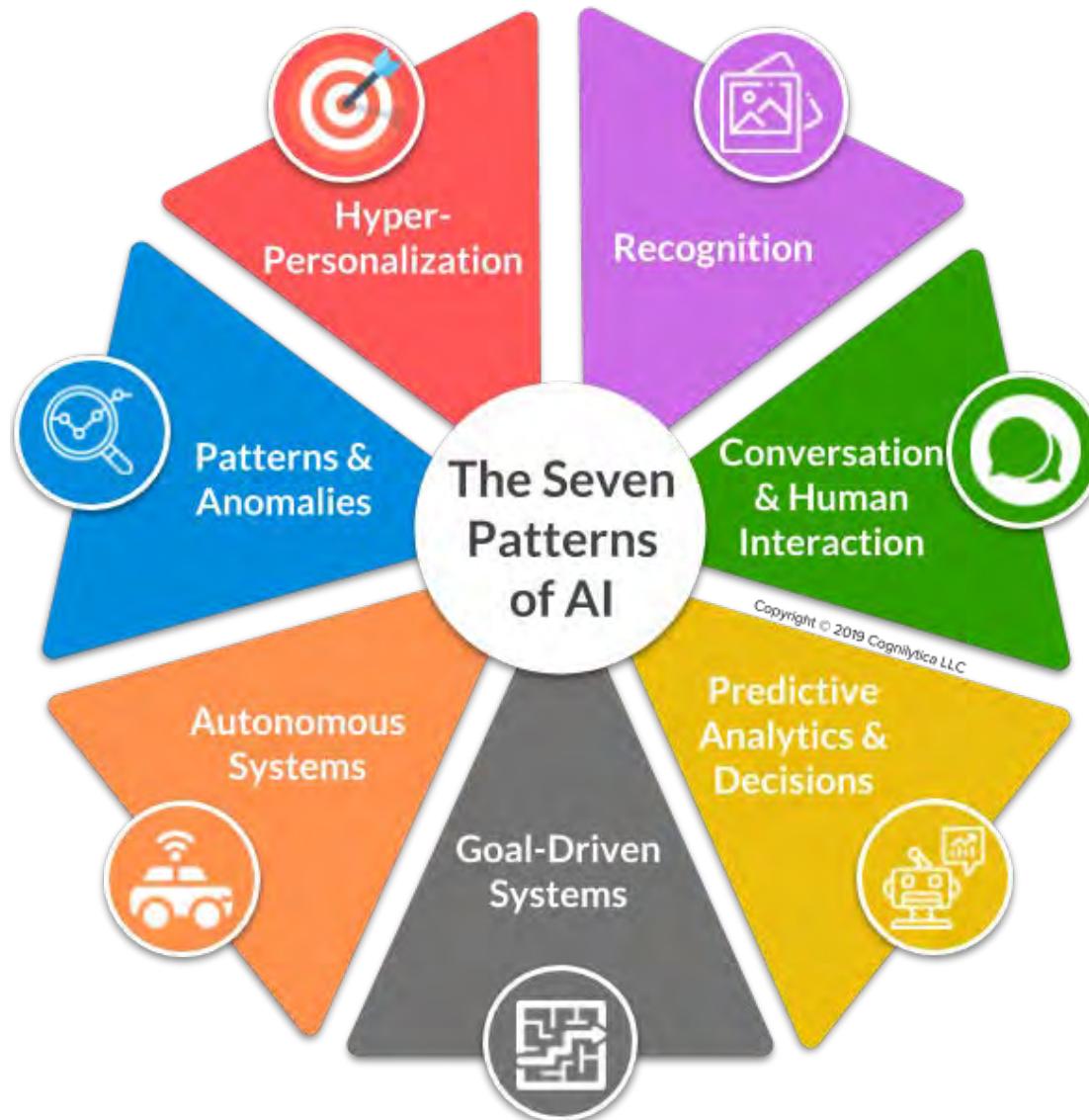
 Using ML to identify and understand images, sound, items, handwriting, faces, and gestures.
Example use cases: Facial recognition, sound recognition, item detection, handwriting / text recognition.

GOAL-DRIVEN SYSTEMS

 Find the optimal solution to a problem through trial and error.
Example use cases: scenario simulation, game playing, bidding and real-time auctions



Patterns of AI





Hyperpersonalization



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MARKET RESEARCH AND INTELLIGENCE ON AI

THE HYPERPERSONALIZATION PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI



Hyperpersonalization



Pattern: Using machine learning to develop a unique profile of each individual that adapts over time for a wide variety of purposes, including displaying relevant content, recommend relevant products, or personalized recommendations and guidance.

Objective: Treating each individual as an individual.

PATTERN USE CASES



ENHANCED CUSTOMER PROFILING

Big data and AI are allowing companies to create more complete profiles of customers/users to deliver more personal messaging and content.



CONTENT PERSONALIZATION

With AI-powered predictive analytics, advertisers are now able to get a comprehensive profile of target customers.



RECOMMENDATION SYSTEMS

Use AI to analyze user behavior, preferences, feedback, and characteristics to predict behavior and deliver unique, personalized experiences.



BEHAVIOR PROFILING

Through ML, learn how users behave through interactions.



HYPERPERSONALIZED ADVERTISING

AI lets brands treat each customer as an individual instead of part of a bucket / group.



HYPERPERSONALIZED MEDICINE

AI allows health professional to diagnose and treat each patient with individualized medicine and treatment options.



HYPERPERSONALIZED FINANCE & INSURANCE

AI allows for additional factors to be examined when providing various insurance quotes or loan approvals.

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DOC ID: CGIC0066



Autonomous System



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THE AUTONOMOUS SYSTEMS PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI



Autonomous Systems



Pattern: Physical and virtual (software) systems that are able to accomplish a task, achieve a goal, interact with their surroundings, and perform their objective with minimal to no human involvement.

Objective: Minimizing human labor.

PATTERN USE CASES



AUTONOMOUS VEHICLES

AI allows for autonomous vehicles of all sorts including cars, trucks, boats, trains, warehouse bots, lawnmowers, and more.



COLLABORATIVE ROBOTS

Cobots operate in conjunction with, & close proximity to humans.



AUTONOMOUS BUSINESS PROCESS

Allow systems to autonomously discover processes and increase workflow optimization on its own.



DOCUMENTATION / KNOWLEDGE GENERATION

Automatically extract information from various systems to generate documents and increase operational efficiencies.



AUTONOMOUS DECISIONS

Processes and actions where there is no human involvement such as autonomous routing of internal tickets or routing documents to departments.



AUTONOMOUS LOGISTICS

Autonomously plan and execute logistics tasks such as routing of goods, accurate tracking of shipments, or inventory forecasting.



AUTONOMOUS RETAIL

The customer experience and business operations of brick and mortar stores are completely automatized.

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Predictive Analytics



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THE PREDICTIVE ANALYTICS & DECISION SUPPORT PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI



Predictive Analytics & Decisions



Pattern: Use ML to understand past / existing behavior and predict future outcomes or help humans make decisions about future outcomes using insight learned from past behavior / interactions / data.

Objective: Helping humans make better decisions

PATTERN USE CASES



FORECASTING & PREDICTION

Use previous data, past behavior and interactions to help humans predict future outcomes.



DECISION SUPPORT

Analyzes business data and presents it so that users can make business decisions more easily.



ASSISTED SEARCH

Use AI to find info needles in data haystacks through voice or text search.



SITUATIONAL AWARENESS

Collect data from your situation / environment and make decisions based on that data.



LOGISTICS & SUPPLY CHAIN

AI algorithms optimize supply chain to optimize staffing, inventory control, energy consumption, more accurate tracking of shipments, and more.



BANKING & FINANCE

AI is being used to determine creditworthiness, help with financial trading and investing.



ENERGY

Analytics is helping the energy industry reduce unexpected equipment failures by predicting when a component might fail, or predict when customers might get a high bill and send out alerts.

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DOC ID: CGIG62



Conversation & Human interaction



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MARKET RESEARCH AND INTELLIGENCE ON AI

THE CONVERSATION & HUMAN INTERACTION AI PATTERN

ONE OF THE SEVEN
PATTERNS OF AI



Conversation
& Human Interaction

Definition: Machines and humans interacting with each other using natural language, conversational forms of interaction through voice, text, and written, and image forms.



Objective: Machines interacting with humans the way humans interact with each other.

PATTERN USE CASES



NATURAL LANGUAGE PROCESSING (NLP)

Give machines ability to understand and generate natural language.



AI ENABLED CHATBOTS

Conversational agents that can engage directly with humans for customer support & engagement, conversational commerce, personal assistants, and more.



VOICE ASSISTANTS

Voice-based hardware devices that interact with users to provide a wide range of capabilities.



SENTIMENT, MOOD, INTENT ANALYSIS

Identify and categorize opinions expressed in text to gain a more complete picture of the voice of the customer.



CONTENT SUMMARIZATION

Extract key information from documents and create shorter / more concise versions of text.



MACHINE TRANSLATION

Machines provide translation between different languages giving access to written or spoken information in another language.



CONTENT INTELLIGENCE

Machines are able to automatically understand text and data such as charts within a document.



CONTENT GENERATION

Machine creates content in human understandable format such as generating text, images, or audio.

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DOC ID: CGIG000



Pattern & Anomaly Detection



THE PATTERN & ANOMALY PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI



Patterns & Anomalies



Pattern: Use ML to identify patterns in data and learn higher-order connections between information to provide insight into whether a given piece of data fits an existing pattern or is an outlier.

Objective: Find which one of these things is like the other and which is not

PATTERN USE CASES



FRAUD & RISK DETECTION

Use ML to find which one of these things is like the other and which is not. Used heavily for financial transactions such as credit card purchases.



UNCOVERING INSIGHTS IN DATA

Machines look at data to find insights, patterns, and groupings in the data.



AUTOMATIC ERROR DETECTION & CORRECTION

AI systems can learn what's "normal" behavior and spot mistakes or errors and make adjustments as needed.



INTELLIGENT MONITORING

AI can monitor of various systems (hardware and software) to determine when errors or breakdowns will occur to help predict maintenance cycles of machinery, formulate predictions regarding asset malfunction, and allow for reductions in unplanned downtime.



DATA AUGMENTATION & DISCOVERY

Using unstructured learning to find and group information that might be relevant from data.



PREDICTIVE TYPING / PREDICTIVE TEXT

AI can provide text suggestions that learn over time allowing the software to build custom dictionaries.



CYBERSECURITY APPLICATIONS

AI can help with cybersecurity by learning and adapting to changing threats, identify and spot malware, phishing attacks, and more.



CANDIDATE MATCHING

AI can sort through thousands of potential candidates to find best matches, screen candidates, and help suggest best candidates for position.

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Recognition Pattern



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THE RECOGNITION PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI



Recognition



Pattern: Using ML to identify and understand images, sound, items, handwriting, faces, and gestures

Objective: Have machines identify and understand the real world and unstructured data.

PATTERN USE CASES

OBJECT RECOGNITION, CLASSIFICATION, & ANALYSIS



Deep Learning has made it possible to train and recognize any image.



SOUND & AUDIO RECOGNITION

Using machines to recognize and understand different sound input such as bird songs or genres of music.



HANDWRITING / TEXT RECOGNITION

Computers understand and interpret handwritten content from documents and digital sources such as checks.



GESTURE RECOGNITION

Computers interpret human gestures as commands to enhance video game interaction, interpret sign language, or help surgeons virtually grasp and move objects.



CONTENT SUMMARIZATION

Extract key information from documents and create shorter / more concise versions of text.



MEDICAL IMAGING

AI is augmenting radiologists by being a "second set of eyes" on images and x-rays.



INSURANCE CLAIMS APPLICATIONS

AI helping with real-time assessment of car or storm damage.



COUNTERFEIT DETECTION

AI helping find counterfeit goods such as purses, watches, or drugs.

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DOC ID: CGIG066

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Goal-Driven System



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THE GOAL-DRIVEN SYSTEMS PATTERN OF AI

ONE OF THE SEVEN PATTERNS OF AI

Pattern: Using Reinforcement Learning for real-world games.



Objective: Find the optimal solution to a problem through trial and error

PATTERN USE CASES

GAME PLAYING



First checkers, then chess, and now more complicated games like Go, AI systems play games and learn through trial and error.



SCENARIO SIMULATION

Using AI to create scenarios and figure out best outcomes for things such as resource optimization of money, equipment, time, or other resources.



TRAFFIC LIGHT CONTROL

AI systems can figure out optimal solution to solve congestion.



ROBOTS

AI powered robots can figure out how to run, jump, and move in various environments.



BIDDING AND ADVERTISING

Multi-agent smart bidding solution finds the optimal price and time points.



ROBOADVISING

Automated, algorithm-driven financial planning services that run through thousands of scenarios and automatically invest client assets.



PHARMA / LIFE SCIENCES

AI can run through thousands of sequences to help with protein folding.

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DOC ID: CGIG065



AI IN LAW ENFORCEMENT

Ways AI is impacting the capabilities of law enforcement around the world

ROBOTS

Robotic devices have been used by law enforcement since 2010, most notably used in detecting and deactivating explosive devices. In India, they've gone as far as developing a real-life robot police officer!

CROWD CONTROL

AI has helped improve large-scale surveillance through monitoring data, images, and the use of drones and other devices. Chinese law enforcement is dramatically increasing use of AI-enabled cameras at major events.

PREDICTIVE POLICING

Through the use of tools such as the Harm Assessment Risk Tool (HART), AI has helped improve predictive policing to better stop crimes before they are committed.



MONITORING SOCIAL MEDIA

AI improves scanning of social media for illicit activities such as drug dealing and radicalized individuals such as ISIS recruiters.



IMAGE RECOGNITION AND FACIAL DETECTION

AI helps scan video footage for people/objects, transcribe audio, and increases accuracy in redacting footage. The Netherlands has recently developed interview 'bots' to improve lie detection.

DATA DISCOVERY

Law enforcement uses AI systems to identify patterns and anomalies and uncover important information in piles of data.

MISSING PERSONS

Companies are developing AI technology for law enforcement to improve the tracking of missing persons.



Hands on – Anomaly detection

Visualizations

Tools - <https://bigml.com/tools>

Web-based Frontend

[BigML Inc. \[US\]](https://bigml.com/) <https://bigml.com/>

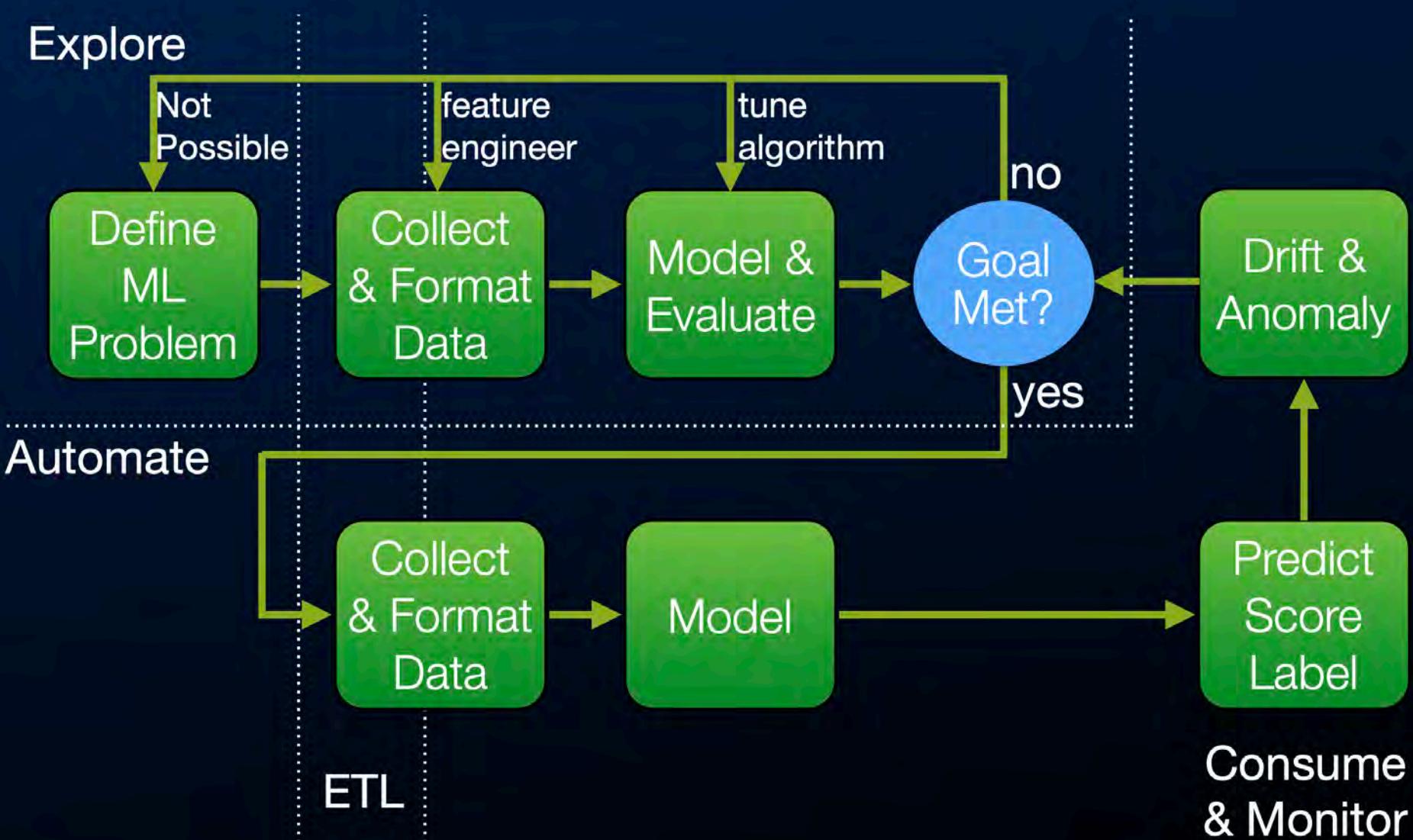
REST API - <https://bigml.com/api>

Distributed Machine Learning Backend

Smart Infrastructure (auto-deployable, auto-scalable)

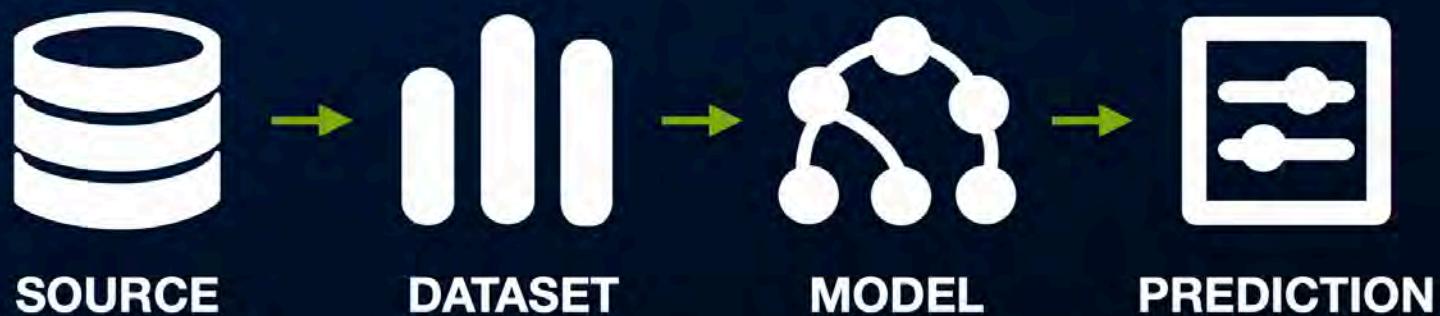


Predictive Application



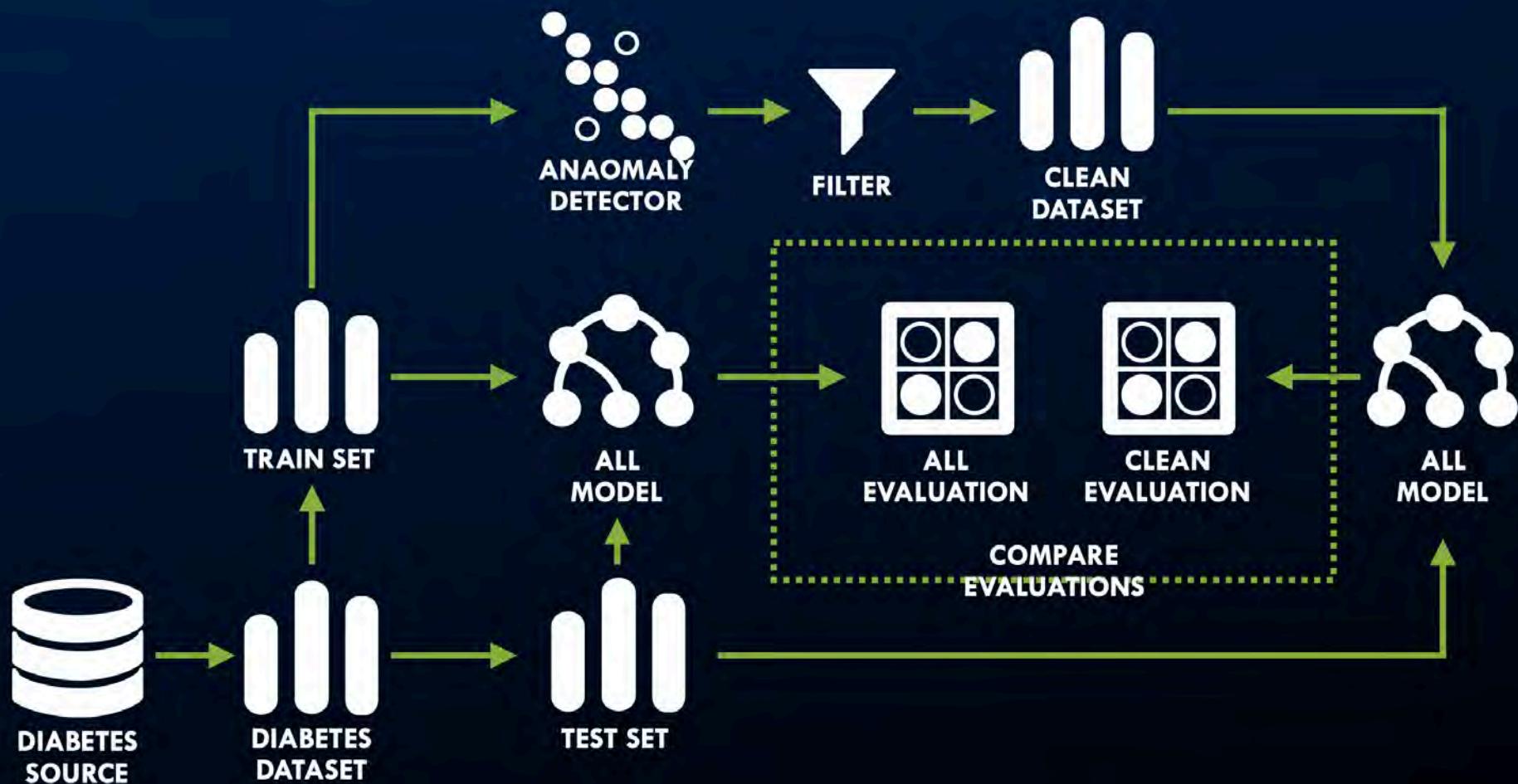


Simple Workflow





Credit Transaction Anomalies





The dataset

- It is important that credit card companies are able to recognize fraudulent credit card transactions so that customers are not charged for items that they did not purchase.
- The datasets contains transactions made by credit cards in September 2013 by european cardholders. This dataset presents transactions that occurred in two days, where we have 492 frauds out of 284,807 transactions. The dataset is highly unbalanced, the positive class (frauds) account for 0.172% of all transactions.





The dataset

- It contains only numerical input variables which are the result of a transformation. Unfortunately, due to confidentiality issues, we cannot provide the original features and more background information about the data. Features V1, V2, ... V28 are the principal components obtained with PCA, the only features which have not been transformed with PCA are 'Time' and 'Amount'.
- Feature 'Time' contains the seconds elapsed between each transaction and the first transaction in the dataset. The feature 'Amount' is the transaction Amount, this feature can be used for example-dependant cost-sensitive learning. Feature 'Class' is the response variable and it takes value 1 in case of fraud and 0 otherwise.

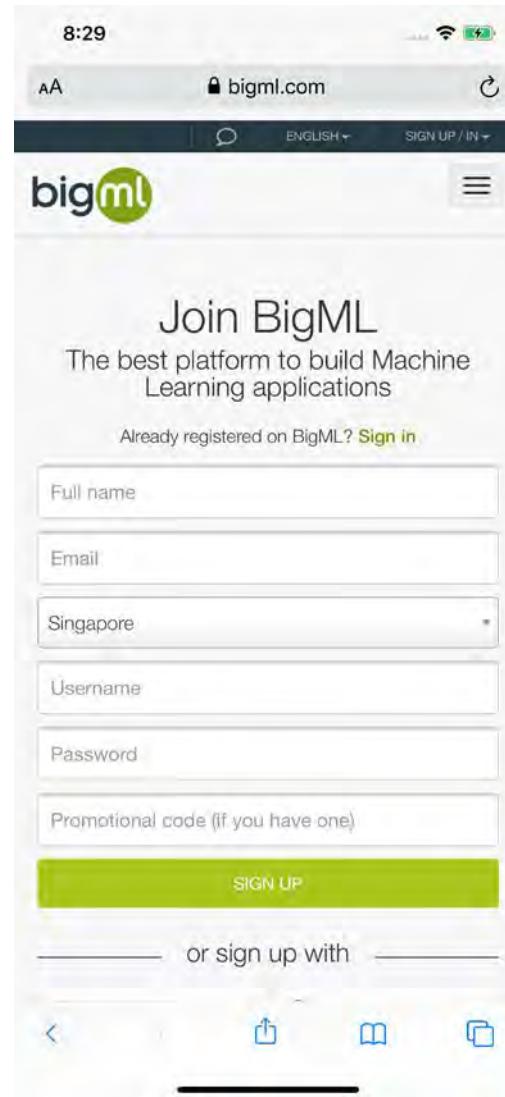
	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	Amount	Class
1	.111	.V12	.V13	.V14	.V15	.V16	.V17	.V18	.V19	.V20	.V21	.V22	.V23	.V24	.V25	.V26	.V27	.V28	.0210531	149.62	0	
2	.05515995	.06178009	.09913898	.0311694	.146817697	-.04704005	.020797124	.02579058	.040399296	.02514121	.0183068	.027783758	-.01104739	.006692808	.012853935	-.01891148	.013355838	-.00210531	0	0		
3	.151272656	.106523531	.048909502	-.0437723	.063555809	.046391704	-.01148047	-.01833613	-.045783	-.06090831	-.02577572	-.0638672	0.10128802	-.03398465	.01571704	.012589453	-.00898831	0.01472417	2.69	0		
4	.052450146	.006608369	.07172973	-.1659459	.234586495	-.28900832	1.10996938	-.1213593	-.2618571	.052497973	.024799815	.07716794	.090941226	-.0689281	-.03276418	-.01390966	-.0553528	-.00597518	378.66	0		
5	.0224873	.017822823	.050775687	-.02879237	-.06314181	-.0596472	-.06840928	.1965775	-.232622	-.02808378	-.01083005	0.0052736	-.01903205	-.1755753	.05473764	-.2219288	0.06272285	0.01645763	123.5	0		
6	-.80228479	.53819555	.134585159	-.1196698	.017512113	-.04514492	-.02370332	-.0381948	.080348693	.040854238	-.0094307	.07982785	-.01374581	.014126698	-.02050096	.050279222	.021942223	.017515315	69.99	0		
7	1.34126198	.035989384	-.03580907	-.01371337	.051761681	.04017259	-.0581328	.068665315	-.033191938	.08496767	-.02082535	-.05598248	-.0263977	-.03714266	-.02327938	.010591478	.025384423	0.08108026	3.67	0		
8	-.14169072	-.01538258	-.07510627	.016737196	0.05014359	-.04435859	0.00282051	.0119873	-.045575	-.02196326	.1677163	-.02707097	-.01541038	-.07800554	.075013694	-.02572368	0.03450743	0.00516777	4.99	0		
9	-.6194678	.029147435	.175796421	-.13238652	.68661325	-.0761717	-.12221273	.03582218	.032450473	-.01567419	.194346534	-.01054547	0.057050353	-.649708	-.04152666	-.05163434	-.12069211	-.10853392	40.8	0		
10	-.07051166	-.01104523	-.02862387	.074435536	-.032887831	-.02100773	-.0499768	.011876486	.057032817	0.05273567	-.07342451	-.02680916	-.02042327	.01101918	.037320468	-.03841573	0.01174736	0.142404433	93.2	0		
11	0.10716447	.083638957	.010664351	-.04435228	.050120191	.073945278	-.05409799	.047667726	.045177286	0.020371146	.02461939	-.06337526	-.01207941	-.03850496	-.069733	.009419883	.024621931	0.08307565	3.68	0		
12	1.19964395	-.06714394	-.05139472	-.0095045	.023090401	0.03196747	.025341472	.085434381	-.02213654	.03872265	-.0093019	.031389441	0.02774016	.050051226	.025153756	-.0129478	.004284987	0.01625326	7.8	0		
13	-.02591156	-.03261432	-.00900467	.036283237	.092890366	-.01294868	-.08099789	.03598539	.070766383	.012599158	.040992369	.023842151	0.00912987	.099671021	-.07673148	-.04922083	0.04247244	-.00543374	9.99	0		
14	.022766623	-.0242682	.120541681	-.03176305	.072567499	-.08156126	.087393645	-.04787788	-.06831926	-.02107559	-.02318092	-.04832853	0.08466769	.039283089	.016113455	-.035499	0.02641555	0.04242209	121.5	0		
15	-.077365569	.032338725	-.0110759	-.01784852	-.06555643	-.01999252	.012400542	-.09804962	-.09829161	-.01531972	-.03687575	0.0744124	0.0174074	.054825473	0.10409415	0.02149106	0.02129331	27.5	0			
16	.084455547	.079294395	0.07044809	-.07349751	.040679571	-.03030576	-.01558867	.078726546	-.022186801	-.1582122	.151566305	0.02218197	.10205862	0.02831665	-.02327453	-.0355572	-.01647775	-.0301536	58.8	0		
17	-.07339806	-.07704067	0.047627	-.01666037	.110695346	.166011356	-.02792654	-.0419944	.04735355	-.026345088	.04962496	.135365049	-.02567533	-.06050837	-.0391244	-.0870865	-.01809975	.01293946	15.99	0		
18	-.04503113	.039670777	.070838041	-.04686473	.035457406	-.02656347	-.0092124	-.0595912	-.05756816	-.01139102	-.02461216	.019600195	0.01380165	.010375833	.036429754	-.03822606	.009280919	0.037050502	12.99	0		
19	.032409781	.027719211	.025264246	-.02918965	.01845202	.114317317	-.09287093	.068046959	.025453646	-.04072013	-.01947958	-.0672638	-.01568575	.0883836	.03424132	-.0490267	.00796924	.013102379	0.89	0		
20	.011722987	.097011672	-.02665678	-.04791295	-.0266085	.047200411	-.07254809	-.070508135	-.04068666	-.2196848	.05036003	.098445979	.045858858	0.0421189	-.04816308	-.0621272	.039205329	.094955425	46.8	0		
21	1.07754241	.06320465	-.04169572	0.05201052	-.00429789	-.01654325	.030424142	.05544325	-.05429252	-.03687910	-.01776498	.04000222	.029581386	.03329036	-.02203849	-.002229844	0.00760226	5	0			
22	1.01915061	.12983287	.042048027	-.0372651	-.08079795	-.02445575	.051566347	.06258473	-.13004082	-.01383339	-.02958529	-.0517955	-.0508807	-.03042145	0.07200101	-.04222344	0.08635534	0.06349865	231.71	0		
23	.169302992	0.040677358	-.09364713	.09373942	0.71091077	-.06023318	.040748438	-.1737162	-.0276123	-.069321	.14399742	.040249166	-.0485082	-.03718663	.03981389	.01996366	-.01637064	-.0146053	34.09	0		
24	.07478579	-.05313773	-.21053465	1.12687011	0.00307532	.042442451	-.0454573	-.0988706	-.08165973	-.03071685	0.01870187	-.0619723	-.01036549	-.03704152	.060320034	0.1085587	-.00405207	-.0114178	2.28	0		
25	.05831995	.052493332	-.04533753	.081839309	1.5552042	-.13968949	.078313084	.043662121	2.17780717	-.02309831	.165018036	.030045409	-.01853525	.042307315	.082059126	-.02276319	.033663445	.025047535	22.75	0		



(1) Sign up for free account

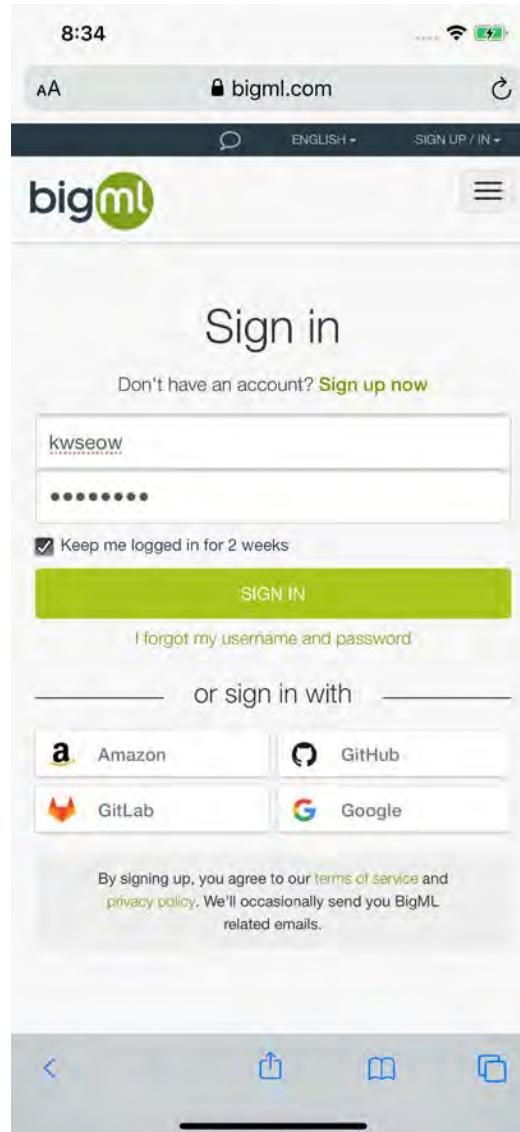


<http://bit.ly/2OTSeJ4>





(2) Sign in





(3) Create Source

The screenshot shows the BigML dashboard interface. At the top, there is a header bar with navigation icons (back, forward, search, etc.), a URL field showing "bigml.com", and various status indicators like "4 GB" and "0 out of 8 tasks". Below the header is a navigation menu with "PRODUCT", "GETTING STARTED", "PRICING", "SUPPORT", "KWSEOW", and "Dashboard". The main content area is titled "KWSEOW - My Dashboard" and shows a "Sources" tab selected. A table lists four CSV files:

Type	Name	Last Modified	Size	Action
CSV	TrainingDataset.csv 558 fields (513 categorical, 45 numeric)	3w 1d	892.1 KB	[Edit]
CSV	sales_data_sample.csv 31 fields (12 categorical, 15 numeric, 3 text, 6 auto-generated datetime)	3w 1d	515.7 KB	[Edit]
CSV	IIP_batch_predict.csv 1 field (1 text)	1m 2w	81.3 KB	[Edit]
CSV	IIP_comments_processed.csv 2 fields (1 categorical, 1 text)	1m 2w	92.9 KB	[Edit]

https://kwseow.github.io/datasets/creditcard_small.csv



(3) Create Source

The screenshot shows the BigML web interface. At the top, there's a navigation bar with icons for back, forward, refresh, and other browser functions. The address bar shows 'bigml.com'. Below the address bar, a modal window titled 'Create a source from a URL' is open. Inside the modal, there's a URL input field containing 'https://kwseow.github.io/datasets/creditcard_small.csv'. Below the URL field is a section labeled 'Examples' with a dropdown arrow. Underneath that is a 'Name:' label followed by an input field containing 'Creditcard'. At the bottom right of the modal are two buttons: 'Cancel' and 'Create', with 'Create' being highlighted in green. In the background, the main BigML dashboard shows a list of datasets, including 'TrainingDataset.csv' and 'sales_data_sample.csv'. On the far right, there's a sidebar with sections for 'KWSEOW', 'Dashboard', 'WhizzML', and some file-related icons. A progress bar at the bottom indicates the process is still ongoing.

https://kwseow.github.io/datasets/creditcard_small.csv



(4) Create Dataset

KWSEOW - My Dashboard

All

Sources Datasets Supervised ▾ Unsupervised ▾ Predictions ▾ Tasks WhizzML ▾

Type	Name	Actions	Last Modified	Size	Jobs
CSV	Creditcard 30 fields (30 numeric)		0min	13.6 MB	0
CSV	TrainingDataset.csv 558 fields (513 categorical, 45 numeric)		3w 1d	892.1 KB	2
CSV	sales_data_sample.csv 31 fields (12 categorical, 15 numeric, 3 text, 6 auto-generated data)		3w 1d	515.7 KB	1
CSV	IIP_batch_predict.csv 1 field (1 text)		1m 2w	81.3 KB	1
CSV	IIP_comments_processed.csv 2 fields (1 categorical, 1 text)		1m 2w	92.9 KB	3
CSV	iris_anomalous_skw.csv 5 fields (1 categorical, 4 numeric)		1m 2w	4.5 KB	1
CSV	iris.csv 5 fields (1 categorical, 4 numeric)		1m 2w	4.5 KB	1

A context menu is open over the first dataset row, showing options: 1-CLICK DATASET, VIEW DETAILS, DELETE SOURCE, and MOVE TO... .



(5) Create Anomaly Detector

- One click detector

Sources **Datasets** Supervised ▾ Unsupervised ▾ Predictions ▾ Tasks WhizzML ▾

Datasets

Name	Size	Last Modified	Actions
Creditcard 39999 instances, 30 fields (30 numeric)	4min	13 M	
892 K			
892 K			
515 K			
2 M			
83 K			
81 K			
70 K			

Creditcard
39999 instances, 30 fields (30 numeric)

1-CLICK SUPERVISED

- MODEL
- ENSEMBLE
- LINEAR REGRESSION
- LOGISTIC REGRESSION
- DEEPNET
- TIME SERIES
- OPTIML

1-CLICK UNSUPERVISED

- CLUSTER
- ANOMALY
- ASSOCIATION
- TOPIC MODEL
- PCA

1-CLICK TRAINING | TEST SPLIT

- RANDOM SPLIT
- LINEAR SPLIT

VIEW DETAILS



(5) Create Anomaly Detector

- Custom Anomaly Detector

The screenshot shows a data analysis interface with a top navigation bar featuring tabs for Sources, Datasets (selected), Supervised, Unsupervised, Predictions, Tasks, and WhizzML. Below the navigation is a toolbar with various icons. A main table displays data for a 'Creditcard' dataset, with columns for Name, Type, Amount, and Time. A context menu is open over the 'Amount' column, listing options for 'CONFIGURE SUPERVISED' tasks: MODEL, ENSEMBLE, LINEAR REGRESSION, LOGISTIC REGRESSION, DEEPNET, TIME SERIES, and OPTIML. To the right of the table, there are three histograms corresponding to the columns V3, V4, and V5.

Name	Type	Amount	Time
V1		1 2 3	1 2 3
V2		1 2 3	1 2 3
V3		1 2 3	39,999 0 0
V4		1 2 3	39,999 0 0
V5		1 2 3	39,999 0 0

CONFIGURE SUPERVISED

- MODEL
- ENSEMBLE
- LINEAR REGRESSION
- LOGISTIC REGRESSION
- DEEPNET
- TIME SERIES
- OPTIML

CONFIGURE UNSUPERVISED

- CLUSTER
- ANOMALY
- ASSOCIATION
- TOPIC MODEL
- PCA



(5) Create Anomaly Detector

The screenshot shows the bigml.com web interface for creating an anomaly detector. The top navigation bar includes links for Sources, Datasets (selected), Supervised, Unsupervised, Predictions, Tasks, and WhizzML. The main workspace displays the 'Creditcard' dataset, which has been uploaded and is represented by a bar chart icon. Below the dataset name are several configuration icons: a lock, a document, a green checkmark, and a progress bar.

ANOMALY CONFIGURATION

Number of anomalies: 20 | Forest size: 217 | Normalize repeats: | Constraints: EXP

Advanced configuration

Anomaly detector name: Creditcard | Reset | **Create anomaly detector**

At the bottom, there is a table header with columns: Name, Type, Count, Missing, Errors, and Histogram. A search bar and a delete button are also present at the bottom right.



(6) Check for anomalies

The screenshot shows the bigml.com dashboard interface. At the top, there are navigation icons (back, forward, search, etc.), a URL bar with 'bigml.com', and a toolbar with 'AA', refresh, and other buttons. Below the toolbar, there's a navigation menu with 'PRODUCT ▾', 'GETTING STARTED', 'PRICING ▾', 'SUPPORT', 'KWSEOW', and a 'Dashboard' button. The main area is titled 'KWSEOW - My Dashboard' and shows a 'All' folder icon. A navigation bar at the bottom includes 'Sources', 'Datasets', 'Supervised ▾', 'Unsupervised ▾' (which is selected), 'Predictions ▾', 'Tasks', and 'WhizzML ▾'. The main content area is titled 'Anomalies' and displays a table of results. The table has columns for 'Name', 'Top N', '1m', '13.6 MB', and several small icons. Three entries are listed:

Name	Top N	1m	13.6 MB
Creditcard top-n=10, 128-tree, no constraints	10	1min	13.6 MB
iris top-n=10, 128-tree, no constraints	10	1m 2w	4.5 KB
creditcard_unsupervised top-n=10, 128-tree, no constraints	10	2m 3w	95.9 MB

At the bottom, there are buttons for 'Show 10 anomalies', a page number '1 to 3 of 3 anomalies', and navigation arrows.



(6) Check for anomalies

Sources Datasets Supervised ▾ **Unsupervised** ▾ Predictions ▾ Tasks WhizzML ▾

Creditcard

ANOMALIES	SAMPLE SIZE	NORMALIZE REPEATS	CONSTRAINTS	FOREST SIZE	INSTANCES
10	1024	NO	NO	128	39,999

TOP ANOMALIES Select all

Rank	ANOMALY	FIELD IMPORTANCE	Percentage	Action
1	V19		72.74%	<input type="checkbox"/>
2	V3		72.05%	<input type="checkbox"/>
3	V6		71.93%	<input type="checkbox"/>

DATA INSPECTOR

V19 2.805882919
V3 -6.60526455
V6



(7) Make prediction

The screenshot shows the bigml.com dashboard interface. At the top, there are navigation icons (back, forward, search, etc.), a URL bar with `bigml.com`, and a toolbar with various buttons. Below the toolbar, the user is on the `KWSEOW - My Dashboard`. The main navigation bar includes `Sources`, `Datasets`, `Supervised`, `Unsupervised` (which is selected), `Predictions`, and `Tasks`. On the right, there's a `WhizzML` dropdown.

The main content area displays the `Creditcard` dataset. It has several configuration parameters: `ANOMALIES` set to `10`, `SAMPLE SIZE` set to `1024`, `NORMALIZE REPEATS` set to `NO`, and `CONSTANT` (partially visible). Below these, there's a section titled `TOP ANOMALIES` with a "Select all" checkbox. Two anomalies are listed: one with a score of `72.74%` and another with `72.05%`. To the right of the anomalies, there's a histogram.

A context menu is open over the first anomaly bar (the one with 72.74%). The menu options are:

- `ANOMALY SCORE`
- `BATCH ANOMALY SCORE`
- `DELETE ANOMALY DETECTOR`
- `MOVE TO...`



(7) Make prediction

KWSEOW - My Dashboard All

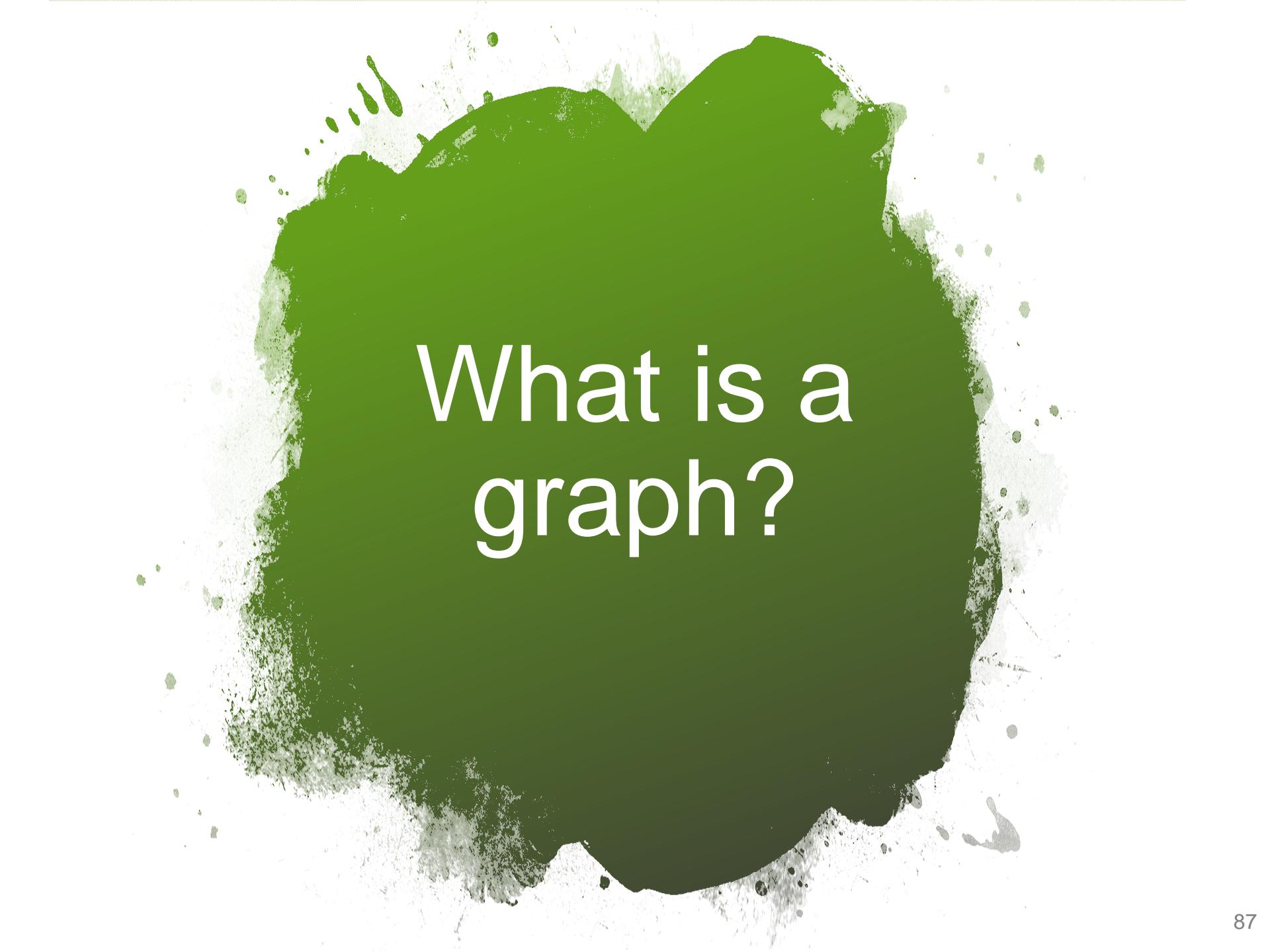
Sources Datasets Supervised ▾ Unsupervised ▾ Predictions ▾ Tasks WhizzML ▾

Creditcard

Score: 66.80%

All input fields:

	V3	Amount	V5	V1	V8	V28
	7.99% <input checked="" type="checkbox"/>	7.75% <input checked="" type="checkbox"/>	5.77% <input checked="" type="checkbox"/>	5.74% <input checked="" type="checkbox"/>	5.45% <input checked="" type="checkbox"/>	5.32% <input checked="" type="checkbox"/>
	-39.91 12.9 -14.26	0.0 9849.27 4783.93	-61.39 54.04 -5.33	-71.0 16.55 -43.5	-56.86 35.38 -12.06	-20.48 44.71 11.19



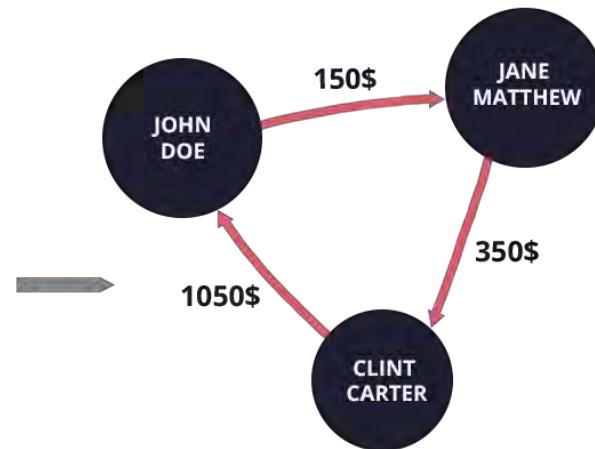
What is a graph?



What is a graph?

- A graph is a data structure that consists of a set of nodes, and edges (or relationships).
 - Each node represents an entity, such as a person, a bank account or any piece of data.
 - Each edge represents how two nodes are linked to each other, for example person «a» owns bank account «b».
 - Nodes and edges can have properties, additional information associated with them. For instance, the name of the person «a» is «John».

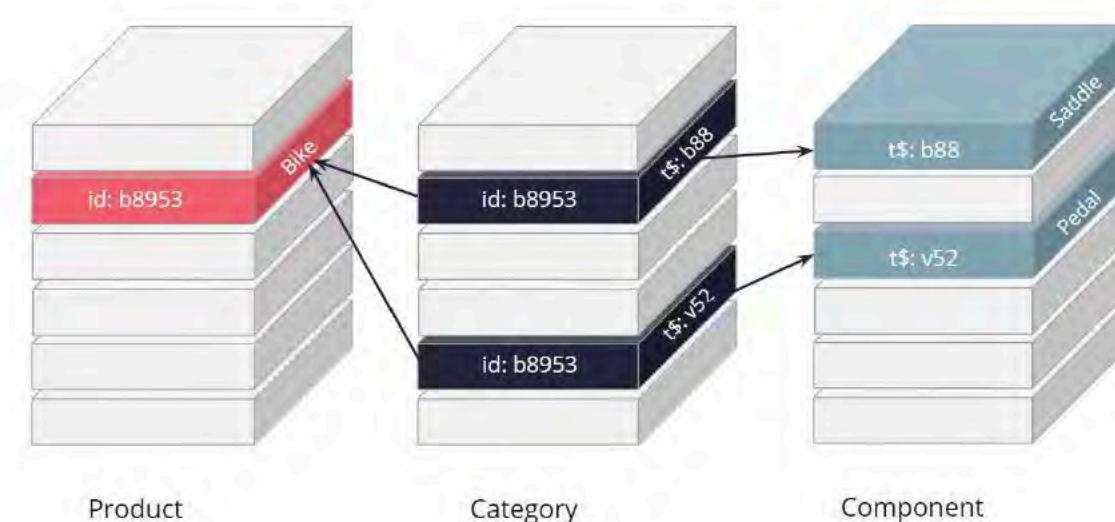
ID	Date	Sender	Amount	Receiver
#1	05/12/18	John Doe	150\$	Jane Matthew
#2	06/24/18	Jane Matthew	350\$	Clint Carter
#3	04/28/18	Clint Carter	1050\$	John Doe





From relational to graph

- The graph approach emerged to address some of the shortcomings of the relational databases management systems (RDBMS)



A tabular data model requires complex sets of joins across tables to model relationships.



From relational to graph

- They are very good for instance for routine analysis of data, or fast operations at scale such as verifying that a transaction belongs to a valid customer. But they also have their drawbacks:
 - poor performances for querying relationships: retrieving the relationships of a row requires going from table to table via “joins”. These joins have an exponential computational cost. As a result, queries that require going through a high number of joins are oftentimes unpractical for performance reasons;
 - low flexibility: tables are hard to evolve and relationships across tables are complex to manage. As a result RDBMS tend to struggle to adapt to domains with complex connected data.



From relational to graph

- Popular graph (or RDF) database vendors:
 - AllegroGraph
 - Cosmos DB
 - Datastax Enterprise Graph
 - JanusGraph
 - Neo4j
 - Stardog



When it's relevant

- Using a graph approach makes sense when your data and your questions involve connections.
- E.g. In a money laundering investigation for example, it is crucial to capture how money flows between individuals and companies.
- Similarly, some questions are particularly well suited for graphs:
 - “how X and Y are connected”,
 - “what is X connected to”,
 - “what’s the role of X in the network”.
- The world biggest companies have been relying on graphs for years now with systems such as the Google’s “Knowledge Graph” or Linkedin’s “Enterprise Graph”.

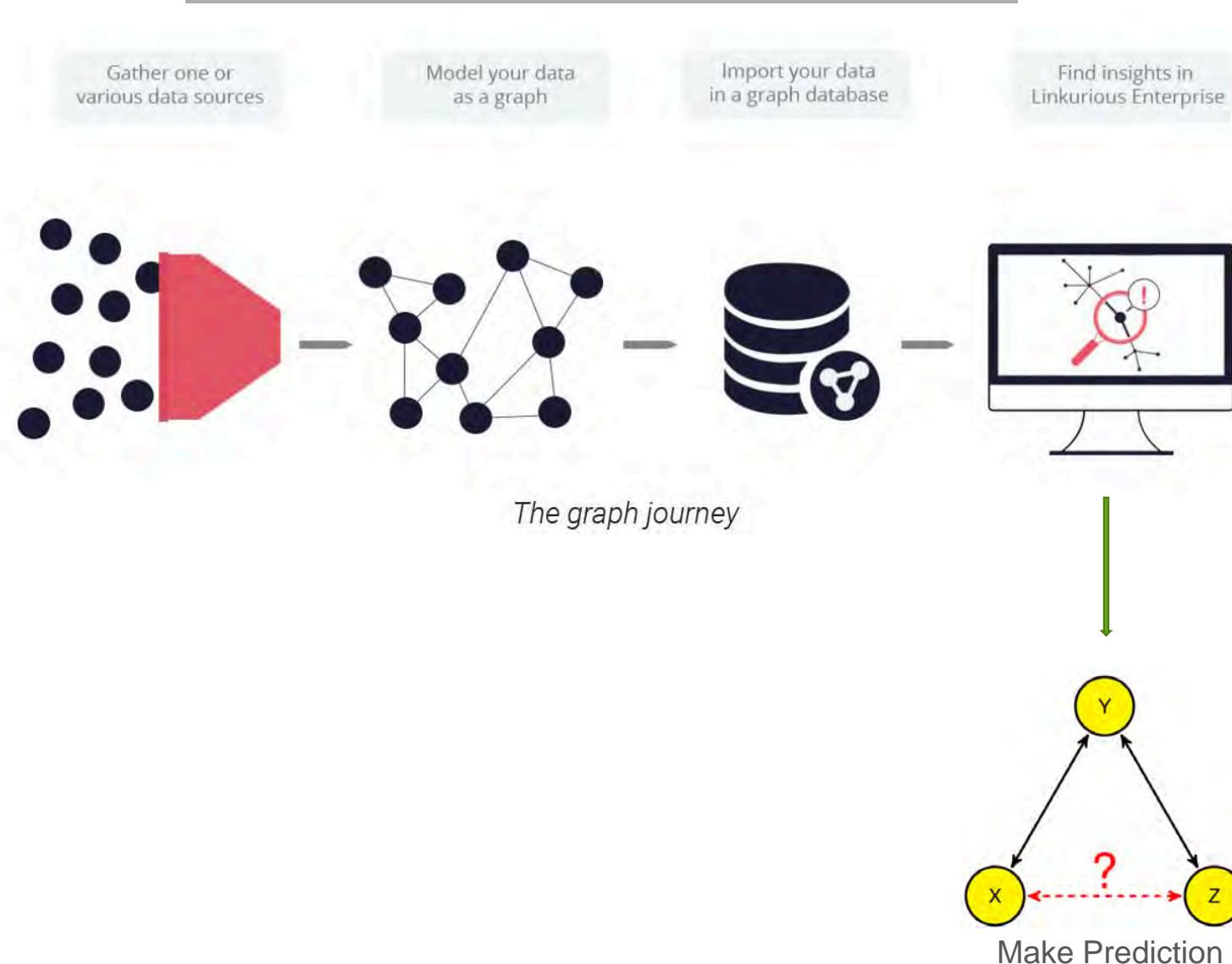


When it's relevant

- Among the use cases in which the graph approach is the most popular are cybersecurity, anti-financial crime or intelligence analysis. In these domains, the organisations switching from tables to graph benefit from:
 - a unified view of their data instead of blindspots and silos;
 - the ability to run complex queries without hitting performance bottlenecks.
- A more complete data picture and the ability to detect complex patterns are invaluable assets to identify cases of fraud or other threats in large volumes of data.
 - For the banks, government agencies and other organisation turning to a graph approach, it leads to the discovery of new threats and faster investigations.



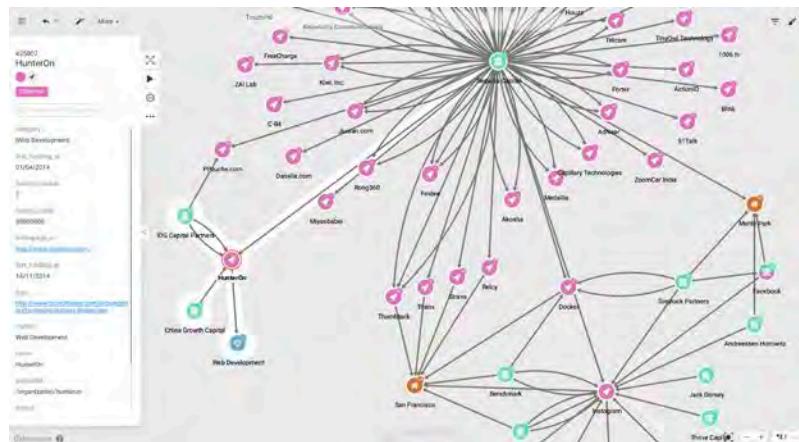
Workflow



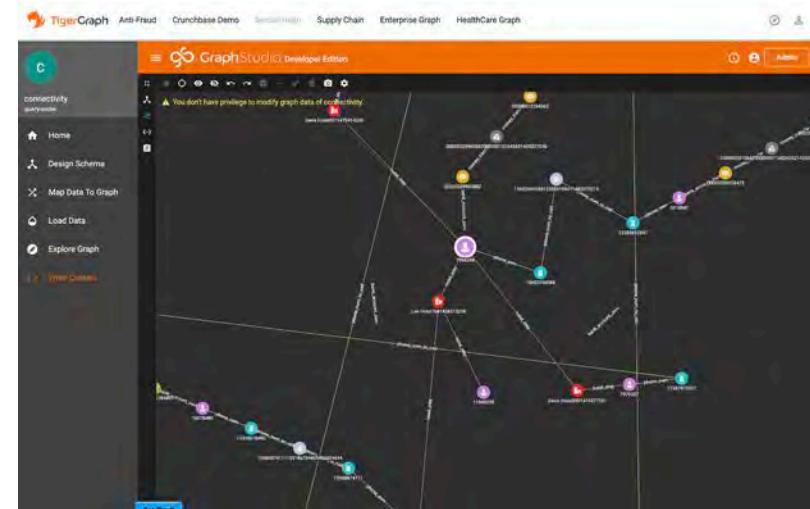


Graph service provider

- lets you visualize and analyse graph data. It connects to a graph database and provides a real-time access to the data.
- Help you:
 - detect sophisticated threats: the unified graph view of your data reveals suspicious connections and patterns otherwise hidden in silos;
 - accelerate investigations: graph visualization removes the difficulty of tracking information scattered across tools and tables, letting you find hidden insights faster.



linkurio.us



tigergraph.com



(1) Sign up for test drive



<http://bit.ly/31sm8ad>



TAKE A TEST DRIVE

First Name*

Last Name*

Work Email*

Phone Number*

Company*

SUB!



(2) Login to testdrive



<https://testdrive.tigergraph.com>





(2) Social graph demo

8:20

AA testdrive.tigergraph.com

TigerGraph Anti-Fraud Crunchbase De

C connectivity queryreader schema for connectivity

Home Design Schema Map Data To Graph Load Data Explore Graph Write Queries

Feedback

This screenshot shows the GraphStudio interface at 8:20. The main area displays a social graph with several nodes, each representing a user profile with a picture and some text. Edges connect the nodes, representing relationships like 'Follows' or 'Friends'. The interface includes a sidebar with navigation options: Home, Design Schema, Map Data To Graph, Load Data, Explore Graph, and Write Queries. A top bar shows the URL testdrive.tigergraph.com and the TigerGraph logo. A feedback button is located at the bottom right.

8:49

testdrive.tigergraph.com

TigerGraph Anti-Fraud Crunchbase De

GraphStudio Developer Edition

You don't have privilege to modify schema for connectivity.

This screenshot shows the GraphStudio interface at 8:49. It displays a similar social graph to the first one, with nodes representing users and edges representing their connections. A prominent message at the top states, "You don't have privilege to modify schema for connectivity." The interface includes a top navigation bar with the URL testdrive.tigergraph.com and the TigerGraph logo, and a bottom feedback button.



(2) Social graph demo

8:52

AA testdrive.tigergraph.com

TigerGraph Anti-Fraud Crunch

C

connectivity

query reader

Home

Design Schema

Map Data To Graph

Load Data

Explore Graph

Write Queries

Enter query parameters

A: vertex

Vertex type: citizen

Vertex id: 74111

B: vertex

Vertex type: citizen

Vertex id: 2996088

k: int number

5

Run query

Feedback

Done

99



Investigations



Investigation 01

Find top 10 people that relates both Citizen 8497253 and 13546088.

Investigation 02

How are Citizen 9627525 & 9742157 connected?

Investigation 03

Who are the Citizens that link Citizen 8672114 & 10144141?



StellarGraph is a Python library for machine learning on graph-structured (or equivalently, network-structured) data.

- implements several state-of-the-art algorithms for applying machine learning methods to discover patterns and answer questions using graph-structured data.
- The StellarGraph library can be used to solve tasks using graph-structured data, such as:
 - Representation learning for nodes and edges, to be used for visualisation and various downstream machine learning tasks;
 - Classification and attribute inference of nodes or edges;
 - Link prediction;
 - Interpretation of node classification through calculated importance of edges and neighbours for selected nodes



Applications

Navigation



Google & Waze find the fastest route, by processing traffic data.

Ride sharing



Uber & Lyft predict real-time demand using AI techniques, machine learning, deep learning.

Audience



Facebook & Twitter use AI to decide what content to present in their feeds to different audiences.

Content



Image recognition and sentiment analysis to ensure that content of the appropriate "mood" is being served.

Natural language



We carry around powerful natural language processing algorithms in our phones/computers.

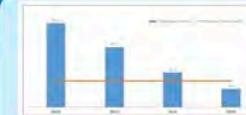
Object detection



Cameras like Amazon DeepLens* or Google Clips* use object detection to determine when to take a photo.



Deep Learning "proven" to work for image classification.



Models outperform humans on image classification.



Object detection models beat previous benchmarks.

2012

2015

2016

Application Area: Abandoned Baggage Detection

- We can automatically detect when baggage has been left unattended, potentially saving lives.
- This system relies on the breakthroughs we discussed:
 - Cutting edge object detection.
 - Fast hardware on which to train the model (Intel® Xeon® processors in this case).



Abandoned baggage



Finance

- Better Customer Service
- More Reliable Investment Services with Robot Advisor
- Greater Efficiency with Less Paperwork
- Improved Financial Security

JPMorgan Chase Uses COIN Machine Learning Program To Eliminate 360K Lawyer Hours A Year



TREND 1



Readying for banking's shift from mobile-first to AI-first

Artificial intelligence (AI) in banking is not new. Banks are already using AI in heavily-manual processes for accuracy, efficiency, speed and cost benefits. What is new, however, is the move of AI beyond process to interaction. The next stage of AI in banking will be toward simple and smarter interfaces: drawing on machine learning that adapts to data and interactions to improve areas like fraud detection, and tapping AI-enabled tools (like centralized platforms/assistants or messaging bots) to better converse with and offer services to customers in the front-office. Relying on AI for some internal and external interactions will help elevate the customer experience and move staff to more judgment-based and higher value added roles.



JP Morgan



Fraud Detection

Traditionally: Fraud is on the rise, but fraud detection is a challenging problem to solve correctly.

- Historically, a predefined rule-set was used for fraud identification, but this approach misses much of the nuance that surrounds fraud
- 1/3 of falsely identified fraud events result in lost customers
- In the US, this loss is worth 13 times the cost of actual fraud



Now with AI: With ML techniques, banks can predict fraud based on a behavioral baseline to compare against.

- Uses historical shopping data and shopping habits of customers
- Compares new data to baseline to determine likelihood of fraud



Example: Sift Science

- Established a fraud data consortium developed from over 6000 websites to leverage large-scale real-time ML
- Autonomously learns new fraud patterns based on billions of user actions





Sift Science



Risk Management

Traditionally : New regulations force tighter control on financial institutions.

- New business model disruptions
- Increasing pressure on costs and returns



Now with AI : ML can help discern the credit worthiness of potential customers

- Tailor a financial portfolio to fit the goals of the user using ML algorithms.
- Financial institutions can develop early warning systems for automated reporting, portfolio management, and recommendations based on ML.



Example: ZestFinance

- Traditional underwriting systems make decisions using few data points.
- Those with a limited credit history are often denied credit, ultimately leading to loss of revenue for lenders.
- ZestFinance leverages thousands of data sources together with ML to more accurately score borrowers, even people with a small credit history.





Zest Finance





Stock Trading

Traditionally : The speed and volume of information is daunting.

- The market is reactionary.
- It's difficult to remain competitive while relying on traditional trading methods.
- Fundamental analysis is unable to show the entire financial picture.



Now with AI : Companies use massive datasets together with DL methods for better forecasting.

- Data pulled from financial, political, and social media
- Analyst reports combined.



Example: Sentient Technologies, and Learning Evolutionary Algorithm Framework (LEAF*)

- Manages millions of data points to find trends and make successful stock trades.
- AI algorithms identify and combine successful trading patterns.
- Successful strategies are tested in the real world, evolving autonomously with LEAF.
- Sentient has received more funding than any other AI company.



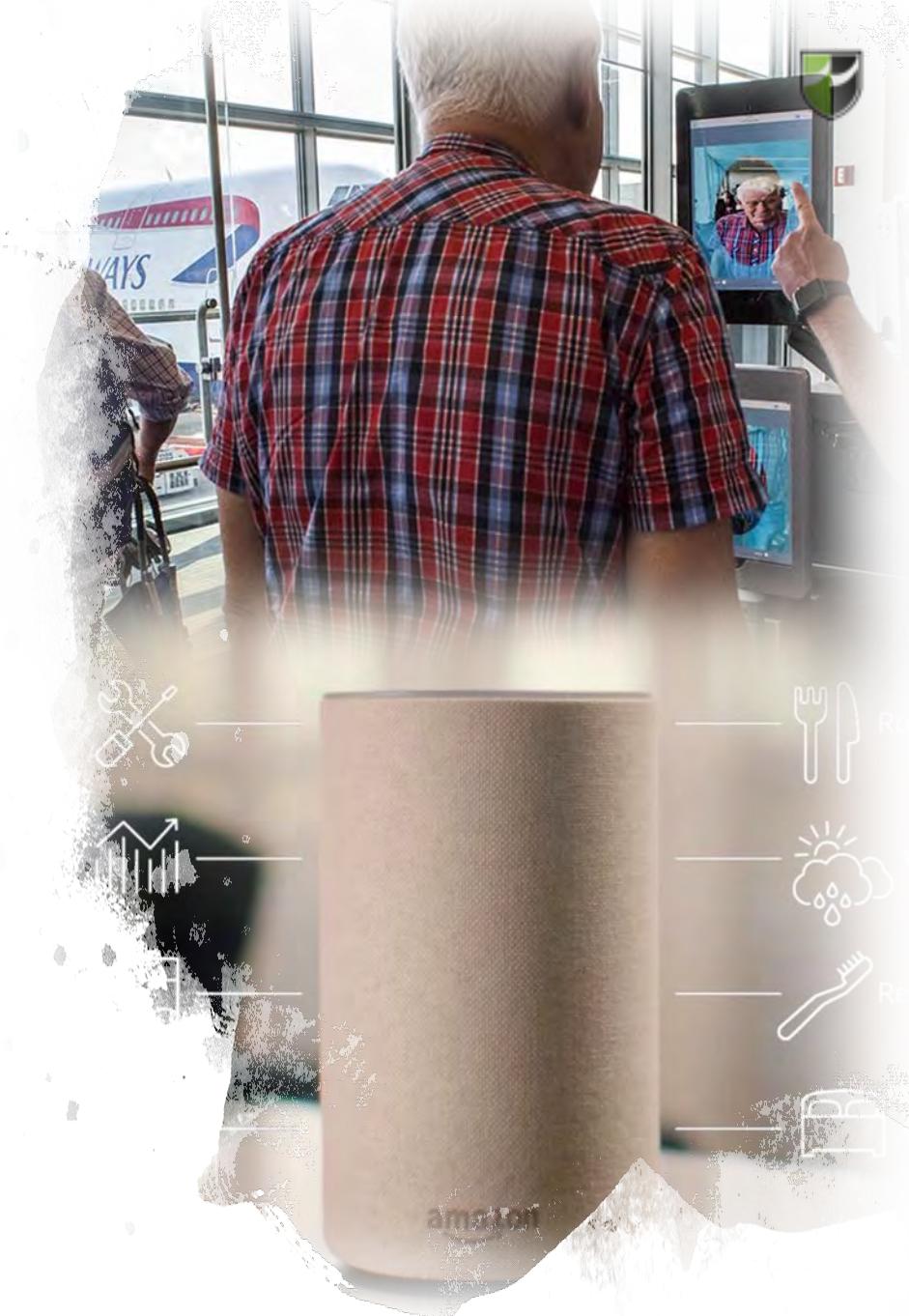


Cognizant



Travel

- Hotel Bookings by Voice Command
- AI Concierge Services
 - <https://techcrunch.com/2018/06/19/amazon-launches-an-alexa-system-for-hotels/>
- Travel Service Chatbots
- Check-in Through Facial Recognition
- Self-Driving Cars and Mobility as a Service
 - <https://www.economist.com/international/2016/09/29/it-starts-with-a-single-app>
- Other Robotic Tools





Healthcare

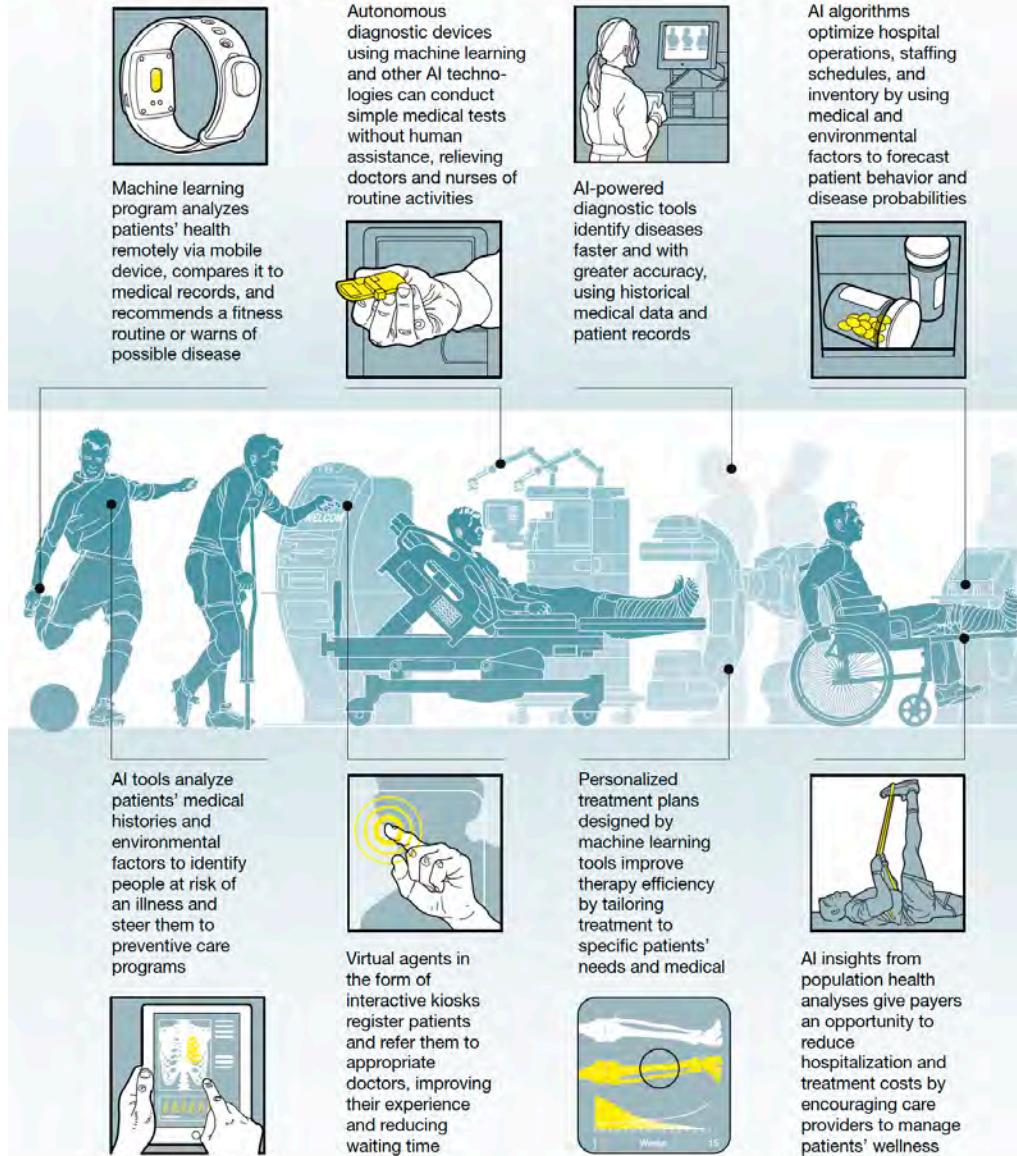
- IBM Watson, Google Deepmind
- At-home testing and personalized health care
- Wearables
- Robot-Assisted Surgery
- Virtual Nursing Assistant
- Administrative Workflow assistance



Healthcare

- Make quicker diagnoses, create better treatment plans and enable new approaches to insurance
- Identify public-health threats and the most at-risk patients
- help medical professionals diagnose disease and improve operations
- Insurers can devise new ways to encourage
- preventive care and incentivize providers
- Doctors will be able to tailor treatments—even drugs—to individual patients
- Virtual agents can serve as primary touchpoints for patients
- Several hurdles stand in the way, starting with data availability

AI in health care: quicker diagnoses, better treatment plans, and improved health insurance





Healthcare – Medical Diagnosis

Traditionally: Medical Diagnosis was a challenging process.

- Many symptoms are nonspecific
- Process of elimination was used to determine root cause (neither efficient nor exact)



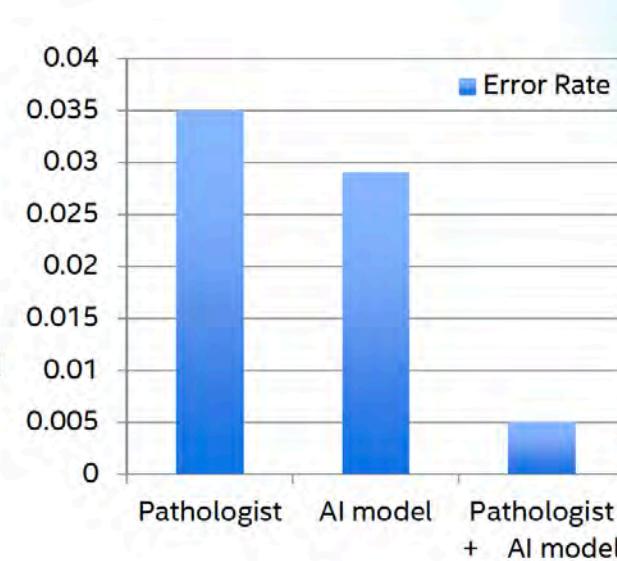
Now with AI: Doctors can provide diagnoses more efficiently and accurately, with the availability of:

- Large medical datasets
- Computer vision algorithms



Example: Breast Cancer, 2016, Harvard Medical School researchers

- Used DL to identify cancer in lymph node images
- Used Convolutional Neural Nets and custom hardware
- AI model combined with humans achieved lower error than either one individually





Healthcare – Treatment Protocol

Traditionally: Doctors would diagnose a condition and recommend a treatment based on what historically worked for most people.

- Some considerations for population/demographics
- Difficult to create custom treatments without extensive research/cost



Now with AI: Doctors can tailor treatments to individual patients.

- Large medical datasets
- ML and DL algorithms
- Population/demographics analysis/simulations



Example: ICU Intervene, MIT Computer Science and Artificial Intelligence Laboratory.

- Uses ICU data, from vitals, labs, notes, to determine how to treat specific symptoms.
- Makes real-time predictions from DL models, to provide recommendations for patients.
- Forecasts predictions into the future (a few hours) compared to traditional methods (a few minutes).
- Predictions can be run on common GPU and CPU hardware.





Healthcare – Drug Discovery

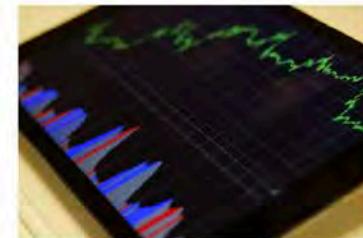
Traditionally: Each new drug approval costs over a billion dollars in Research and Development.

- The cost has been doubling every 9 years since 1970
- The drug discovery process can take decades
- 9 out of 10 drug approval attempts fail
- There are currently only 1,500 approved drugs



Now With AI: Companies are leveraging structured and unstructured data with AI, to establish a pipeline of new drug discovery.

- There are 10^{20} possible drug-like molecules
- Massive space for potential discovery



Example: HetioNet drug discovery model, 2016, UCSF, Himmelstein and Baranzini.

- Developed a graph network to encode millions of biomedical reports.
- Used ML to predict probability of treatment efficacy for ~209,000 compound-disease pairs.
- Provided clear pharmacological insights for epilepsy drug discovery and treatment.





Healthcare – Surgery

Traditionally: Every type of surgery poses possible risks to the patient.

- Adverse anesthesia effects
- Operational complications



Now with AI: Semi-intelligent computer systems predict surgical steps, identify complications, and warn surgeons about pending challenges.

- Computer “vision” leverages data from laparoscopic and arthroscopic cameras
- Smart systems automate dictation by generating notes during the surgery
- Surgeons can send point-of-view live feeds of the operative site to experts anywhere in the world for real-time advice.





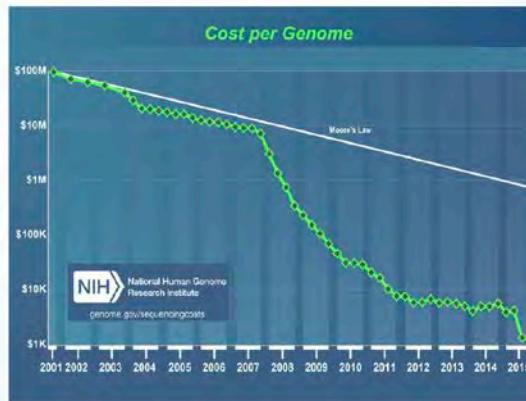
Robot Surgery



Healthcare – Genome Sequencing

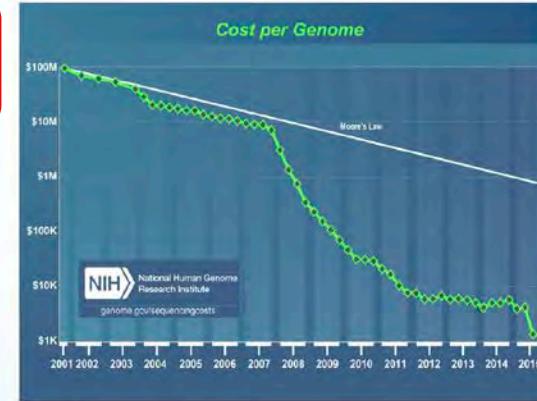
In 2001: Full human sequencing cost \$100 million.

- The first genome sequencing took ~13 years



Now with AI: Sequence companies are employing AI techniques to reduce cost and increase accuracy.

- Illumina claims that within the near future sequencing will only take 1 hour and cost only \$100



Example: Google's DeepVariant* sequencing:

- Leverages massive data sets together with DL to identify all variants
- Accuracy on genome classification: 99.958 %
- DeepVariant* is computationally expensive, but the framework can run on GPU hardware, allowing for a faster learning process
- Availability as open source code promises to revolutionize the industry





Transportation Industry

- Hyperloop
- High-Speed Tunnel Networks
- Self-Driving Cars
- Self-Flying Aircraft





Autonomous Car

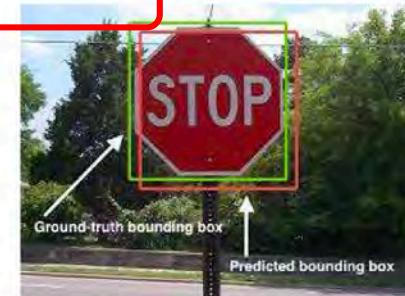
Traditionally: Despite having safer cars, the number of deadly car accidents have been on the rise the last few years.

- The leading cause of automobile accidents is human error
- One of the primary sources of traffic jams is each driver acting out of self-interest, that prevents traffic flow
- Part of the population who can't drive: children, the elderly, and the disabled



Now with AI: Self-driving cars are enabled by the latest AI breakthroughs in computer vision.

- Cars identify stop signs, lane lines, and other landmarks via DL tools
- Mapping technology can use computer vision to detect addresses
- Cars triangulate and can use other 3D-sensing technologies, such as LIDAR and RADAR



Example: Waymo, the autonomous vehicle division of Alphabet Inc.

- Waymo has been operating self-driving minivans without a safety driver since October 2017
- Waymo's Carcraft* software accelerated the car's development, with 2.5 billion simulated miles driven in 2016
- The system used DL together with massive data sets collected from self-driving cars on public roads





Automated Trucking

Traditionally: There is a shortage of 48,000 drivers nationwide.

- Driver turnover rates at some companies reach 300%
- Truck drivers are twice as likely as other workers to be obese and/or have diabetes
- Truckers are half as likely to have health insurance
- The number of accidents and fatalities have increased in recent years



Now with AI: Autonomous trucks can coordinate movements with other trucks.

- Save on fuel, and reduce wind-drag and the chance of a collision
- Video, LIDAR, and accelerometers are used to collect detailed data about the truck's surroundings
- Guidance algorithms provide feedback for braking, steering, and throttling commands, based on incoming and historical data





Retail Industry

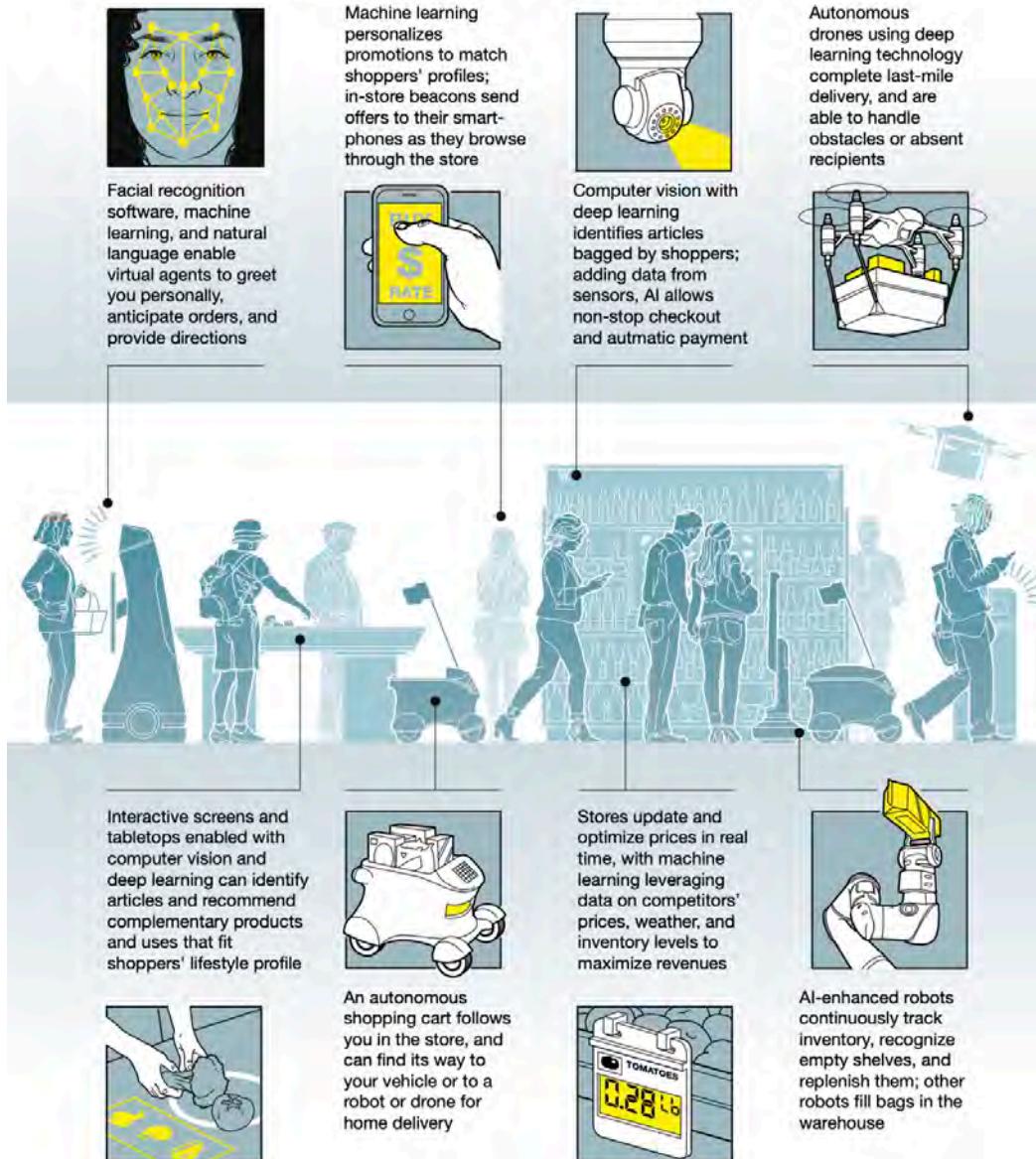
- Intelligent Shopping Systems
- Robots
- Biometric technologies
- Facial recognition



Retail Industry

- Artificial Intelligence: The Next Digital Frontier
 - 20 percent stock reduction by using deep learning to predict e-commerce purchases.
 - 2 million fewer product returns per year.
 - 30 percent reduction of stocking time by using autonomous vehicles in warehouses.
 - 50 percent improvement in assortment efficiency.
 - 4-6 percent sales increase using geospatial modeling to improve micro market attractiveness.
 - 30 percent online sales increases from the use of dynamic pricing and personalization.

Retailers can know more about what shoppers want—sometimes before shoppers themselves





Customer Experience

Traditionally: Americans are shifting their spending from material goods to experiences.

- The “Amazon effect”: there have been nine major retail bankruptcies in 2017
- Retailers need to become competitive or risk obsolescence
- Balancing “out-of-stock” with “over-stock” trade-off requires great finesse



Now with AI: Companies bring experience and optimization to retail shopping.

- AI-powered gift concierge learns your preferences as you engage, and can help predict the appropriate gift to buy
- Leveraging ML-trained agents, companies are providing recommendations via natural language
- Companies using AI via Watson* to monitor factors from weather to consumer behavior, to optimize consumption rate predictions



Example: The North Face and Watson* are combining massive datasets and AI, to bring the brick-and-mortar experience to e-commerce.

- The North Face, with Fluid and IBM Watson*, has launched XPS* - an AI-enabled digital expert that uses a natural language interface to help shoppers.
- XPS curates and filters the available options, so shoppers are more likely to make a purchase

THE NORTH FACE

FluidXPS™ Powered by IBM Watson™





Food Supply Chain

Traditionally : Restaurants use historical data or “gut-feeling” approach to supply chain.

- This can result in excessive waste or food unavailability



Now with AI : Many companies have started to leverage sophisticated algorithms to forecast demand.

- Agents can adjust orders with trading partners in real time, as required for business need



Example: Vivanda's FlavorPrint* program.

- Based on recipes and consumer-provided data, Vivanda maps data to create “digital-taste” identifiers for each consumer
- Providing ML-based recommendations to customers may influence demand
- Shares data with food industry customers, enabling them to improve demand forecasts



Education Industry

- Personalized Learning Platforms
- Individualized Artificial Intelligence Tutors
- Personalized Games
- Crafting a more enjoyable learning experience

Example: Adaptive learning systems, and grading.

- Learning analytics track student performance and provide tailored educational programs.
- Using natural language processing and ML models, AI programs can be used for long answer and essay grading.





Agriculture Industry

- Agricultural Drones
- Autonomous Tractors
- Vertical Farms

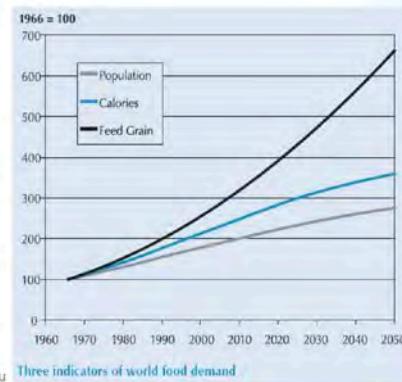




AgTech

Traditionally: The world population is estimated to reach 9 billion by 2050.

- Food production will have to increase by 70% to meet the projected demand.
- Most land suitable for farming is already being used, hence the needed increase must come from higher yields.
- Agriculture must feed the world while not over-straining Earth's resources.



Source: www.card.iastate.edu

Now with AI: Autonomous robots use computer vision and a produce vacuum system for produce harvest.

- DL-enabled robots are being used to identify and kill weeds.
- Companies have shown 90% herbicide reduction due to "targeted" spray application.
- AI-driven genome sequencing advancements enables crop "genome" editing.



Example: TellusLabs yield predictions.

- Uses ML together with weather and other historical data to forecast yields.
- Leverages cloud-based GPUs for DL on satellite images.
- TellusLab's predictions have shown to be consistently more accurate than the USDA.
- Came within 1% of predicting corn and soybean yields in 2017.





I AM AI

I am AI (Variation)

AIVA (Artificial Intelligence Virtual Artist)

00:00



www.aiva.ai

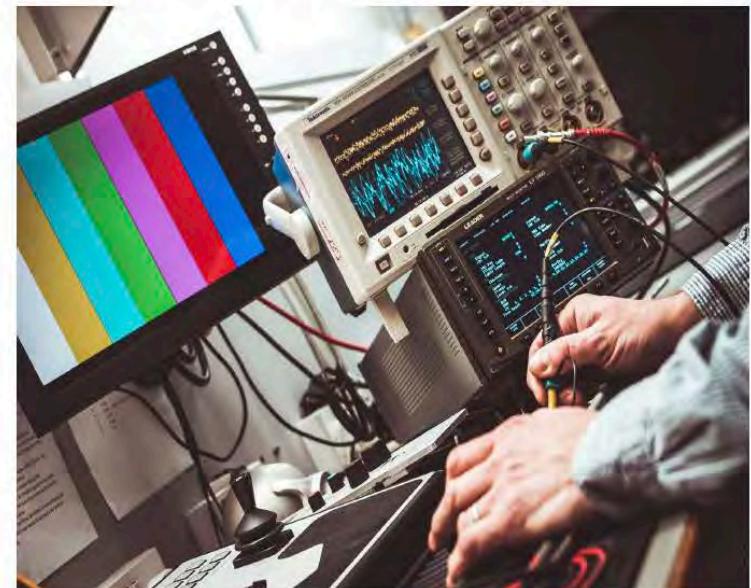
https://www.youtube.com/watch?v=gzGkC_o9hXl30



AI for Music Generation

Example: “I AM AI”, first album released in 2017 to be generated by AI – with professional musicians and DL technology.

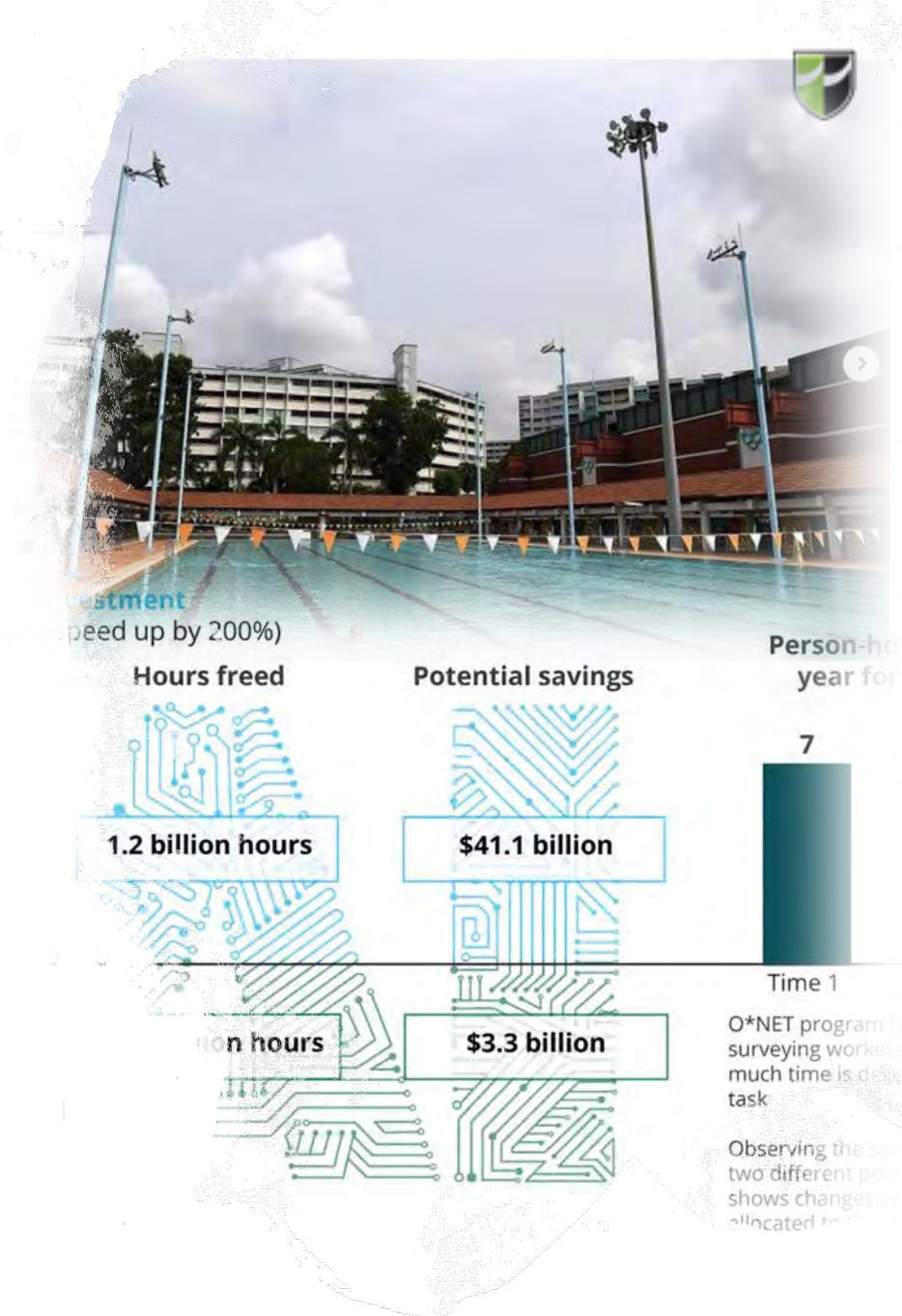
- Music generation is possible due to special DL algorithms that are designed for sequential data.
- The models learn musical patterns based on learning from large musical datasets.
- Raw music files can be processed on cloud-based computer power, making DL on these datasets possible.





Governments

- Public Safety and security
- Bureaucratic Efficiency





Smart Cities

Traditionally: As of 2008, for the first time in history, half of the world's population resides in cities.

- There are heightened demands on scarce resources.
- Simultaneously, a large part of existing infrastructure is underutilized or not being used efficiently.



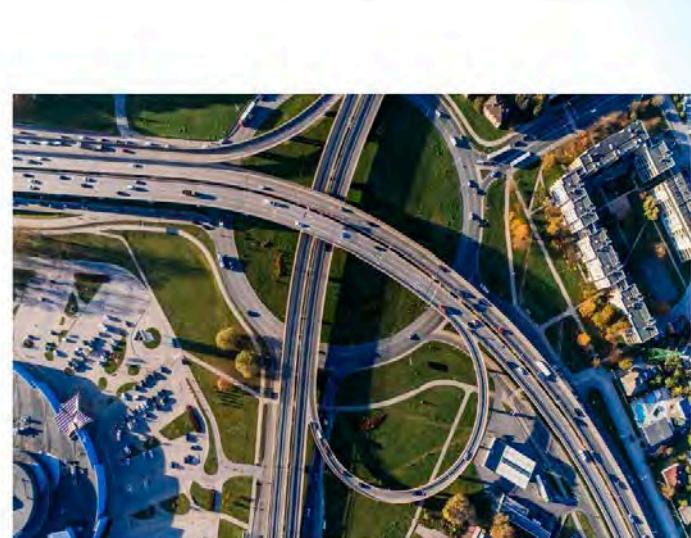
Now with AI: AI techniques are used to analyze photo and video data to perform studies of pedestrian and traffic trends.

- Adaptive signal control: allows traffic lights to tailor their timing based on real-time data.
- With license plate recognition, and DL technology, cities can not only optimize parking but can also track criminals.



Example: AT&T reimagines smart cities

- AT&T developed a framework to help cities integrate Internet of Things (IoT) sensors with AI.
- Remotely monitor the condition of roads, bridges, buildings.
- Assist with public safety.
- Notify police if gunfire has gone off, by using sound detection.





Cybersecurity

Example: Deep Instinct

- Uses GPU-based neural network to achieve 99% detection rates for even the most advanced cyber attacks.
- DeepInstinct's DL models have the ability to detect patterns - mostly designed by humans - enabling the prediction of pending cyber attack.





Oil and Gas

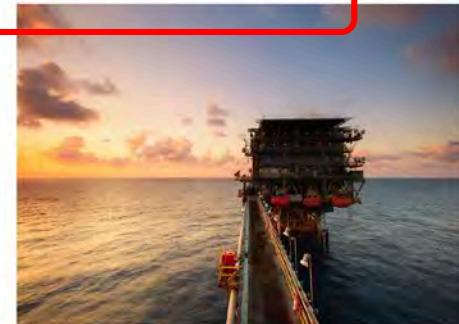
Traditionally: Shrinking oil reserves force companies to operate in remote and possibly hostile areas.

- Price has fallen dramatically in recent years.
- Forcing company layoffs and drastic budget cuts.
- Ultimately, companies are in great need of optimizing operations and cost.



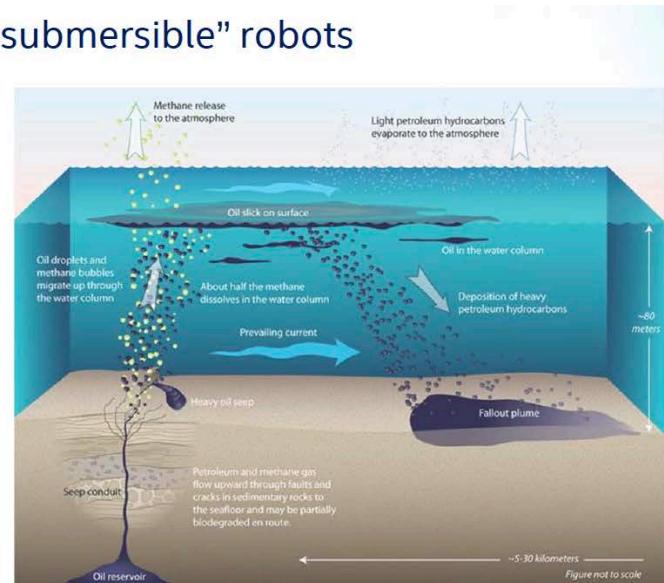
Now with AI: AI uses economic, political and weather data to forecast optimum production locations.

- Drilling is still an expensive and risk-prone endeavor.
- ML, with seismic, thermal and strata data, can help optimize the drilling process.



Example: ExxonMobile and MIT developing “submersible” robots for exploration.

- AI robots are used in ocean exploration to detect “natural seep”.
- Robots are trained via DL techniques and learn from their mistakes.
- Simultaneously protect the ecosystem and detect new energy resources.

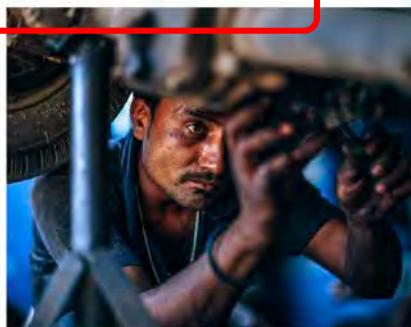




Preventive Maintenance

Traditionally : Relied on historical data to provide basis for preventative maintenance schedule.

- Conservative approach: parts were replaced well before failure, and thus financially inefficient.
- Flawed due to inability to predict new failure modes.



Now with AI : Internet of Things (IoT) sensors help to optimize maintenance scheduling.

- Part replacement schedule is optimized by assessing anomalies and failure patterns.
- Safety and productivity can increase exponentially.



Example: AI with General Electric.

- GE is the industry leader for Internet of Things (IoT) sensor installations on engines and turbines, and plans to have 60,000 engines connected to the internet by 2020.
- Computer vision cameras and reinforcement learning algorithms find tiny cracks or damage.
- Sensor data and AI allows GE to track performance and optimize part replacement.





Fault Detection

Example: Computer vision for fault detection on solar panels.

- DL algorithm trained on labelled data of correctly manufactured vs. flawed panels
- Reduced the need for human inspection by 66% compared to historical need





Automate Garment Industry

Example: SoftWear Automation's "sewbots".

- Computer vision is used to track fabric at the thread level.
- Eliminates need for human seamstress / seamster.
- Allows designers to create garments that were previously thought to be too complicated or specialized to construct.





AI and Customer Service

Example: Bot assistants and customer service agents

- AI Augmented messaging.
- AI for sorting and routing inquiries.
- AI enhanced customer phone calls.
- Some companies have used AI to fully automate customer service.





AI and Next Gen Gaming

Now with AI: Forza 5 Motorsport* uses its “Drivatar” AI system to learn how to drive in the style of other players in the game.

- Neural networks are used to train characters to walk and run realistically.
- Reinforcement Learning (RL) is a technique used throughout gaming.



AI Services



- Google Search
- Google Assistant ([hands on](#))
- Google Photo (image recognition)
- Speech Recognition
- Google's AI Services for Companies
 - <https://experiments.withgoogle.com/collection/ai>
- Google's cloud-based AI Tools
 - <https://ai.google>
- Google's AI Experiments:
 - <https://experiments.withgoogle.com/ai>
- Do-it-Yourself AI:
 - <https://aiyprojects.withgoogle.com/voice/>



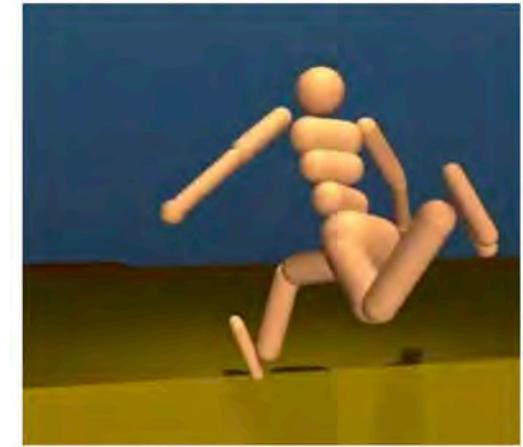
Hi, how can I help?

Meet your Google Assistant.

Ask it questions. Tell it to do things. It's your own personal Google, always ready to help.

Beware – Google's AI is so smart it just taught itself to walk without any human help

Jimmy Nsubuga Monday 17 Jul 2017 6:31 pm



Voice Kit

Do-it-yourself intelligent speaker. Experiment with voice recognition and the Google Assistant.



Vision Kit

Do-it-yourself intelligent camera. Experiment with image recognition using neural networks.

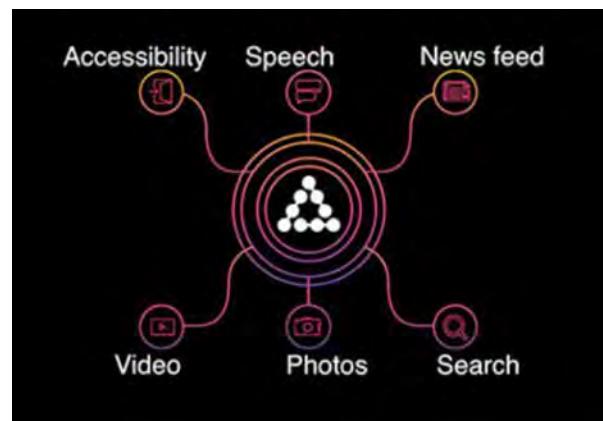


AI Services

- Facebook Photo search
- FB Learner Flow (<https://code.fb.com/ml-applications/introducing-fblearner-flow-facebook-s-ai-backbone/>)
- Text Analytics (Deep Text)
- Pattern Recognition to Prevent Suicides
- Improving 360 Degree Photos
- Computer Vision
- Facebook Personal Assistant M (experiment)
- Facebook Messenger Platform Chatbot
- Facebook's AI research Activities
 - <https://research.fb.com/category/facebook-ai-research/>

Facebook will use AI to help correct skewed 360-degree photos

The company has a technique for dealing with big file sizes, too.



TECHNOLOGY NEWS · NOVEMBER 28, 2017 / 12:05 AM / A YEAR AGO

Facebook to expand artificial intelligence to help prevent suicide

David Ingram

3 MIN READ



AI Services

- Amazon Recommended Products
- Alexa Personal Assistant
- Cloud Storage
- Amazon's AI platform:
 - Amazon Lex
 - Amazon Polly
 - Amazon Recognition

The screenshot shows the 'EARNING TOOLS' section of the AWS Machine Learning Tools page. It features a large image of a small, futuristic-looking autonomous racing car. Below the image, there are two main sections: 'AWS DeepRacer' and 'AWS DeepLens'.
AWS DeepRacer
AWS DeepRacer is a fully autonomous 1/18th-scale race car designed to help you learn about reinforcement learning through autonomous driving.

- Experience the thrill of the race in the real world when you deploy your RL model onto AWS DeepRacer.
- Build models with Amazon SageMaker and then train, test, and iterate on the track using AWS DeepRacer's AI racing simulator.
- Starting in 2019, compete in the world's first global autonomous racing league, to race for prizes and a chance to advance to win the coveted AWS DeepRacer Cup.

[Learn more »](#)
AWS DeepLens
AWS DeepLens is the world's first deep learning-enabled video camera for developers. Integrated with Amazon SageMaker and many other AWS services, it allows you to get started with deep learning in less than 10 minutes through sample projects with practical, hands-on examples.

- Choose your deep learning model from the AWS DeepLens pre-trained model library, or your own models trained with Amazon SageMaker.
- Deploy your model to the device with a single click.
- Watch the results in real time in the AWS Management Console.

[Learn more »](#)



The screenshot displays the AWS AI Platform landing page, showcasing nine different AI services arranged in a grid:

- Recommendations**: Personalize experiences for your customers with the same recommendation technology used at Amazon.com. [AMAZON PERSONALIZE »](#)
- Forecasting**: Build accurate forecasting models based on the same machine learning forecasting technology used by Amazon.com. [AMAZON FORECAST »](#)
- Image and Video Analysis**: Add image and video analysis to your applications to catalog assets, automate media workflows, and extract meaning. [AMAZON REKOGNITION »](#)
- Advanced Text Analytics**: Use natural language processing to extract insights and relationships from unstructured text. [AMAZON COMPREHEND »](#)
- Document Analysis**: Automatically extract text and data from millions of documents in just hours, reducing manual efforts. [AMAZON Textract »](#)
- Voice**: Turn text into lifelike speech to give voice to your applications. [AMAZON POLLY »](#)
- Conversational Agents**: Easily build conversational agents to improve customer service and increase contact center efficiency. [AMAZON LEX »](#)
- Translation**: Expand your reach through efficient and cost-effective translation to reach audiences in multiple languages. [AMAZON TRANSLATE »](#)
- Transcription**: Easily add high-quality speech-to-text capabilities to your applications and workflows. [AMAZON TRANSCRIBE »](#)



AI Services

- Cortana - <https://www.microsoft.com/en-us/windows/cortana>
- Presentation Translator -
<https://translator.microsoft.com/help/presentation-translator>
- HoloLens
- InnerEye - <https://www.microsoft.com/en-us/research/project/medical-image-analysis/>
- Azure Microsoft Cloud Service –
- AI for Earth -
<https://www.microsoft.com/en-us/ai/ai-for-earth>
- AI Language Translator -
<https://www.microsoft.com/en-us/translator/>
<https://www.bing.com/translator> (demo)

Microsoft | AI Products & Services Approach More All Microsoft Sign In

AI for Earth

AI for Earth puts Microsoft cloud and AI tools in the hands of those working to solve global environmental challenges.

▷ Play AI for Earth video

Areas of focus

AI for Earth awards grants to projects that use artificial intelligence to address four critical areas that are vital for building a sustainable future.

[Learn about AI for Earth grants >](#)



AI Services



- Cognos Analytice - <https://www.ibm.com/us-en/products/cognos-analytics>

IBM Watson Developer Cloud

Tone Analyzer

This service uses linguistic analysis to detect joy, fear, sadness, anger, analytical, confident and tentative tones found in text.

*This system is for demonstration purposes only and is not intended to process Personal Data. No Personal Data is to be entered into this system as it may not have the necessary controls in place to meet the requirements of the General Data Protection Regulation (EU) 2016/679.

Sample use cases

Choose an example to learn how you can adjust the tone of your content to change people's perception, or improve its effectiveness.
Learn more...

• Tweets Online Review Email message Product Review in French Your own text

Analyzing Customer Engagement Data? Try out the Tone Analyzer Customer Engagement Endpoint.

I hate these new features On iPhone! Only after the update!
I hate iPhone! Company products, you'd have to torture me to get me to use iPhone!
The engine in iPhonePremiere is bad.
iPhone is a useless, stupid waste of money.
iPhone is the worst phone I've ever had... ever.
iPhone another opell. lot of respect iPhone.
I'm worried my iPhone is going to overheat like my brother's did.

Analyze

- Tone Analyzer - <https://tone-analyzer-demo.ng.bluemix.net> (demo)
- Discovery - <https://discovery-news-demo.ng.bluemix.net>
- Visual Recognition -
<https://www.ibm.com/watson/services/visual-recognition/demo/#demo>
- Text to Speech - <https://text-to-speech-demo.ng.bluemix.net/> (audio streaming does not work on mobile browser)

Insurance (Custom Classifier)

Custom Classifier trained on insurance images

Category	Probability
vandalism	0.64
flat_tire	0.53
broken_windshield	0.11
motorcycle_accident	0.06

International vehicle glass repair company Belron uses Custom Models to automatically generate estimates of repair costs based on customer-submitted images of car damage.

Select an image on the left to evaluate how this custom model analyzes different images.





AI Services

- Speech Recognition on Siri
- QuickType
- A11 Bionic Chip – Core ML
- Apple Music
- Apple HomePod
- Apple Photos



Apple acquires AI tech that seeks to understand your photos

Regaind can tell good pics from bad ones, and interpret what's going on.

Apple has new self-driving car hardware covered with iPod-style white plastic

Kif Leswing, Business Insider US

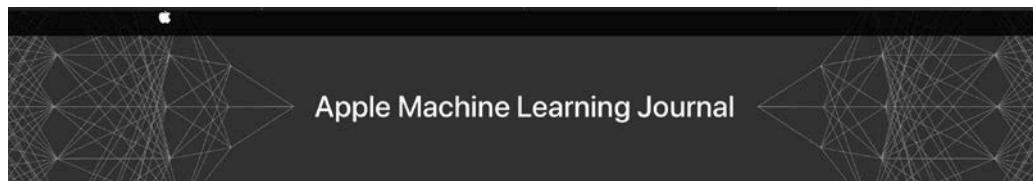
October 18, 2017

1,188 views | Dec 26, 2016, 07:06am

Apple Publishes Its First Artificial Intelligence Paper



Aaron Tilley Forbes Staff



Optimizing Siri on HomePod in Far-Field Settings

Vol. 1, Issue 12 • December 2018
by Audio Software Engineering and Siri Speech Team



AI Services

Robots Run the Warehouses ([link](#))

Innovation

Alibaba lets AI, robots and drones do the heavy lifting on Singles' Day

This year's November 11 shopping ritual will engage a recommendation algorithm, robots, and chatbots capable of understanding human emotion

Topic | Singles' Day (11.11)

SMART CUSTOMER SERVICE

Ali Assistant is a chatbot that handles both spoken and written queries, acting as customer-service rep and personal shopping assistant. It is capable of handling up to

95%

of customer service enquiries



Intelligent Machines

Alibaba's AI Fashion Consultant Helps Achieve Record-Setting Sales

AI will blur the line between online and offline retail.

BIG DATA

With nearly

500 million

active users across its websites and apps, Alibaba has a vast repository of consumer data that can be processed and analyzed by AI programs continuously in real time, leading to increasingly accurate predictions and a better shopping experience.



COMPUTING POWER

Alibaba has built up one of the world's largest networks of interconnected computer servers to run its e-commerce empire, backed by an operating system that can process more than

175,000
transactions per second.



Function specific AI services

Sales	Outreach.io
Virtual Human	https://www.quantumcapture.com/ctrl-human
HR Services	https://leena.ai/HR-FAQ
Scheduling	https://x.ai/how-it-works/
Enterprise support functions	https://www.soapbox.ai/
Sales Bots	https://octaneai.com/
AI-Powered Transcription	http://capiro.ai/index.html
Hiring	https://hiringsolved.com/product
Programming	https://www.codata.com/enterprise https://kite.com/



OSINT



A Guide to Open Source Intelligence (OSINT)

By Michael Edison

Photo/Adobe Stock

OSINT TOOLS

and how you learn how to use them



DATA GATHERING for intelligence purposes



1. Shodan
2. ThreatPinch Lookup browser plugin
3. NetDB
4. Censys
5. HoneyDB
6. Dataplot
7. OnionScan
8. Advanced Reconnaissance Framework
9. Intel Techniques Search Engine
10. MISP

PEOPLE

Consider every possible variation of the person's name.

SOCIAL MEDIA & DATING SITES

Discover what people are talking about if they participate in online forums on social media platforms.

IMAGES & VIDEO

Search social sites to find photos, videos, and discussions related to your target.

SPECIALIZED WEB SEARCHERS

Sites that are not mainstream, may be buried, hard to find or simply not indexed by general search engines.

HOW TO SEARCH

LINK ANALYSIS

PALANTIR GOTHAM

Structured data like log files, spreadsheets, and tables.

Unstructured data like emails, documents, images, and videos.

Large-scale quantitative investigation. Perfect for tracking and analyzing insurance claims data, network traffic flow, and financial trading patterns.

PALANTIR METROPOLIS

Open source big data integration, analytics, and visualization platform.

FOSS PROJECT

Large-scale quantitative investigation. Perfect for tracking and analyzing insurance claims data, network traffic flow, and financial trading patterns.

DATA SPLOIT

To perform various OSINT techniques, aggregate all the raw data from multiple sources, dashboard, and facilitate alerting and monitoring on the data.

OTHER DATA ANALYSIS

OPEN GRAPHITI

3D data visualization engine for data scientists to visualize semantic networks and work with them.

ABOUT THE T FOR DIGITAL .

The Tow Center for Digital Journalism at Columbia's Graduate School of Journalism explores how technology is changing journalism, its practices and its consumption – as we seek new ways to judge the reliability, standards, and credibility of information online.

HIND THE



WIKIPEDIA
The Free Encyclopedia

Article Talk

Open-source intelligence

From Wikipedia, the free encyclopedia

This article has multiple issues. Please help improve it or remove these template messages.

- This article is written like a personal reflection, personal feelings or presents an original argument about the subject. (December 2010)
- The examples and perspective in this article deal primarily with the United States. (December 2010)
- This article needs to be updated. (April 2017)

Open-source intelligence (OSINT) is data collected from publicly available sources to be used for intelligence purposes.



Open Source Intelligence Methods and Tools

A Practical Guide to Online Intelligence

Nihad A. Hassan
Rami Hijazi

Apress®

<https://www.peerlyst.com/posts/resource-osint-tools-and-how-you-learn-how-to-use-them-guurrhart>

<https://www.amazon.com/Open-Source-Intelligence-Methods-Tools/dp/1484232127>



Where to go from here?

MOOC:
DataCamp
<https://www.datacamp.com/>

Edx
<https://www.edx.org/>

The screenshot shows the DataCamp website's search results page for "python". At the top, there is a purple banner with the text "Subscribe now. Save 50% on DataCamp and skill up. Offer ends in 24 days 04 hrs 56 mins 51 secs." Below the banner, the DataCamp logo and a search bar with the word "python" are visible. The main heading says "57 results for 'python'". There are six course cards displayed in two rows of three:

- Intro to Python for Data Science**: Major the basics of data analysis in Python. Expand your skill set by learning scientific computing with NumPy. 4 hours. Instructor: FILIP SCHOUWENAARS.
- Intermediate Python for Data Science**: Level up your data science skills by creating visualizations using matplotlib and manipulating data frames with Pandas. 4 hours. Instructor: FILIP SCHOUWENAARS.
- Python Data Science Toolbox (Part 1)**: Learn the art of writing your own functions in Python, as well as key concepts like nesting and error handling. 4 hours. Instructor: HUGO BOWNE-ANDERSON.
- Deep Learning in Python**: Learn the fundamentals of neural networks and how to build deep learning models using TensorFlow 2.0. 4 hours.
- Supervised Learning with scikit-learn**: Learn how to build and tune predictive models and evaluate how well they will perform on unseen data. 4 hours.
- pandas Foundations**: Learn how to use the industry-standard pandas library to clean, load, and manipulate dataframes. 4 hours.

The screenshot shows the edX website homepage. At the top, there is a navigation bar with links for "Courses", "Programs & Degrees", "Schools & Partners", "edX for Business", and a search bar. To the right of the search bar are "Sign in" and "Register" buttons. Below the navigation, a large banner features a woman looking at a tablet with the text "Accelerate your future. Learn anytime, anywhere." and a "Find courses" button. A search bar below the banner asks "What do you want to learn?". Logos for various partner institutions are displayed, including MIT, Massachusetts Institute of Technology, HARVARD UNIVERSITY, Berkeley, THE UNIVERSITY OF TORONTO SYSTEM, THE FUDAN-KONGSIN PARTNERSHIP, and THE UNIVERSITY OF TORONTO CHINA. A prominent "CYBER MONDAY" banner on the right side of the page offers "THE COUNTDOWN IS ON! Get 15% off your purchase." with a "Start Exploring" button.



Lifelong Learning



Scan me



- <https://www.rp.edu.sg/soi/lifelong-learning>

Short Courses



SOI offers an extensive variety of short, industry-relevant courses for ICT skills upgrading and skills acquisition. Our courses are categorized under different areas, ranging from Artificial Intelligence (AI), Business Intelligence / Business Analytics (BI/BA), Business Processes (BP), Unmanned Aerial Vehicle (UAV), IT Security, New/ Digital Media, Software Development to the Internet of Things (IoT). To view our short course offerings, click on the relevant tab below.

AI Data Analytics IT Security DevOps Software Development New/ Digital Media UAV RPA

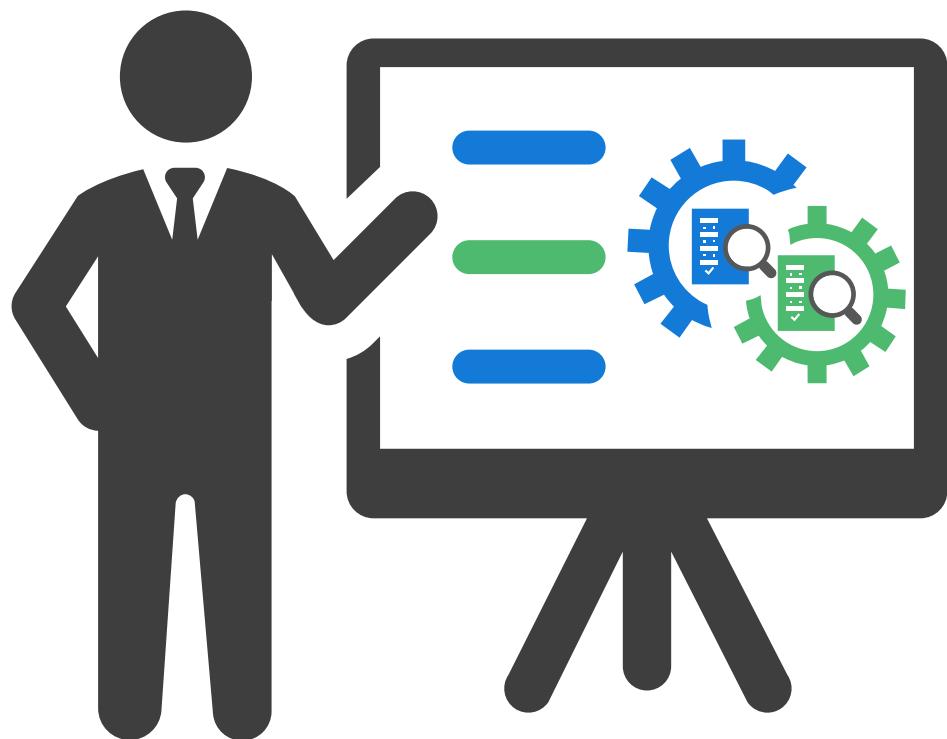
+ Artificial Intelligence for Everyone - A Practical Experience (1 day Beginner)

+ Artificial Intelligence for Techies - A Hands-On Approach (1 day Beginner)

+ An Introduction to Code-Free Machine Learning (1 day Beginner)



Summary



Email
seow_khee_wei@rp.edu.sg

Telegram
[@kwseow](https://t.me/kwseow)

Source code:

152



Thank you