



Artificial Intelligence for Everyone

A Practical Experience



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:	Hands-on building a telegram chatbots with a QnA Knowledge base (1 hour)
Section 5:	Hands-on Training Custom Computer Vision (1 hour)
Section 6:	Use cases sharing (30 mins)
Section 7:	AI Services (15 mins)



Resources

- Goto bit.ly/2UYWtYS
 - Download pdf (this presentation deck and activity sheets)
 - Download sample scripts
 - Links to other resources. Save you the typing!
- Goto bit.ly/2UYWtYS
 - Training and testing images for activity. Remember to unzip!
- You will need Telegram. Download and install on your phone/laptop. <https://desktop.telegram.org/>
- You will also need a Google account.
(Please sign up for one if you do not have it.)



Introduction of trainer



Name
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Telegram
@zacktohsh

Email
Zack_toh@rp.edu.sg



Past Projects (Crowd Detection) (18RIGO09)

SSDv1



SSDv2



Yolo





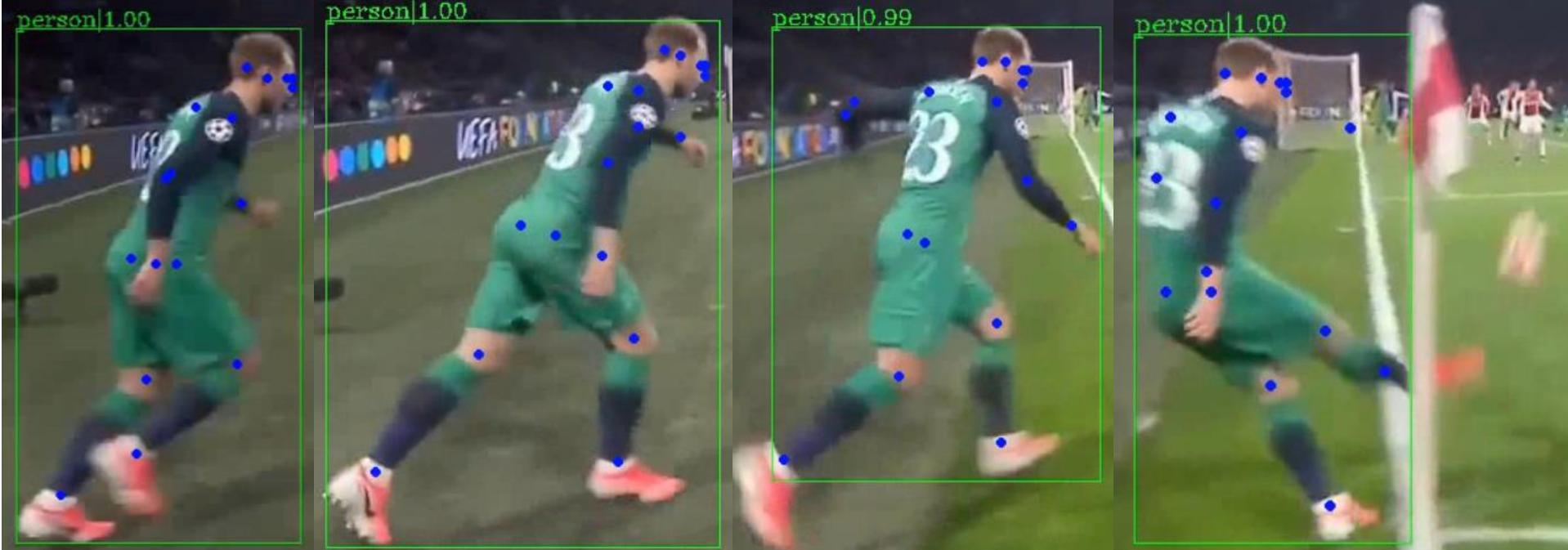
Commercial Project (POC)

- Prototype development for self check-out inventory system.
 - Edge analytics through raspberry Pi.



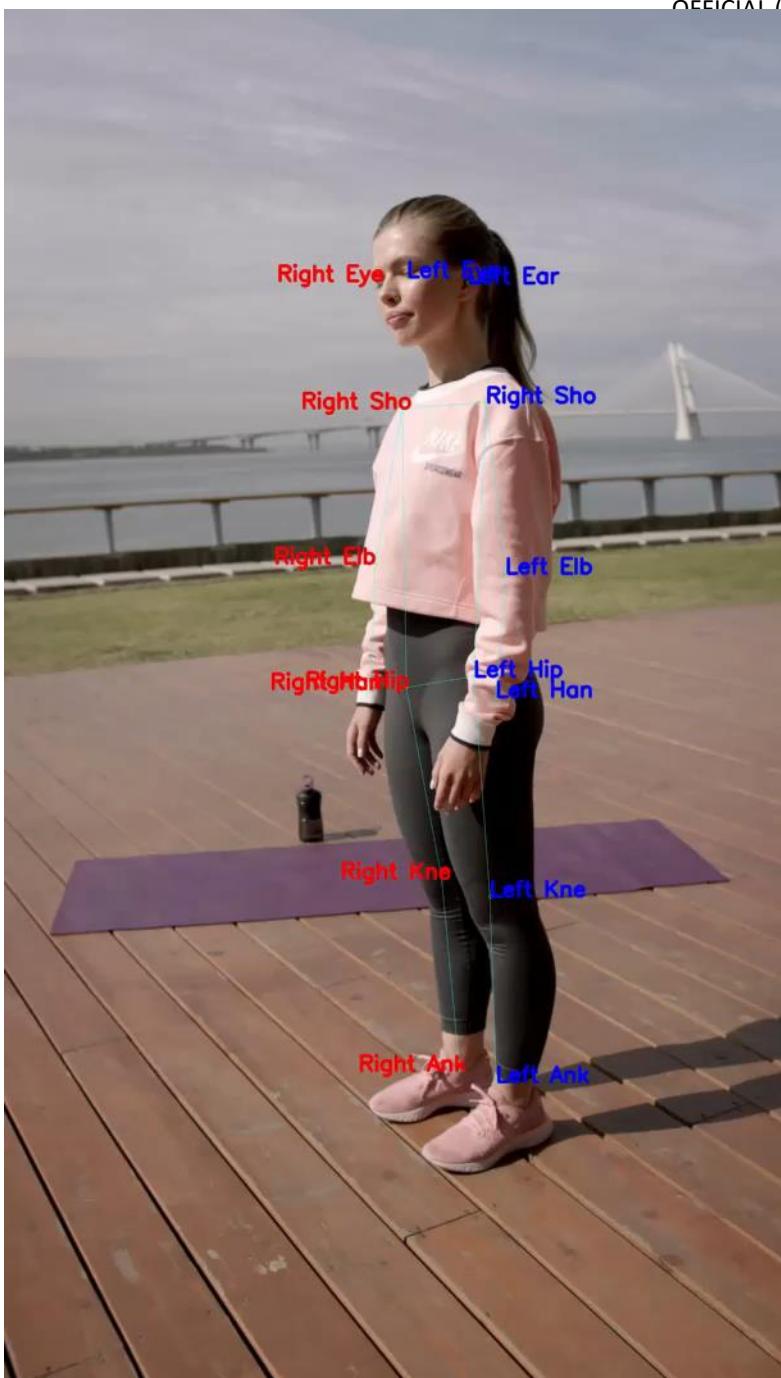
Deep Learning for Sports Tagging (19RBF07)

Contextual awareness is the holy grail of computer vision. It aims at equipping a machine with the ability of deciphering what is happening in any given image. The automated tagging in sports is a new emerging area in sports industry. This project would contribute tremendously to the productivity and efficiency of sports tagging and dramatically reduce the labor needed in curating the sports statistic. The proposed prototype has high commercialization potential as shared by current sports tagging companies (e.g., Dartfish SA, Hudl and Prozone).



Processed Throw-in





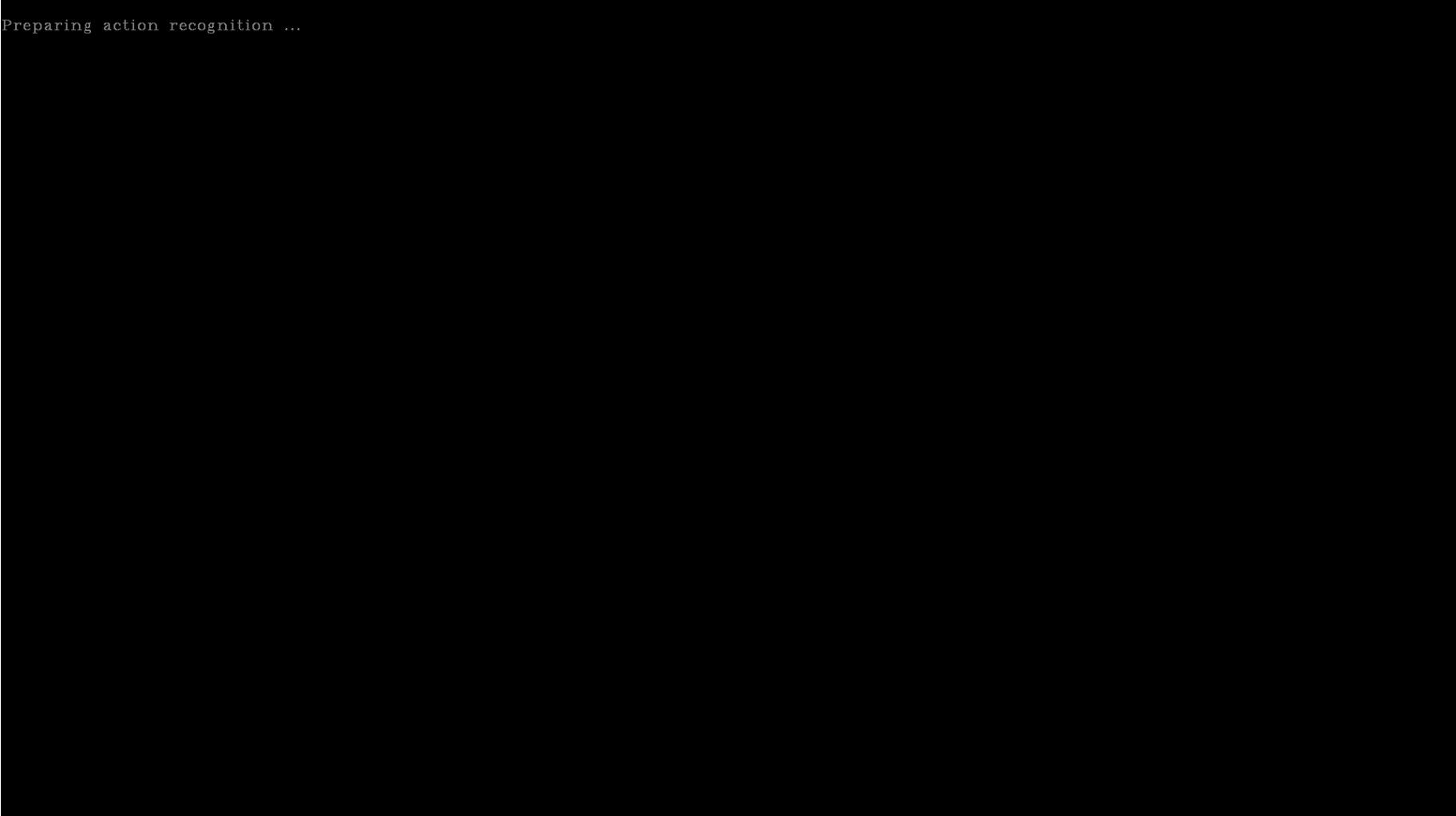
Pose Recognition

Video obtained from: <https://www.pexels.com/>

Pose generated with Posenet

Outcome of Project

Preparing action recognition ...





Innovative Approach and Value (PA13)





Testing of Model Created



Courses

- Video Analytic Techniques
- Applied AI Solutions Development (Computer Vision)
- AI for Techies
- An Introduction to Code-Free Machine Learning
- AI for Everyone

What is AI?

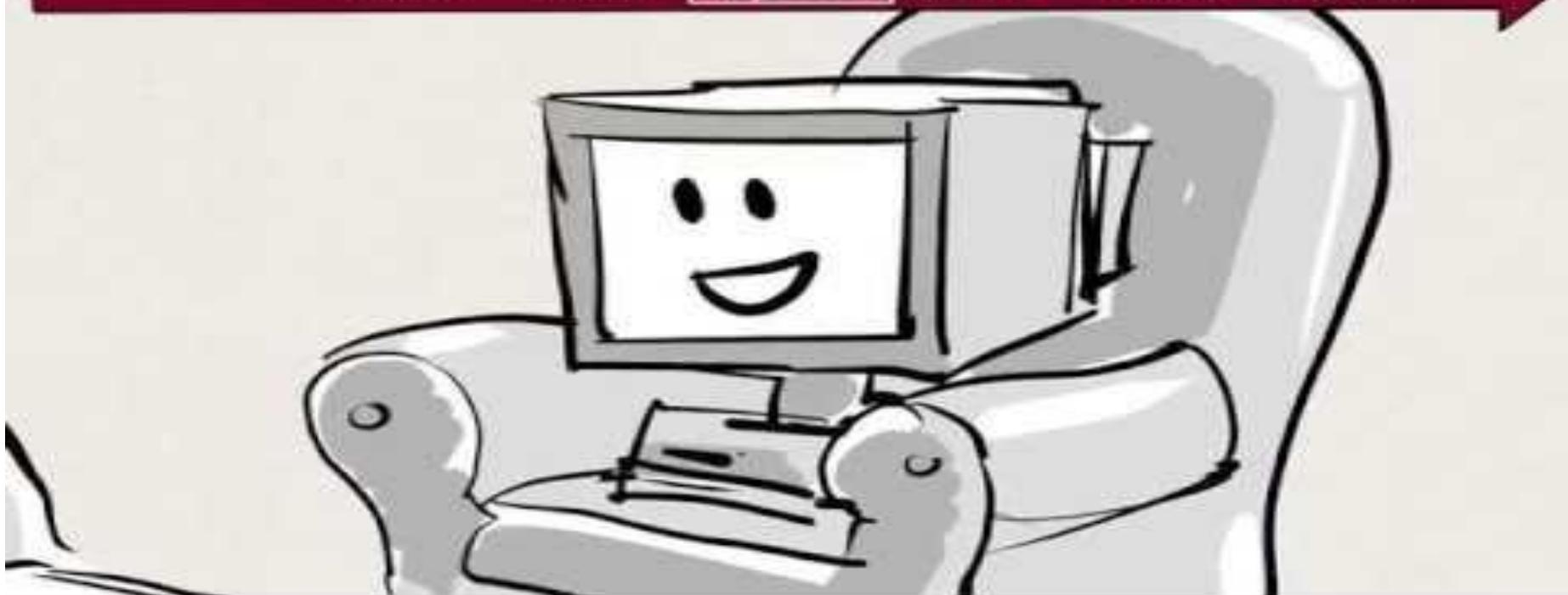
What is Artificial Intelligence?

- 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



A brief history of AI

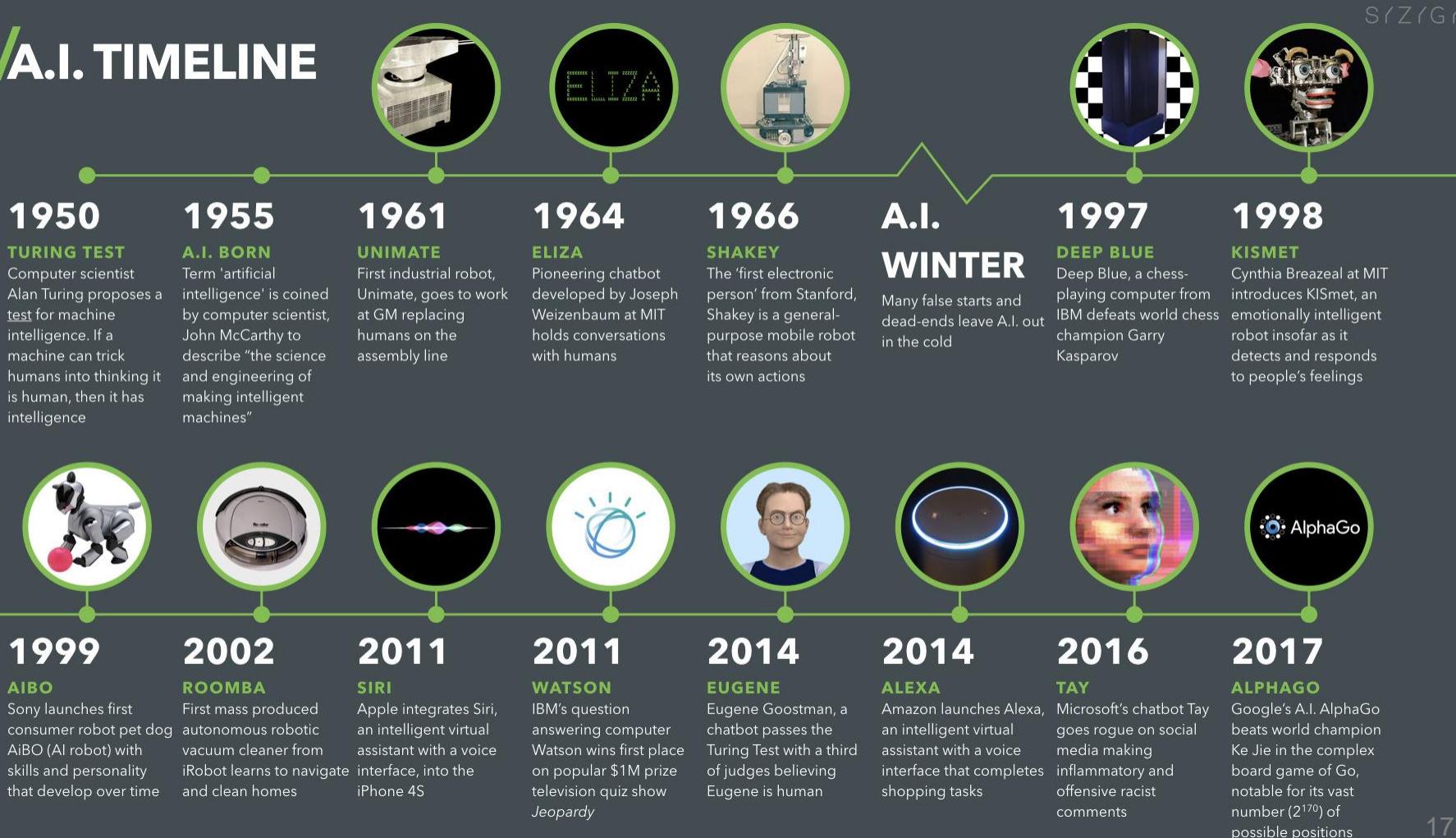
1950 1955 1960 1970 1980 1990





History of AI

A.I. TIMELINE

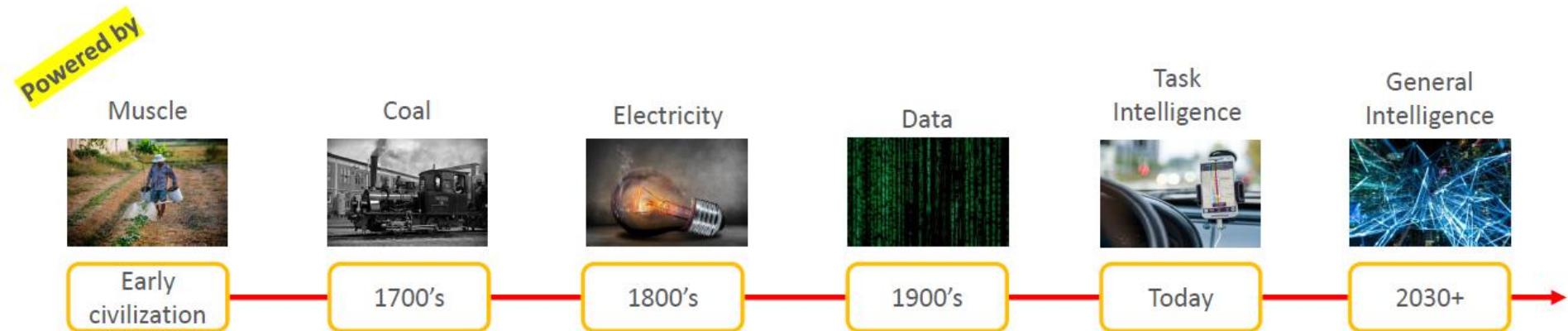
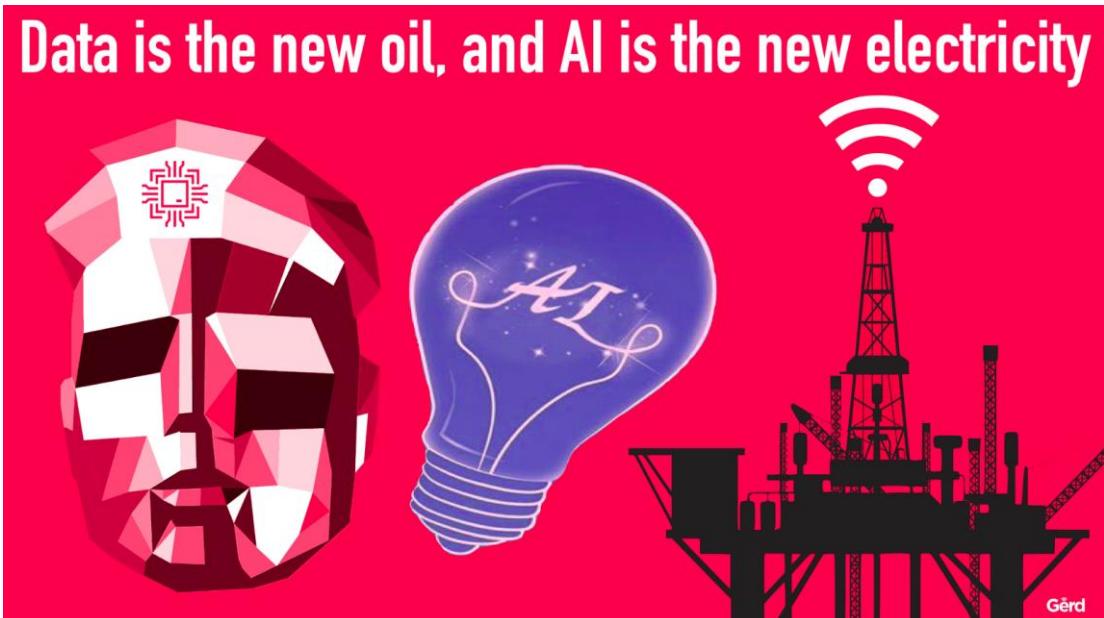




AI is the new electricity

"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



What do we need for AI to happen?

Data

Neural Network

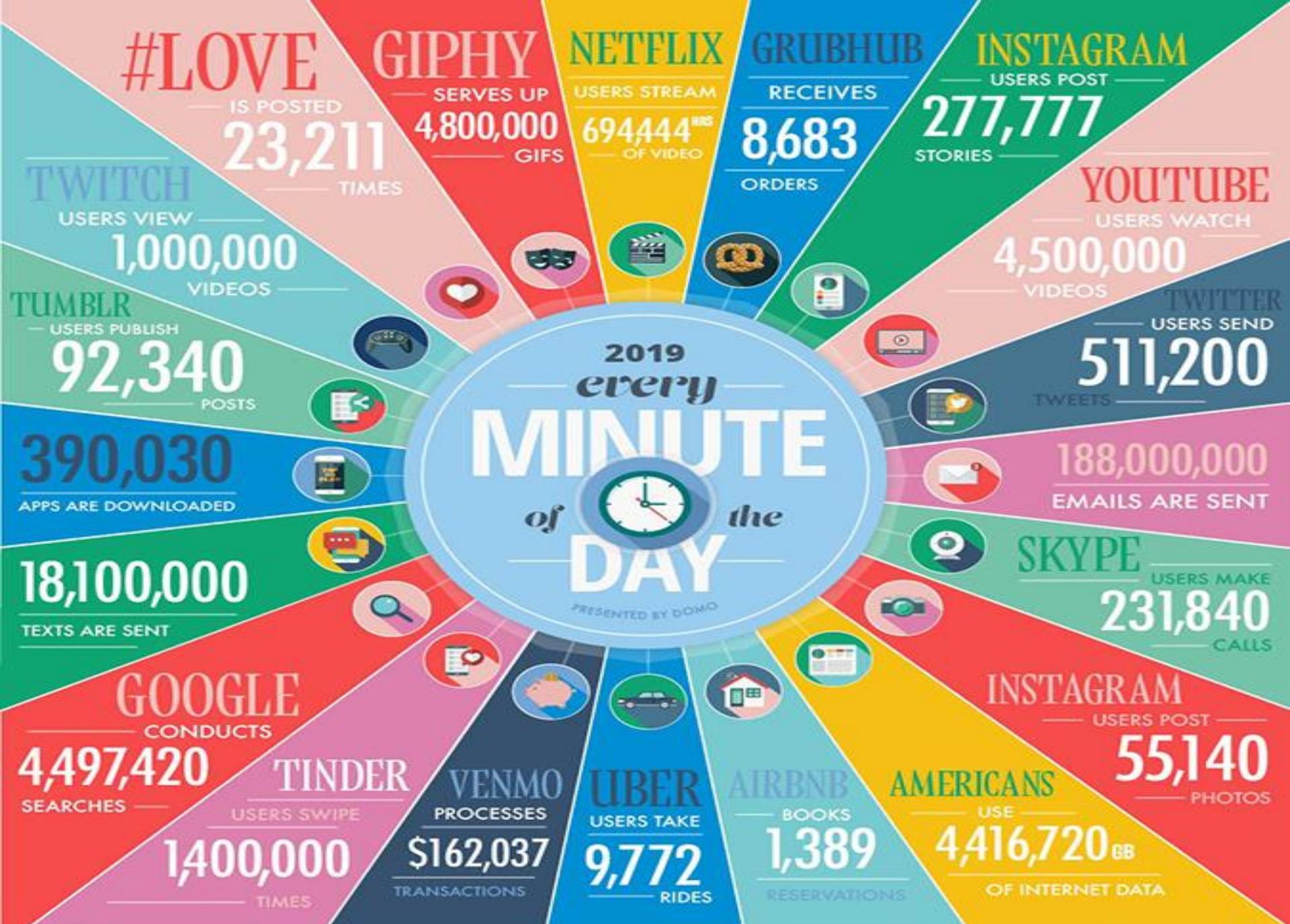
Hardware



DATA IS CRITICAL TO ARTIFICIAL INTELLIGENCE

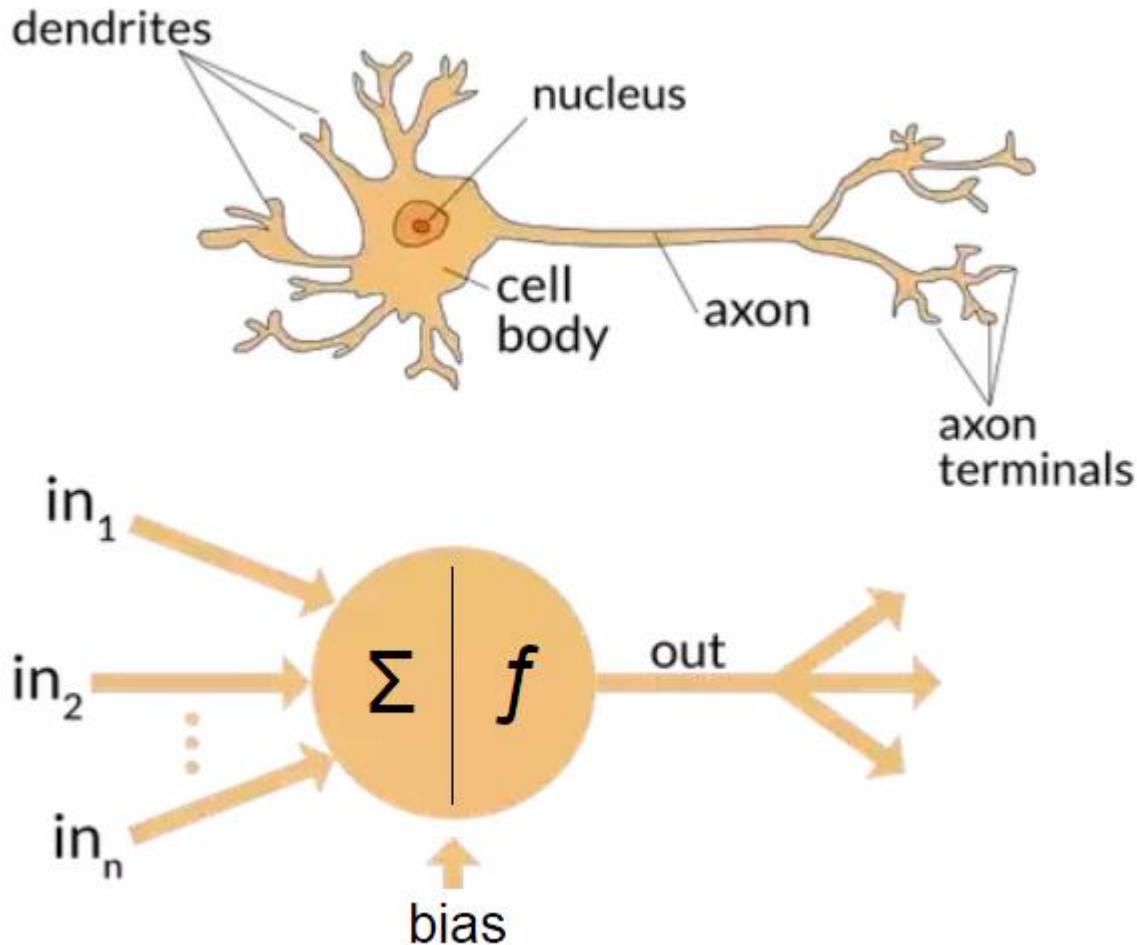


Image source: Kai-Fu Lee, Sinovation Ventures



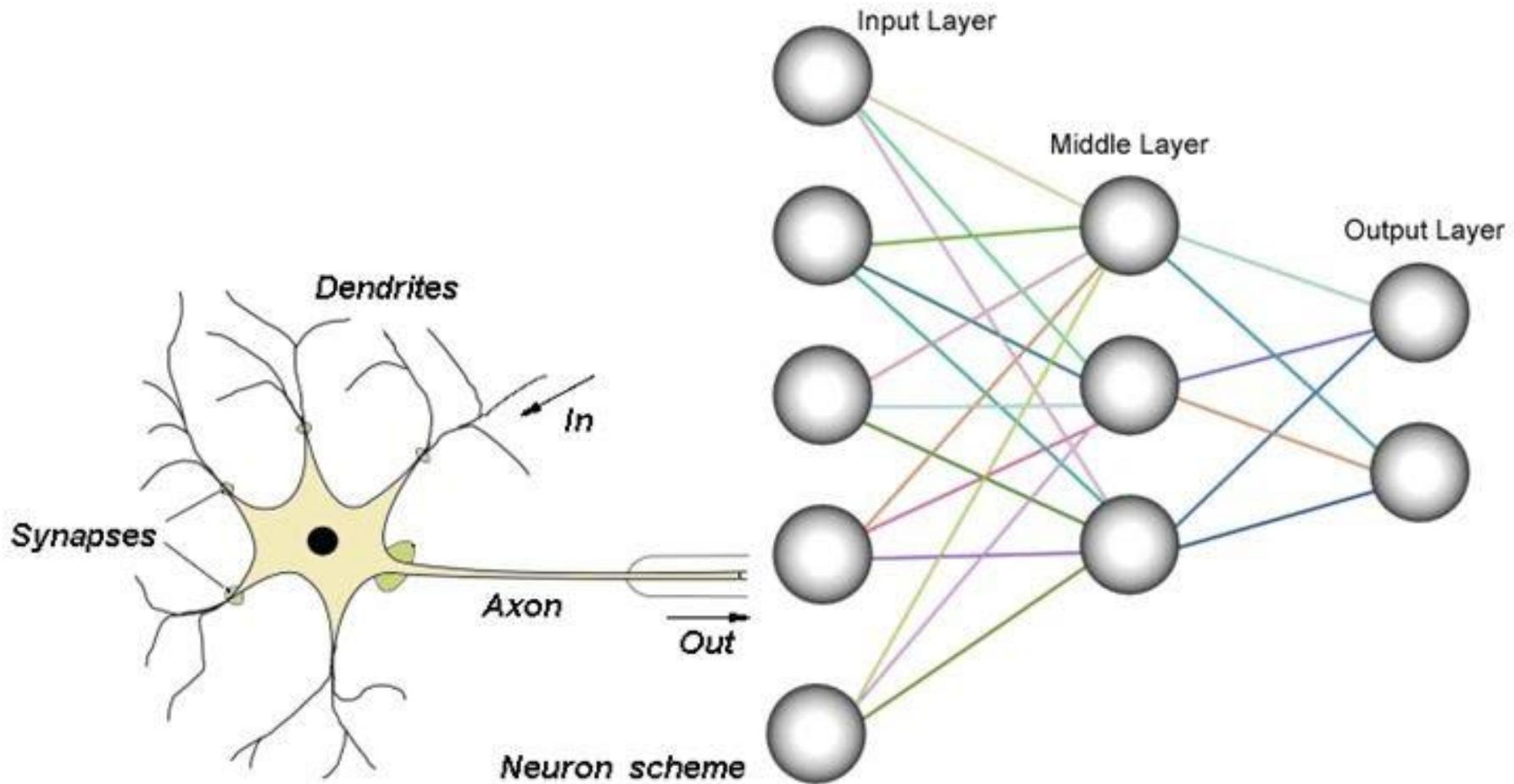


Neural Network





Neural Network



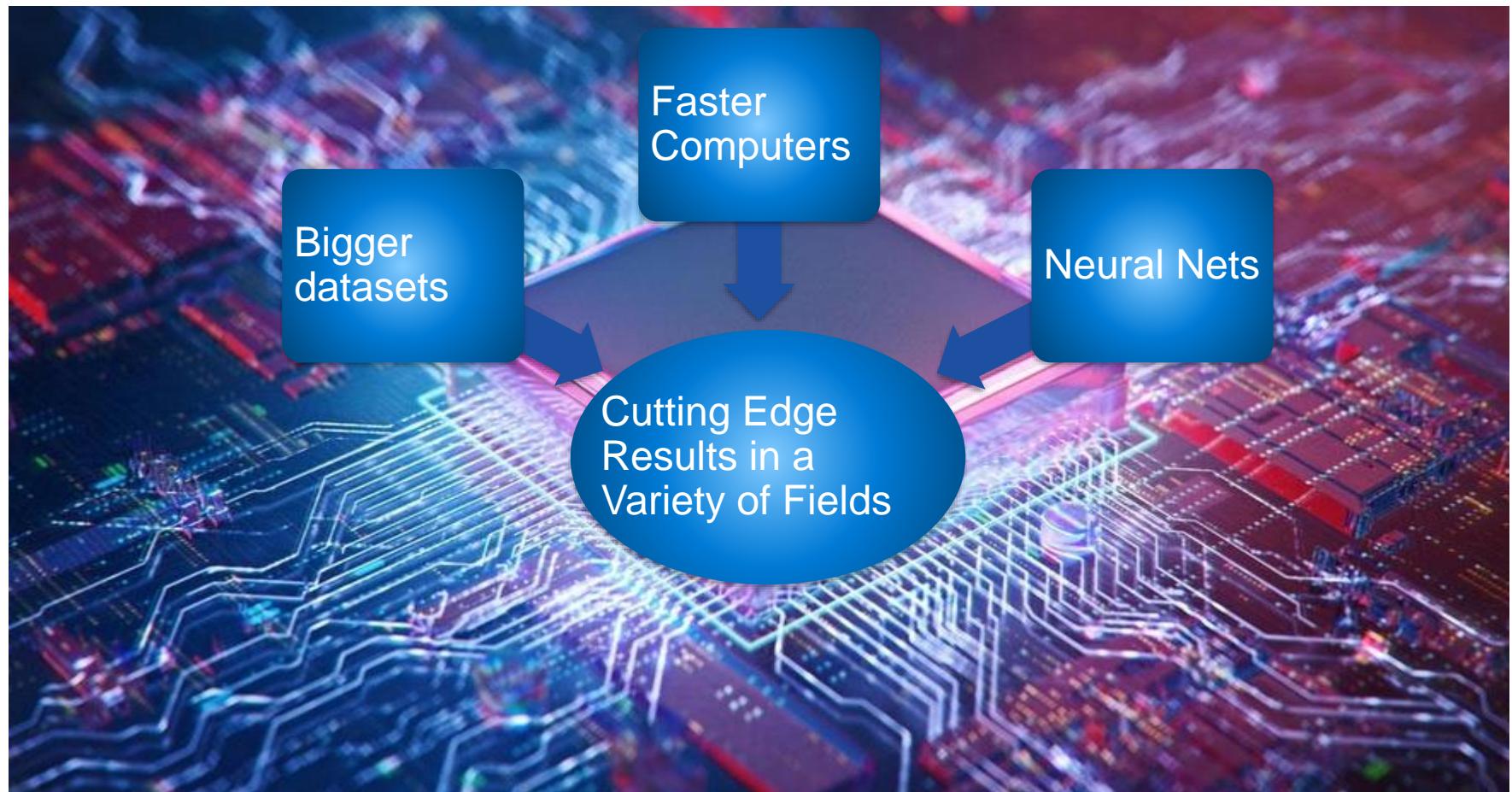


What is neural network?



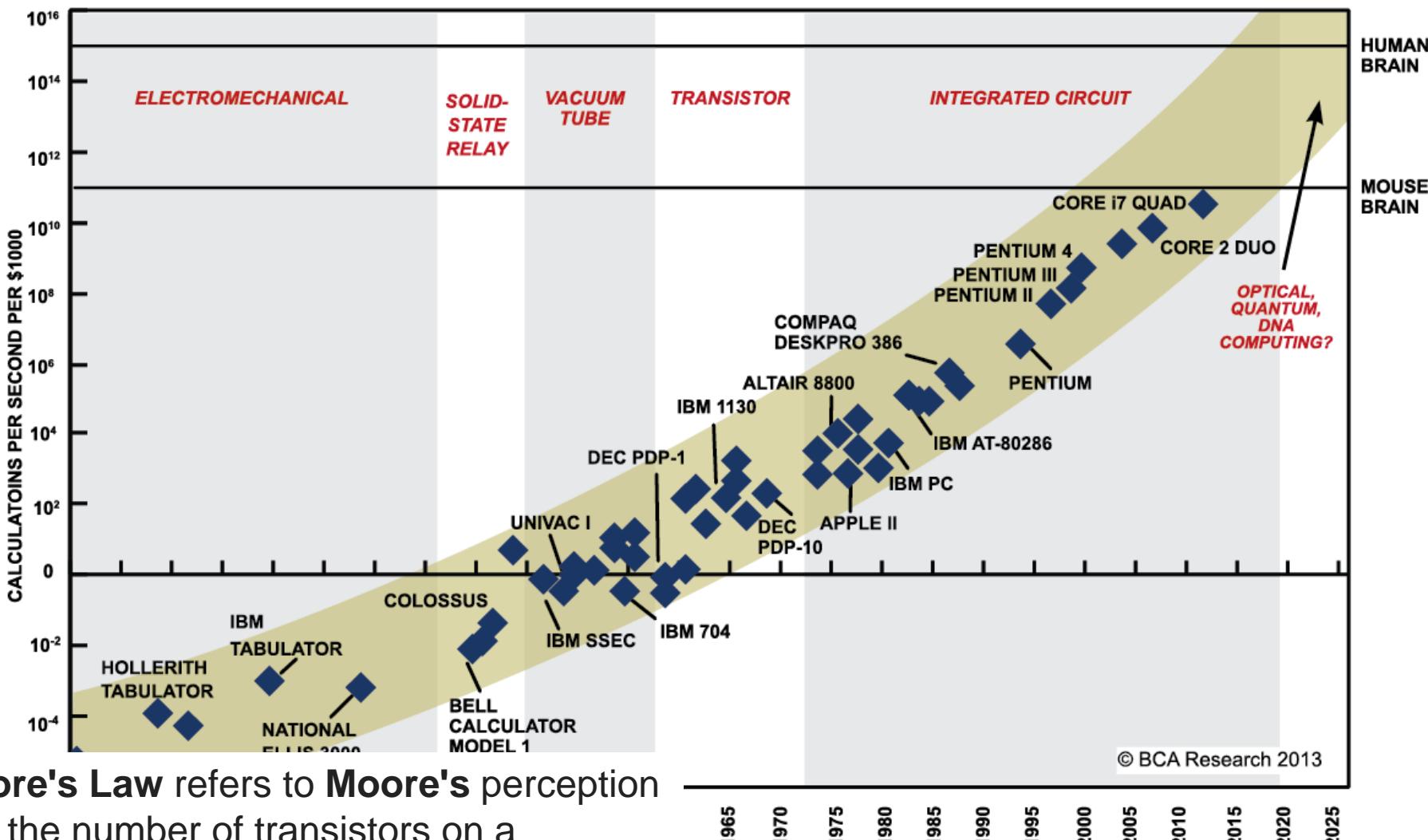
AI Hardware

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





Moore's Law

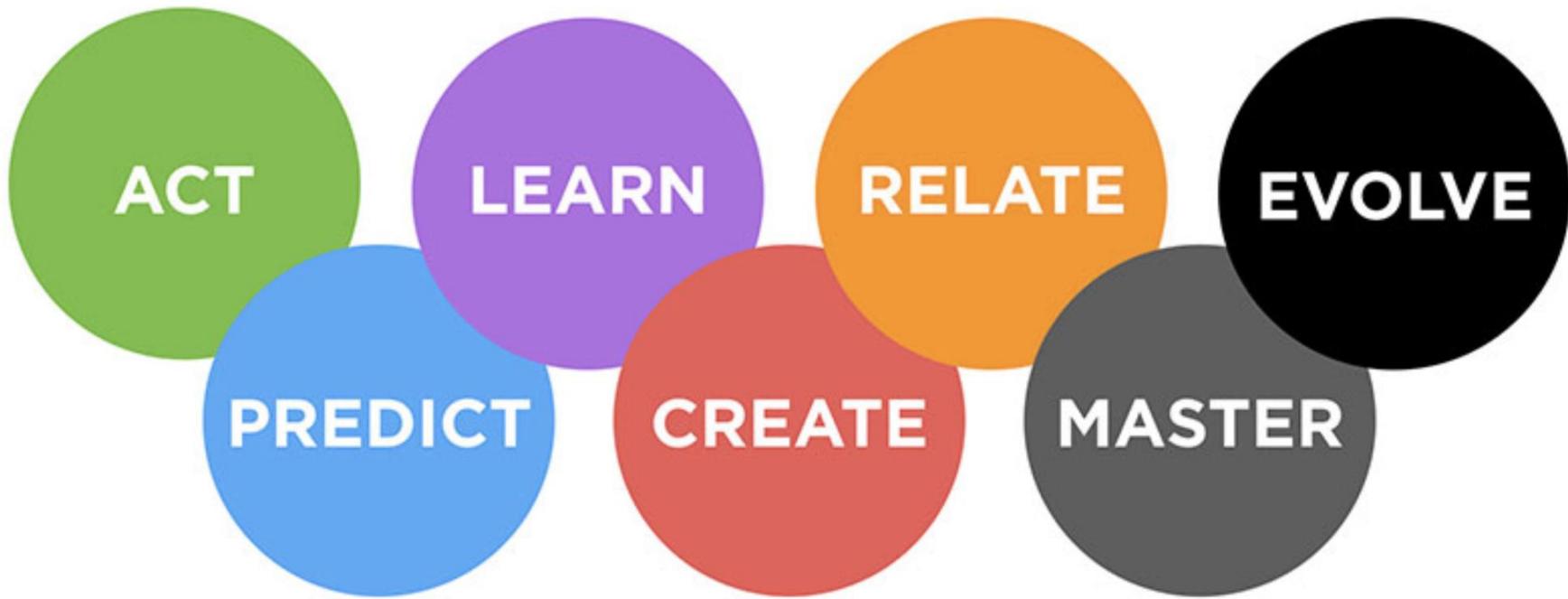


Moore's Law refers to Moore's perception that the number of transistors on a microchip doubles every two years, though the cost of computers is halved.

"BIOLOGY", P.67, THE VIKING PRESS, 2006. DATAPoints BETWEEN 2000 AND



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



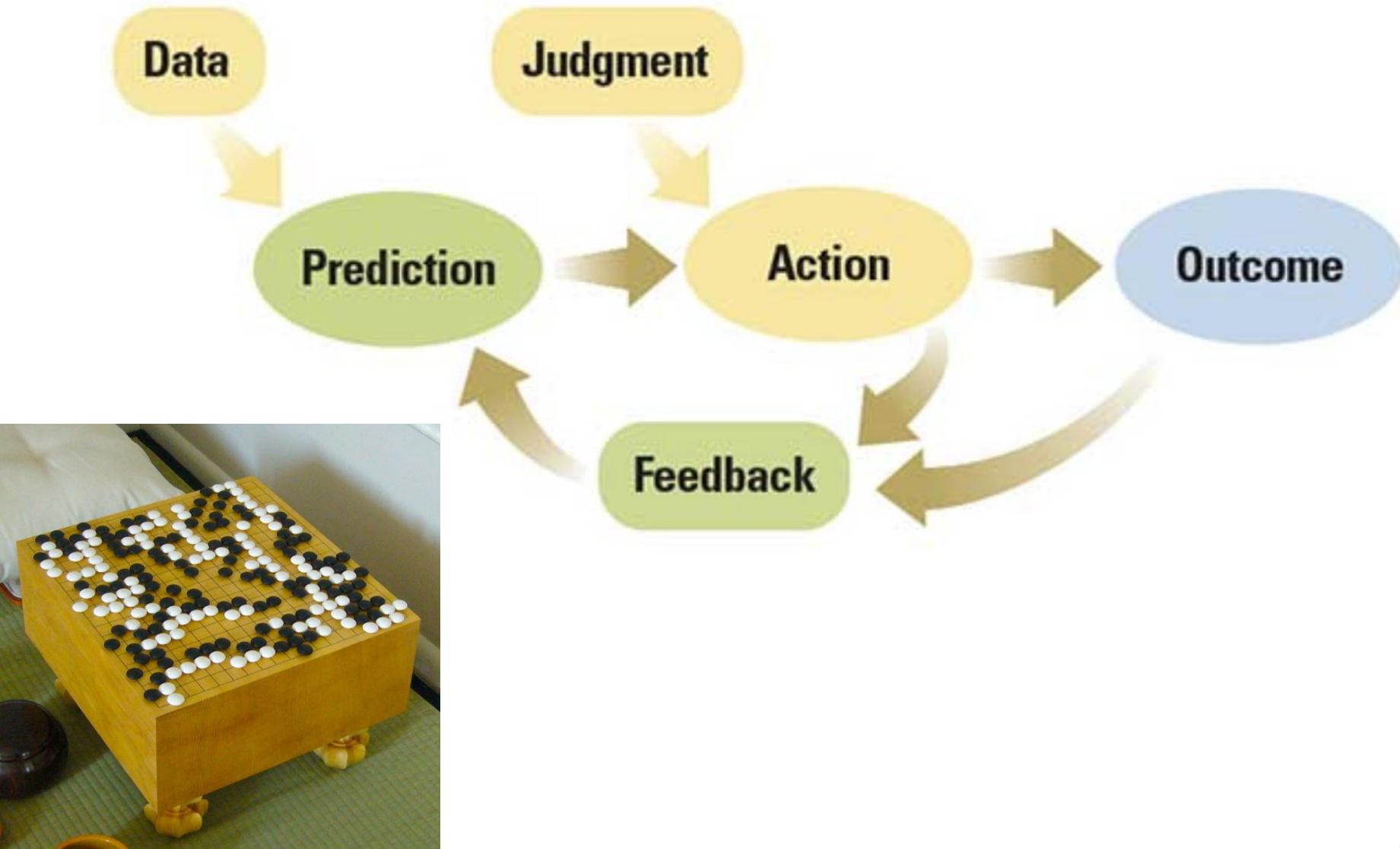


Systems that Predicts





Systems that Learns





Systems that Create

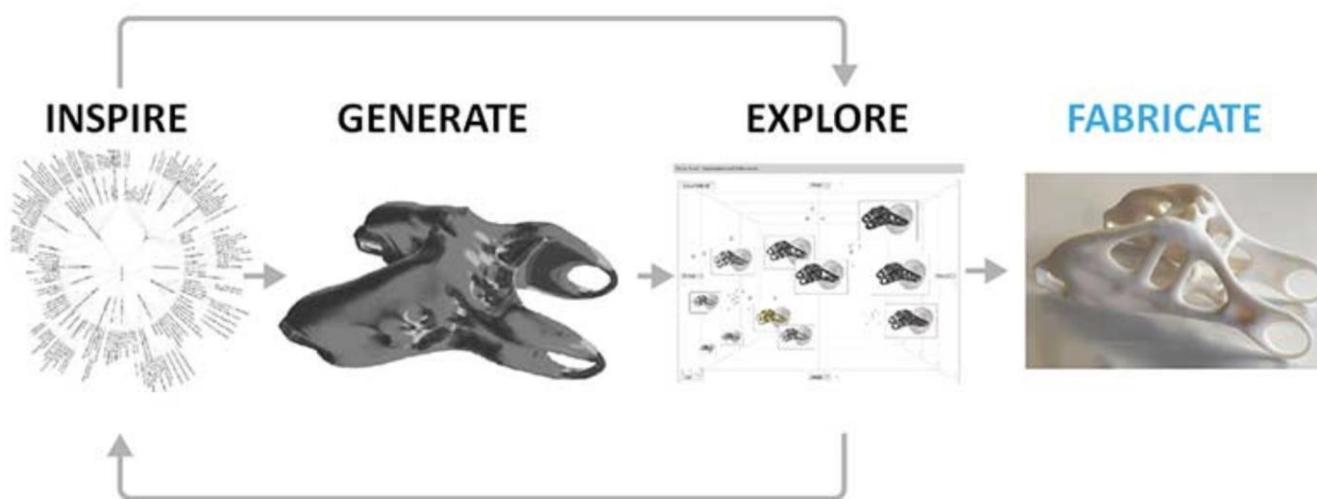
Computers now capable of producing original writing, imagery, music, industrial designs, and even AI software!



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."





I AM AI

I am AI (Variation)

AIVA (Artificial Intelligence Virtual Artist)

00:00



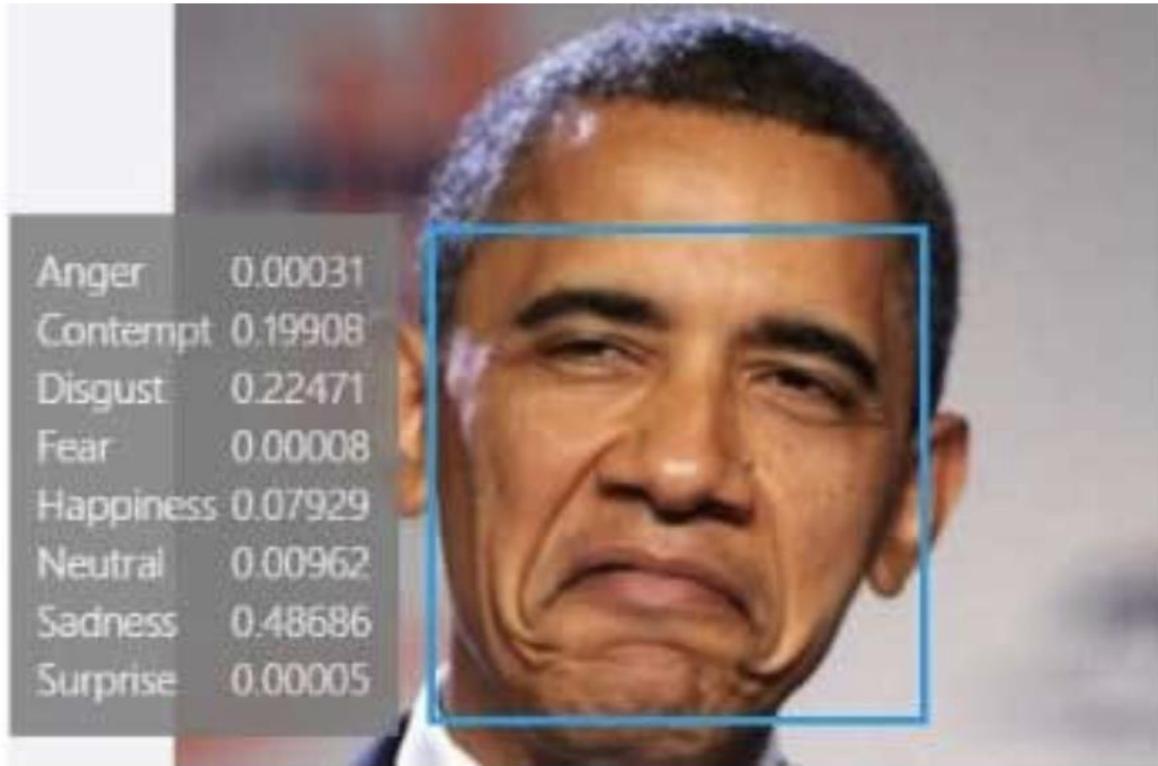
Aiva Technologies

www.aiva.ai

https://www.youtube.com/watch?v=gzGkC_o9hXQ



Systems that Relate

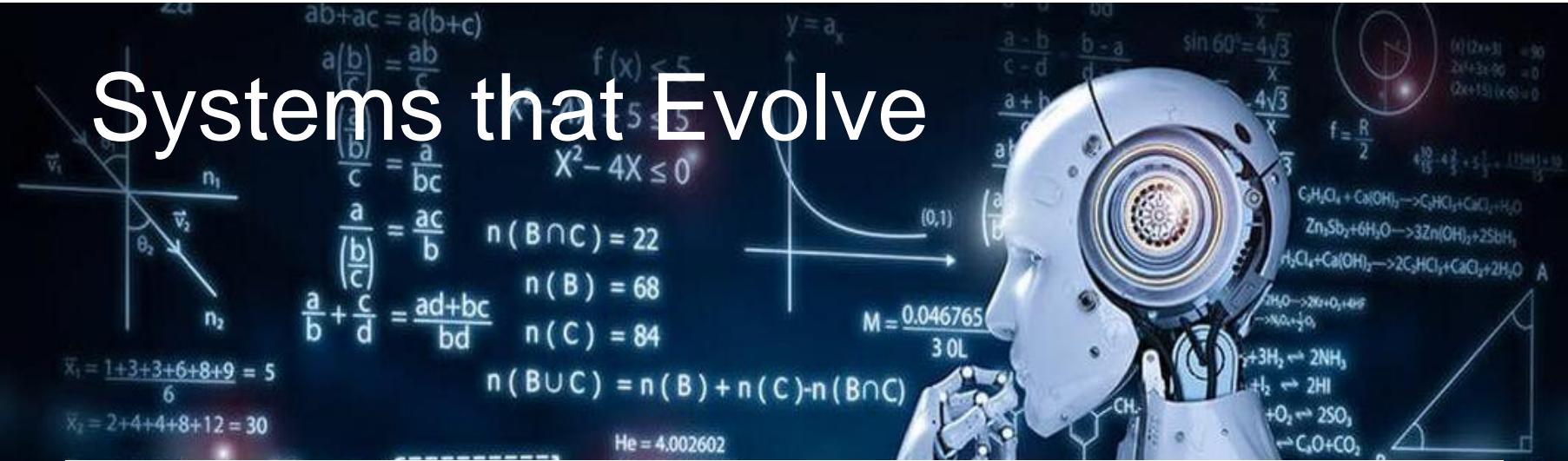




Systems that Master

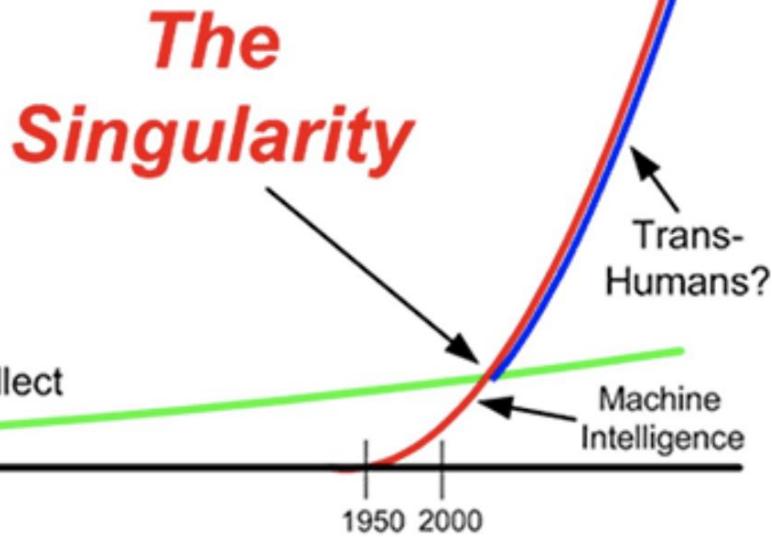


Systems that Evolve



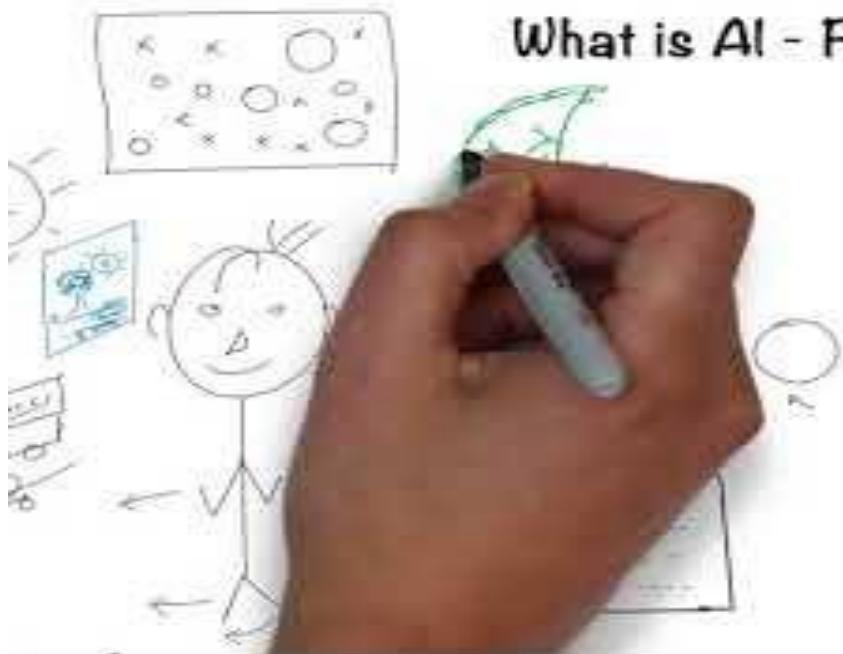
The **technological singularity**—also, simply, **the singularity**—is a hypothetical point in time at which technological growth becomes uncontrollable and irreversible, resulting in unforeseeable changes to human civilization.

- Wikipedia

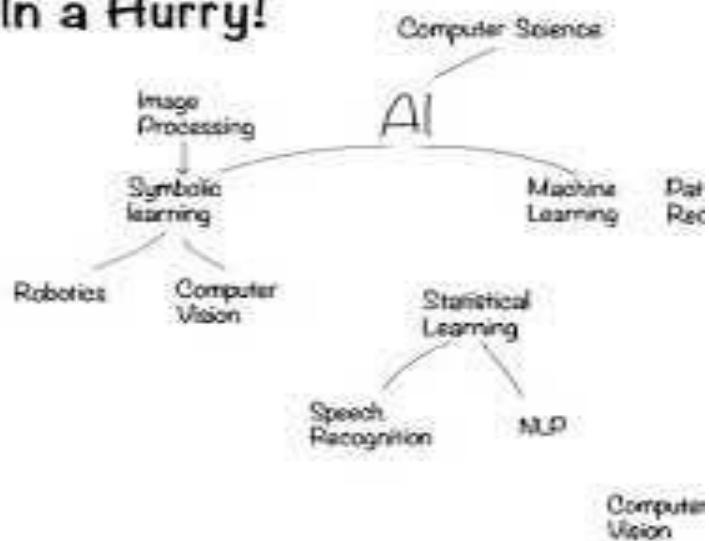




Artificial Intelligence in a Nutshell



What is AI - For People In a Hurry!

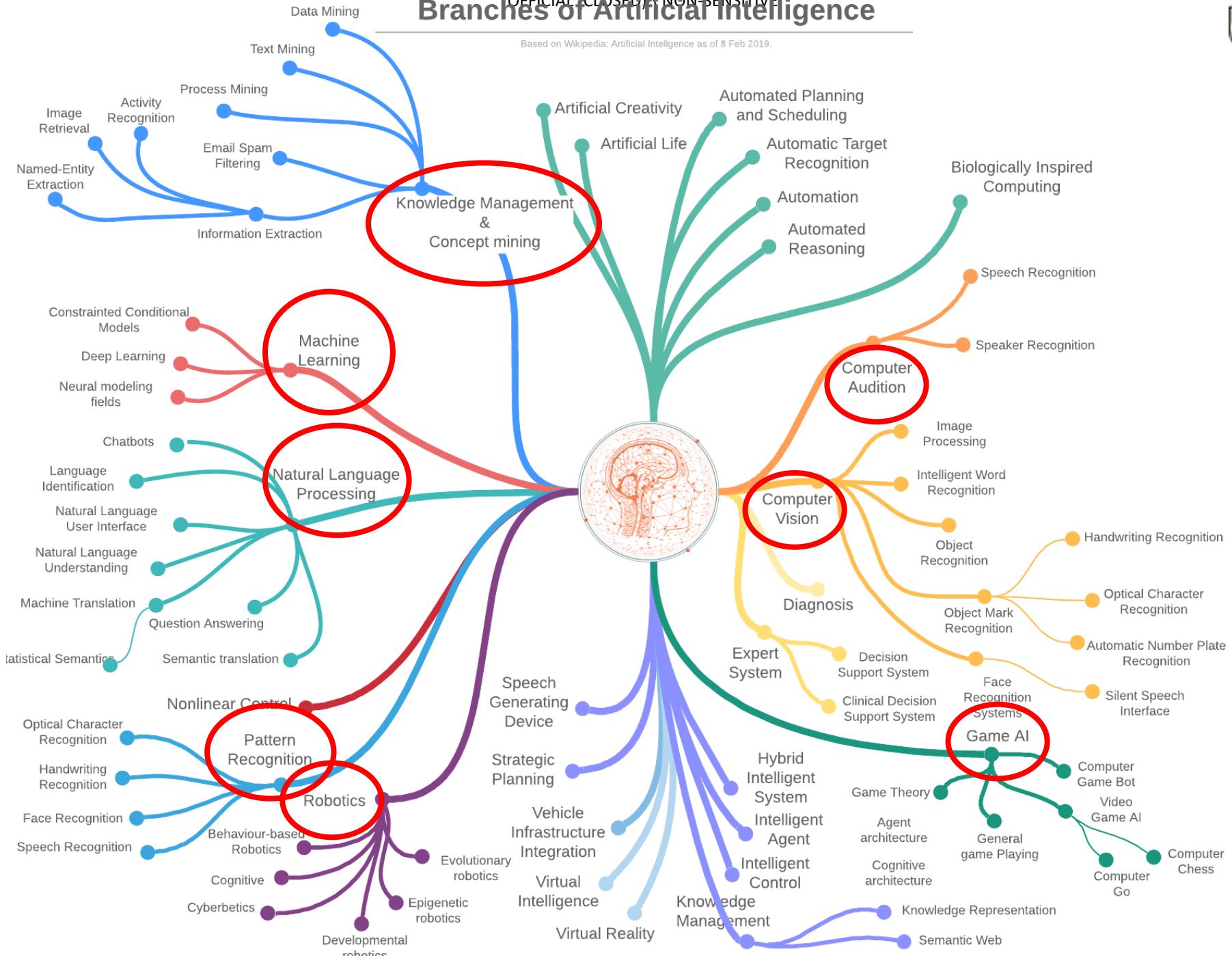


Categories of AI



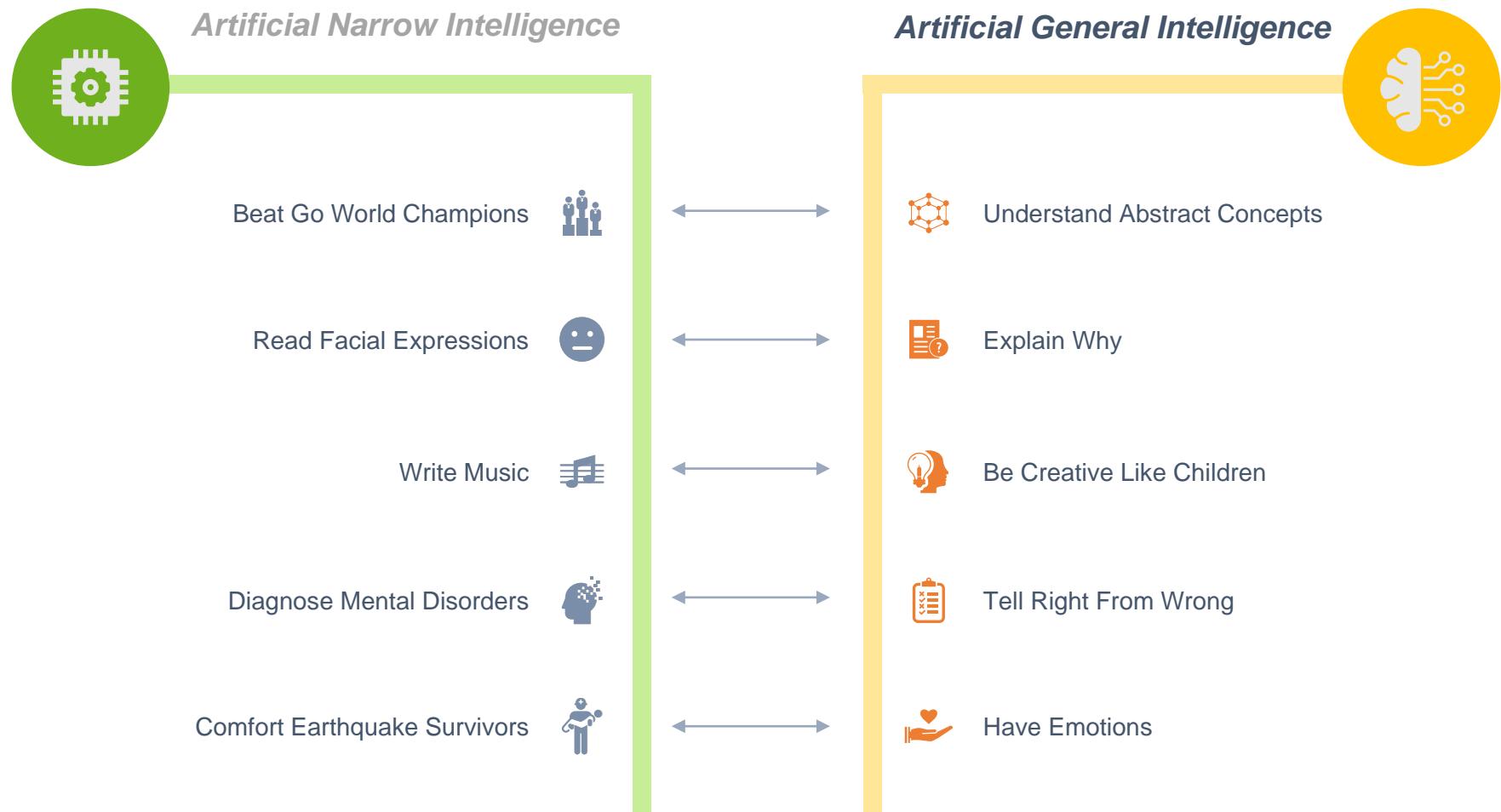
OFFICIAL (CLOSED) & NON-SENSITIVE Branches of Artificial Intelligence

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





Artificial Narrow Intelligence vs Artificial General Intelligence





Mapping Human Perceptions to AI-enabled Capabilities

Vision	Computer Vision	Conversational Interface Licensed to Seow Khee Wei
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	



15 Mins Break



bit.ly/top10_2020

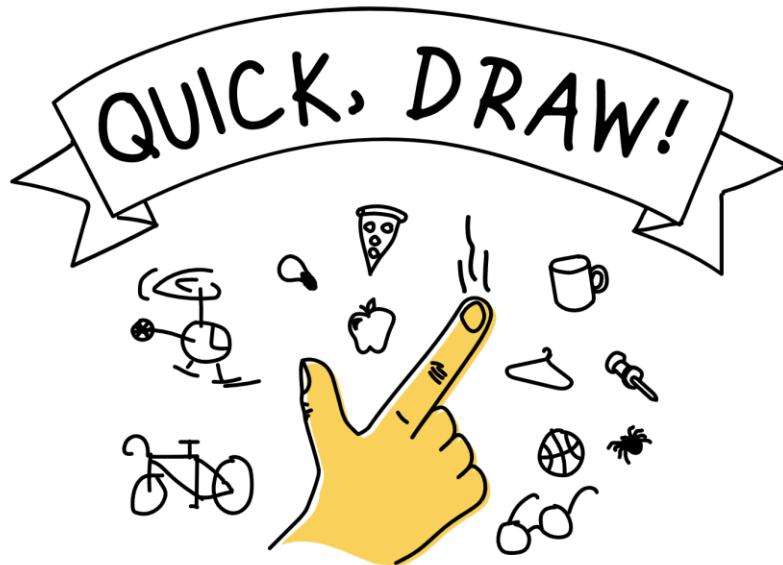
Hyperautomation

Machine Learning (ML)



Quickdraw Game

<https://quickdraw.withgoogle.com>



Can a neural network learn to recognize doodling?

Help teach it by adding your drawings to the [world's largest doodling data set](#), shared publicly to help with machine learning research.

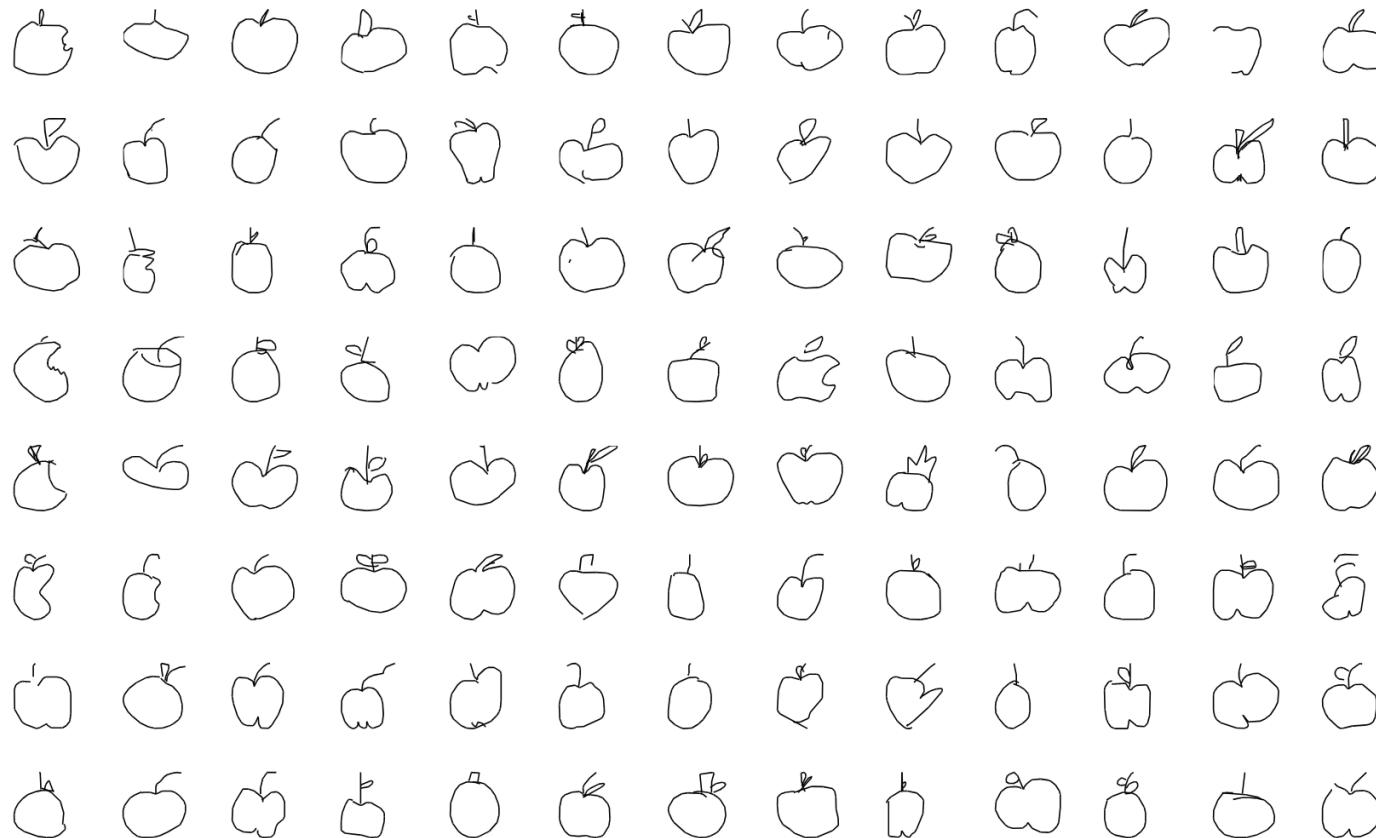
Let's Draw!





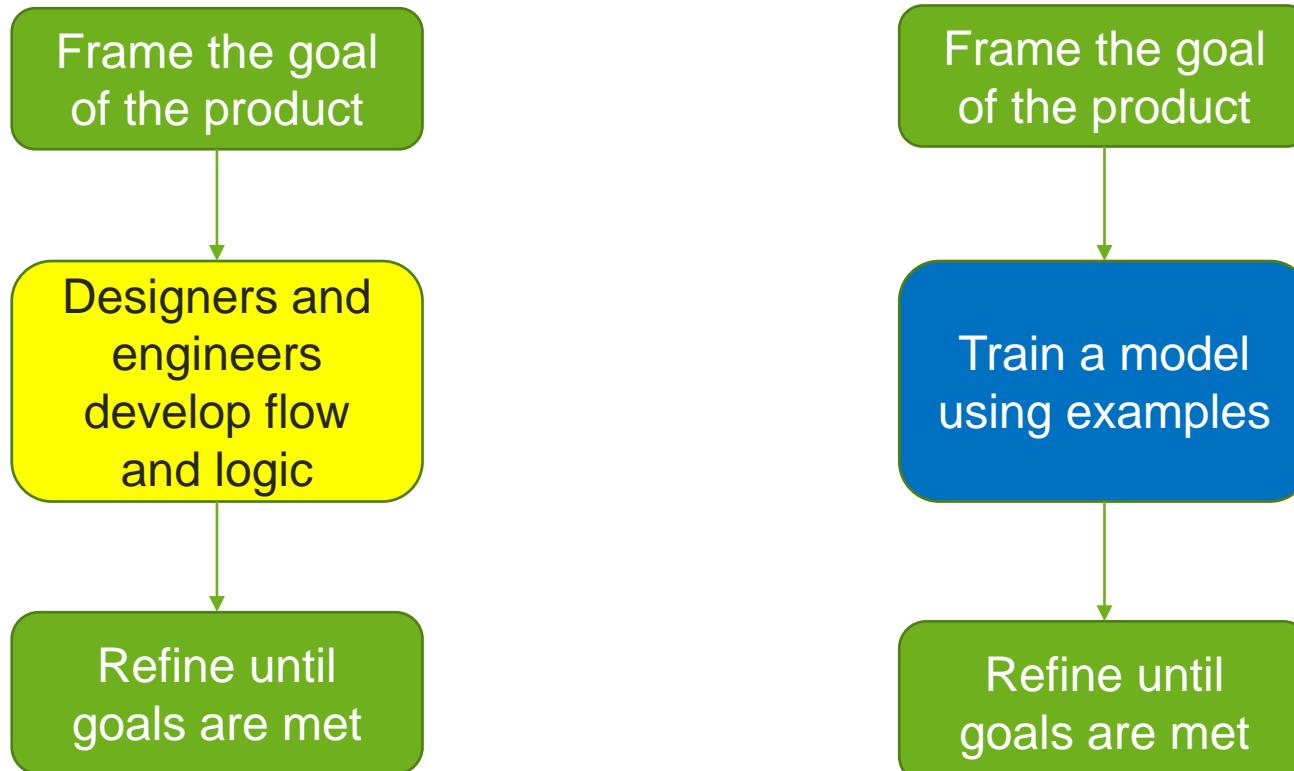
How does ML work in QuickDraw?

- <https://quickdraw.withgoogle.com/data/apple>





Rule based Vs Machine Learning





Which approach to use?

Which three suppliers to get a quote from

Rule-based

Machine Learning



Which approach to use?

Classifying an
object in a photo

Rule-based

Machine Learning



Which approach to use?

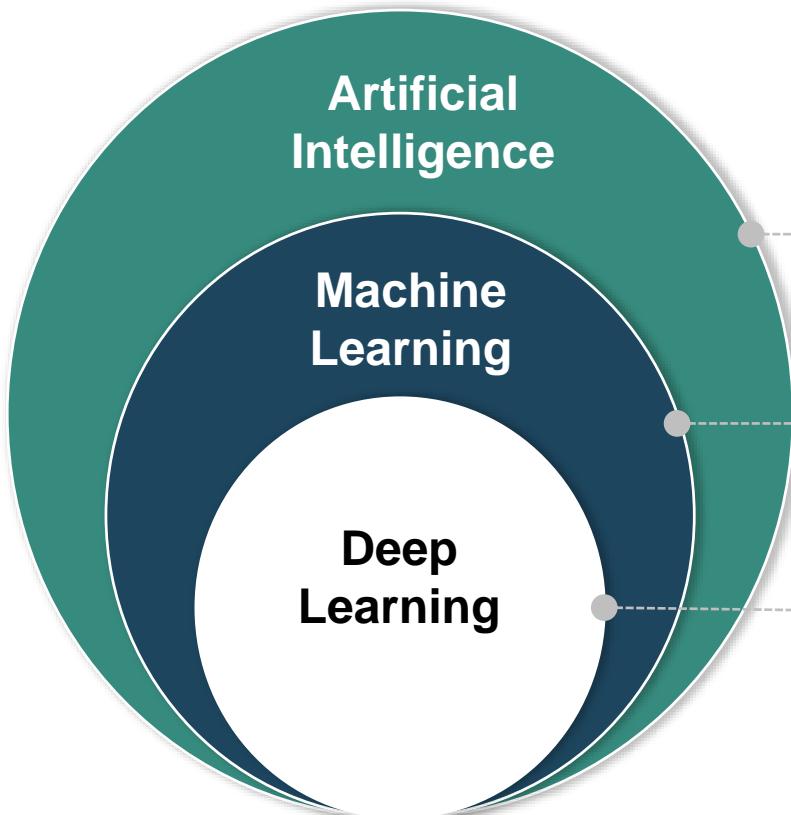
Search Engine

Rule-based

Machine Learning



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.

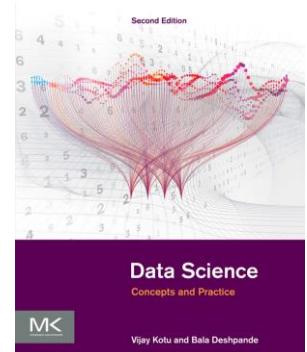
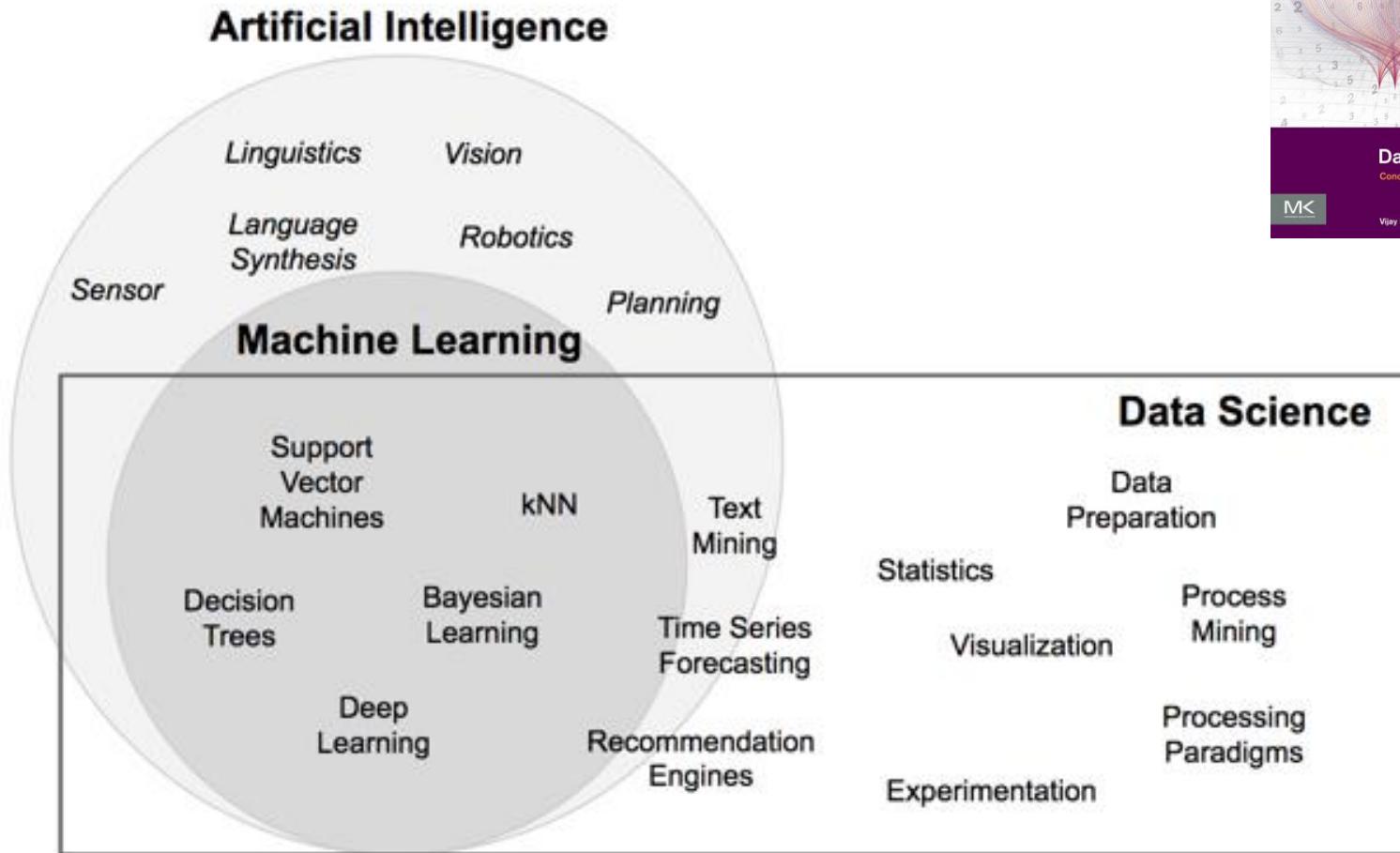


Deep Learning

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

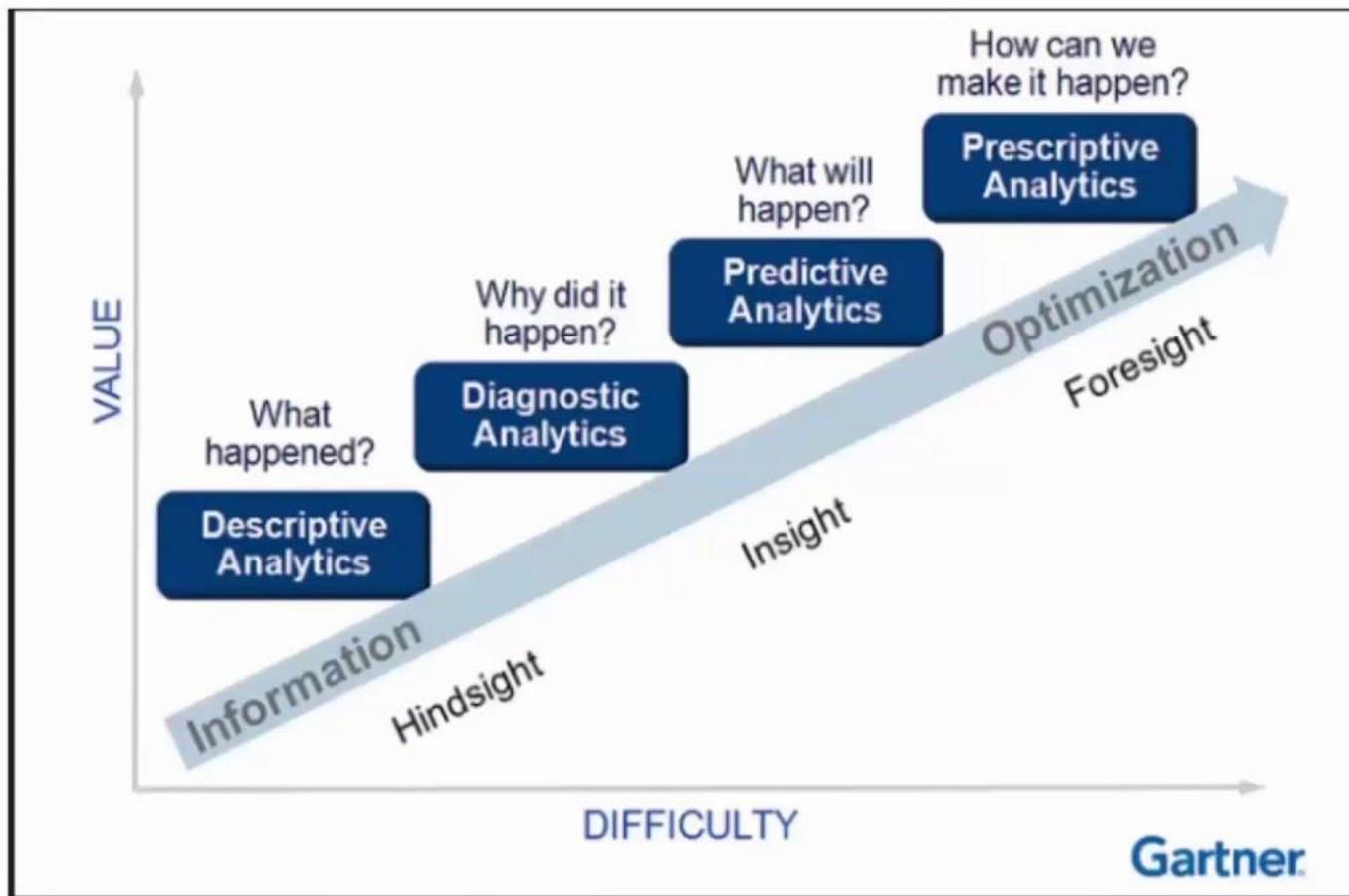


AI vs ML vs DS





Gartner Analytic Continuum





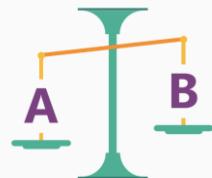
5 questions data science answers

**Is this weird?
(Anomaly detection)**



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

**Is this A or B?
(Classification)**



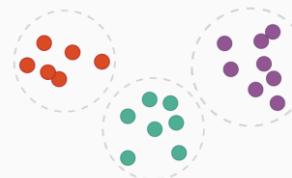
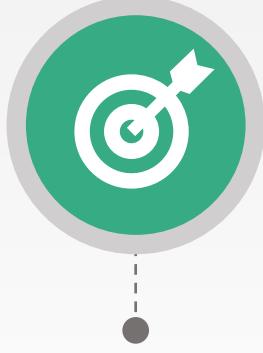
Will this tire fail in the next 1,000 miles: Yes or no?
Which brings in more customers: a \$5 coupon or a 25% discount?

**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?

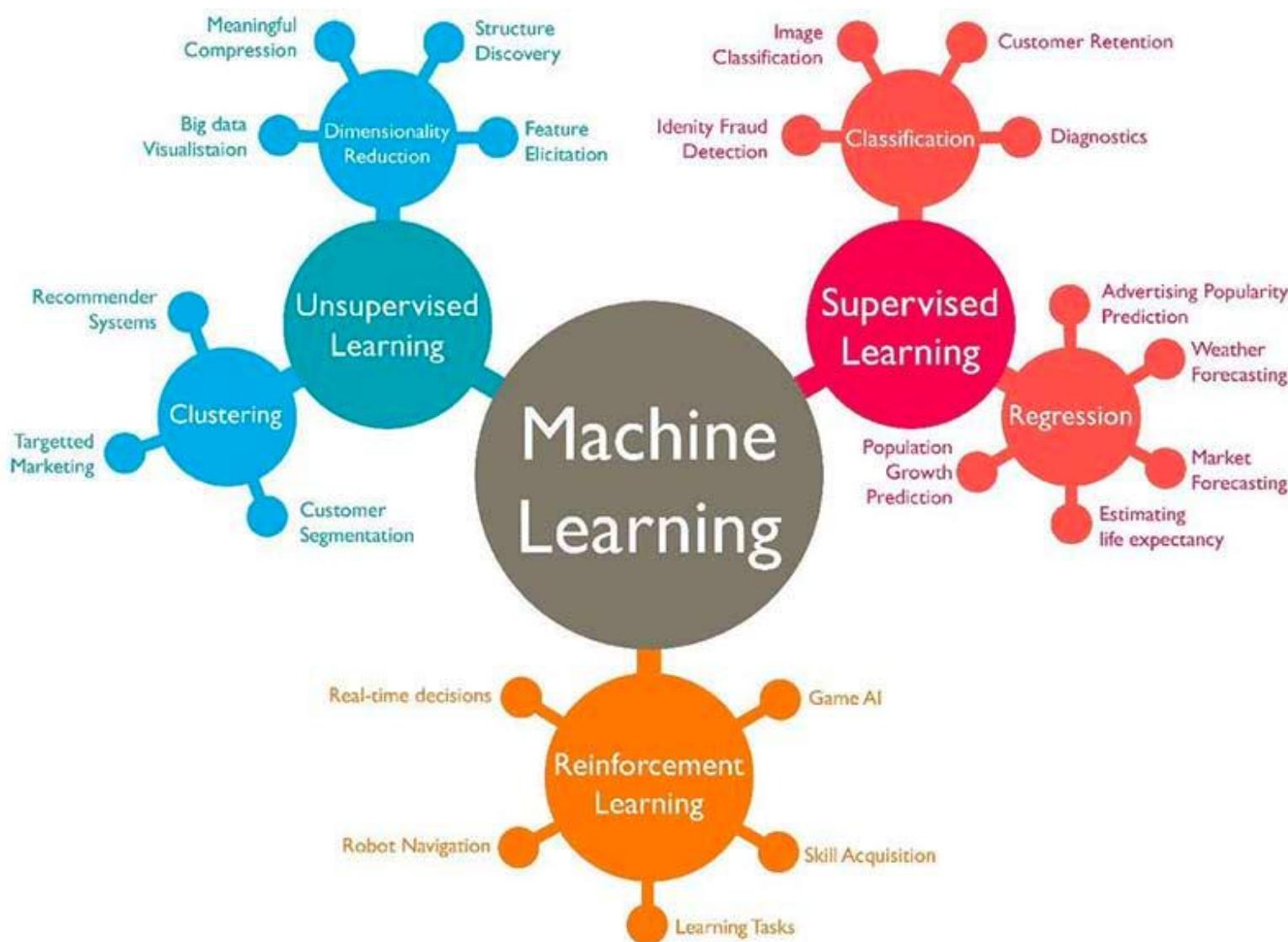
**What should I do?
(Reinforce Learning)**



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



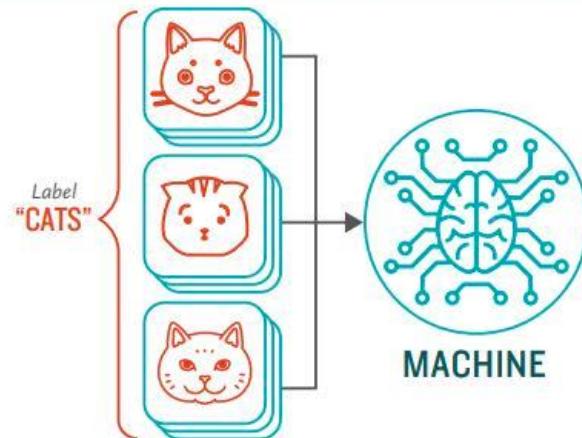


Supervised Learning

How **Supervised** Machine Learning Works

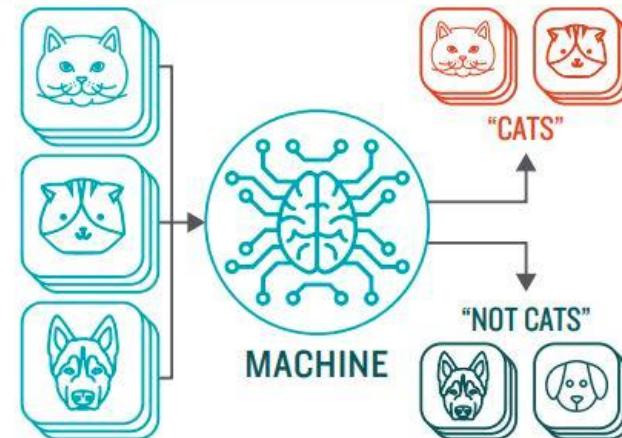
STEP 1

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

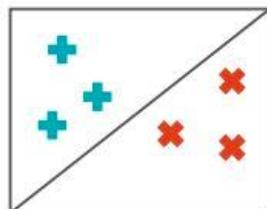


STEP 2

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

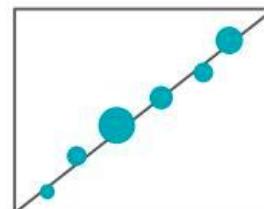


TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLASSIFICATION

Sorting items into categories



REGRESSION

Identifying real values (dollars, weight, etc.)

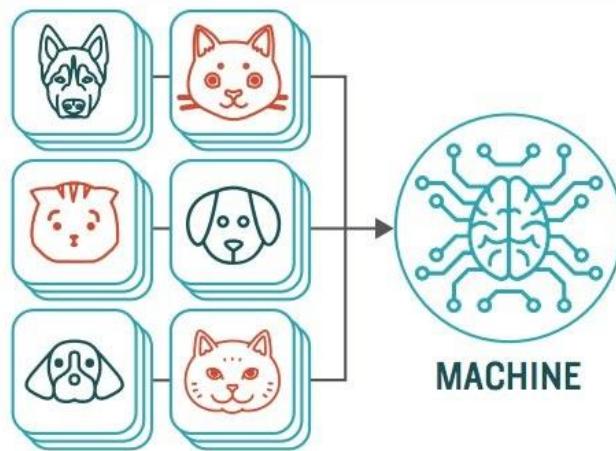


Unsupervised Learning

How **Unsupervised** Machine Learning Works

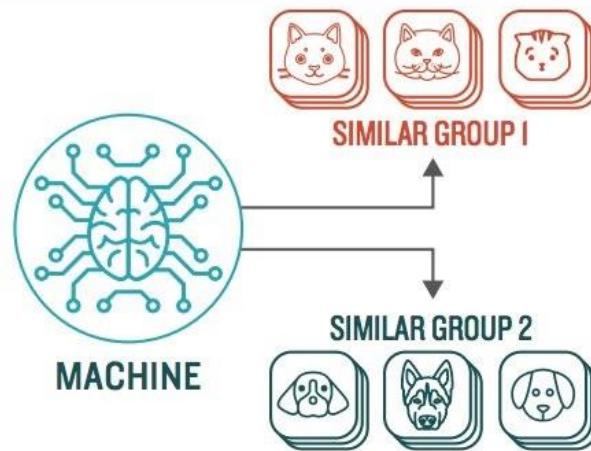
STEP 1

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



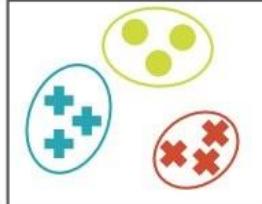
STEP 2

Observe and learn from the patterns the machine identifies



TYPES OF PROBLEMS TO WHICH IT'S SUITED

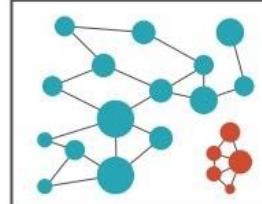
CLUSTERING



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?

Examples



Classifier



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

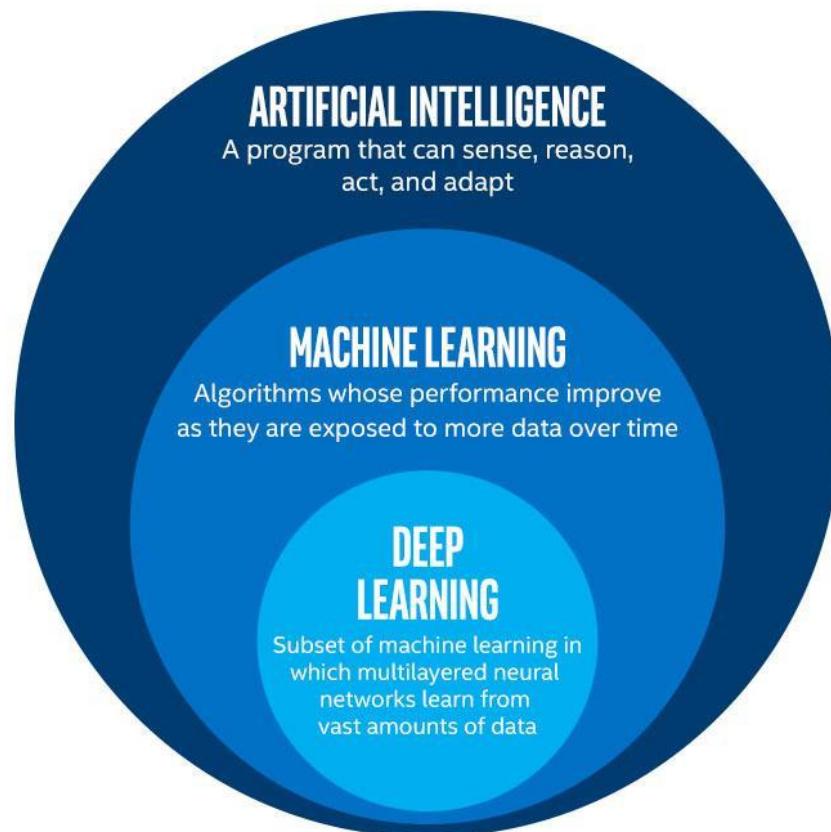


What is deep learning?

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

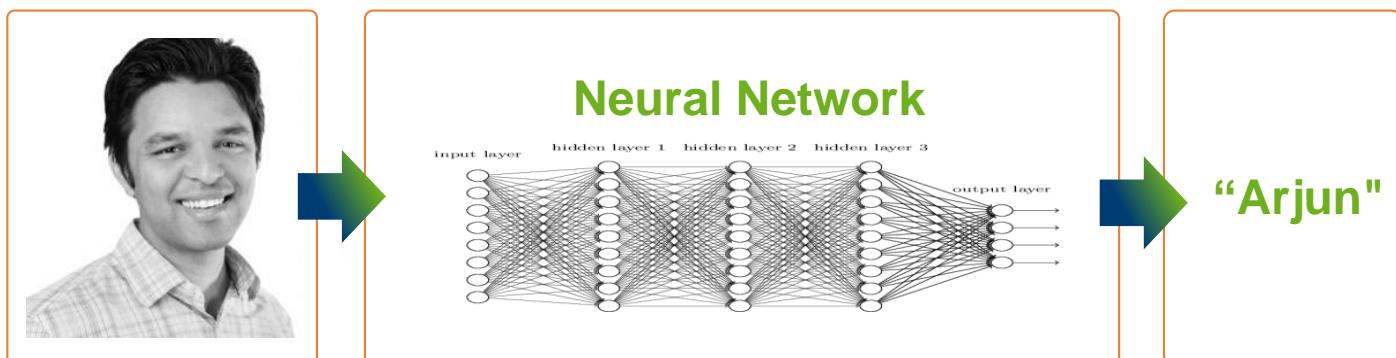
Classic Machine Learning

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



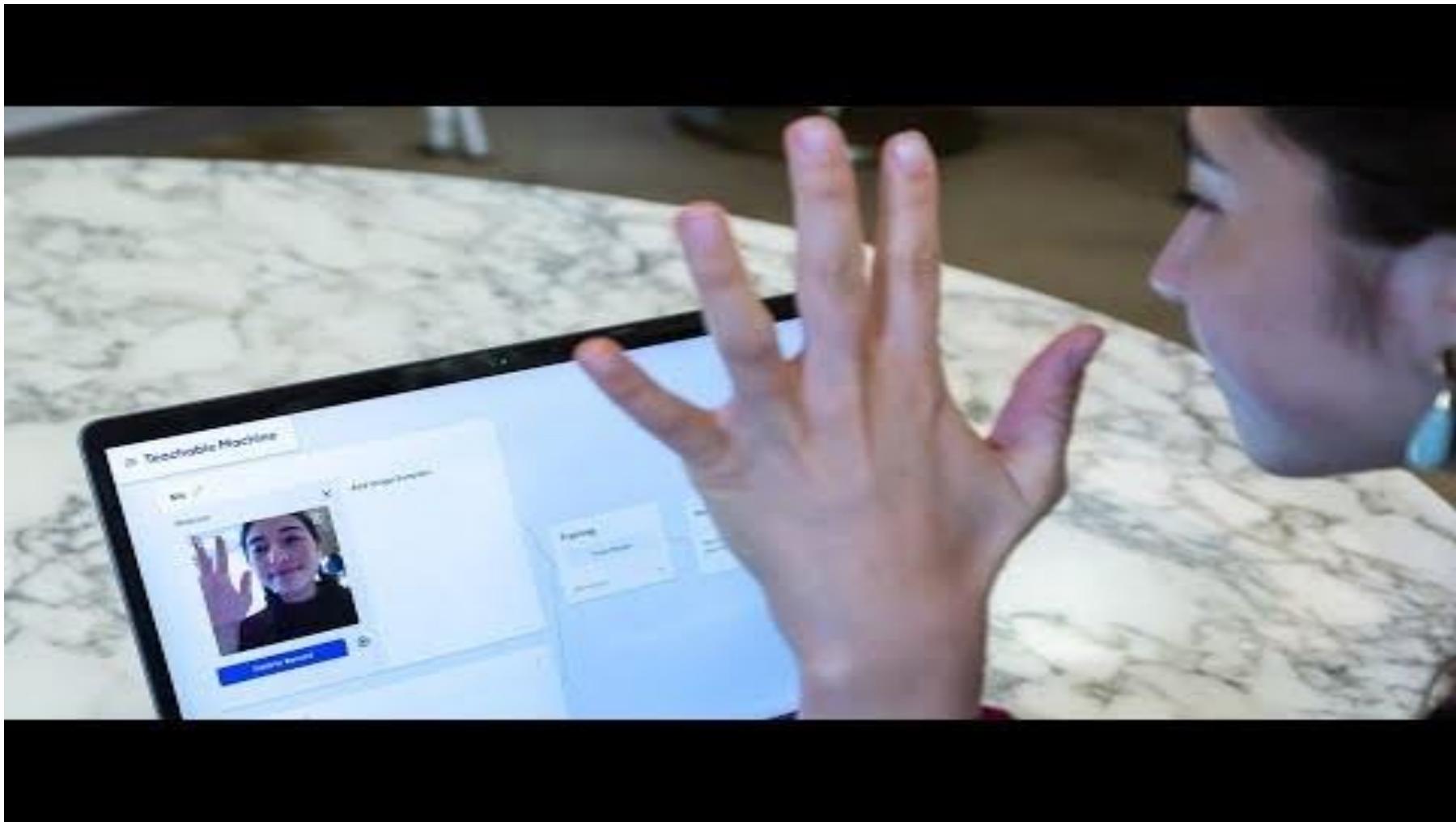
Deep Learning

Steps 1 and 2 are combined into 1 step.





Teachable Machine



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



Reinforcement Learning



Photo: ST



Reinforcement Learning

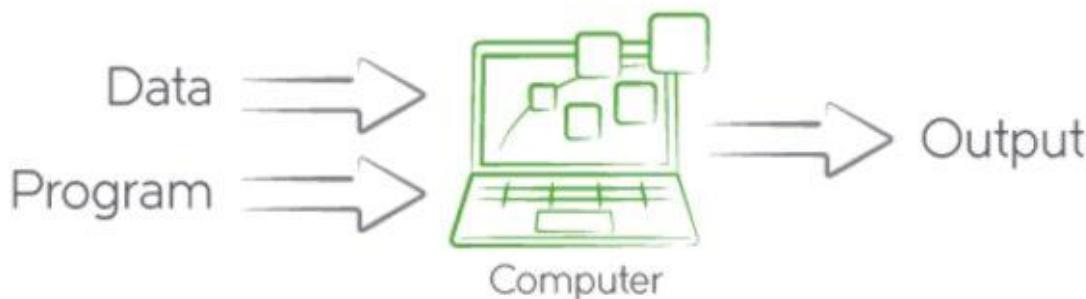




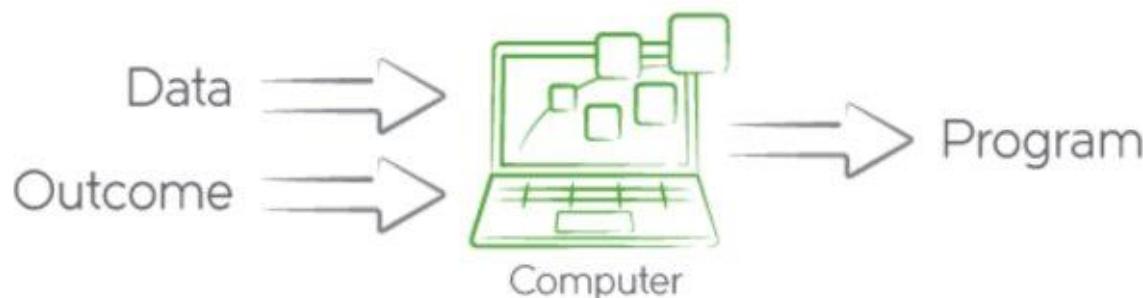


Traditional Programming vs Machine Learning

Traditional Programming

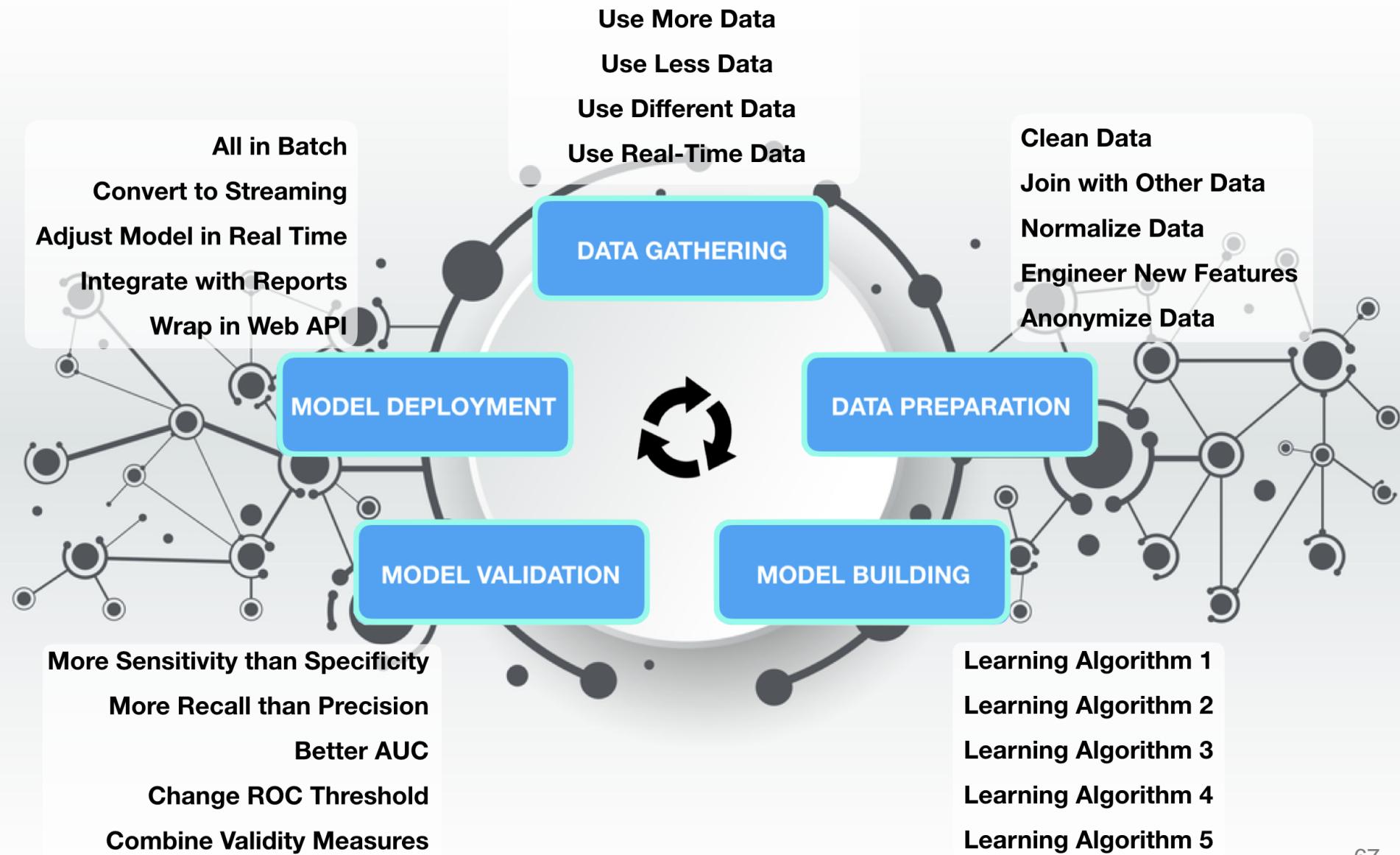


Machine Learning





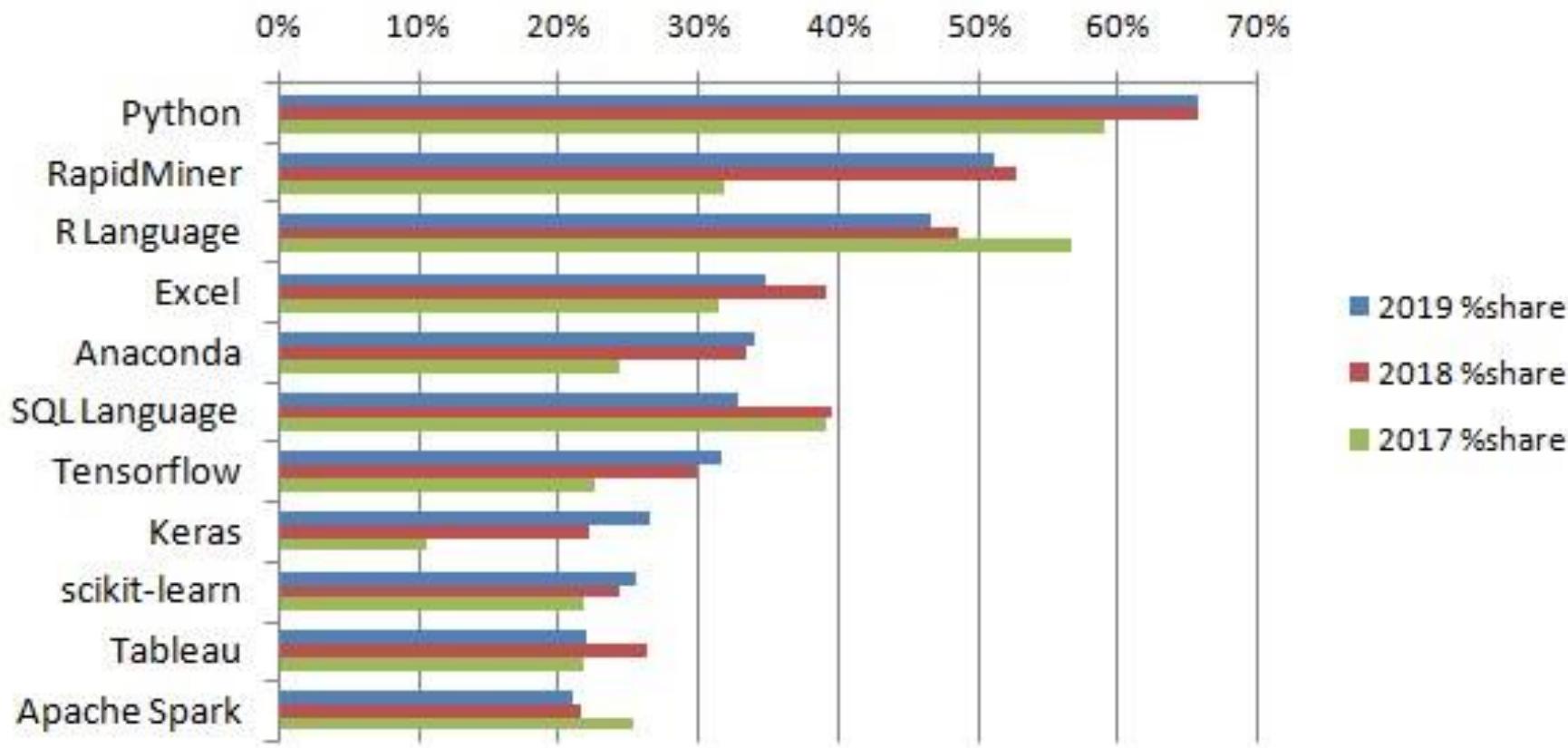
AI/ML Workflow





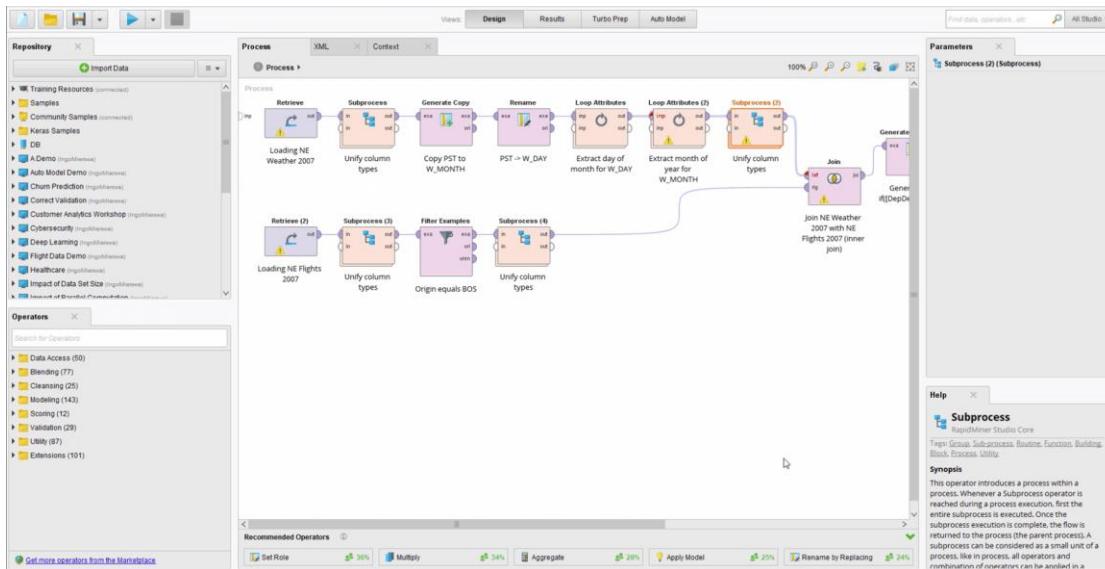
What are the popular tools?

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

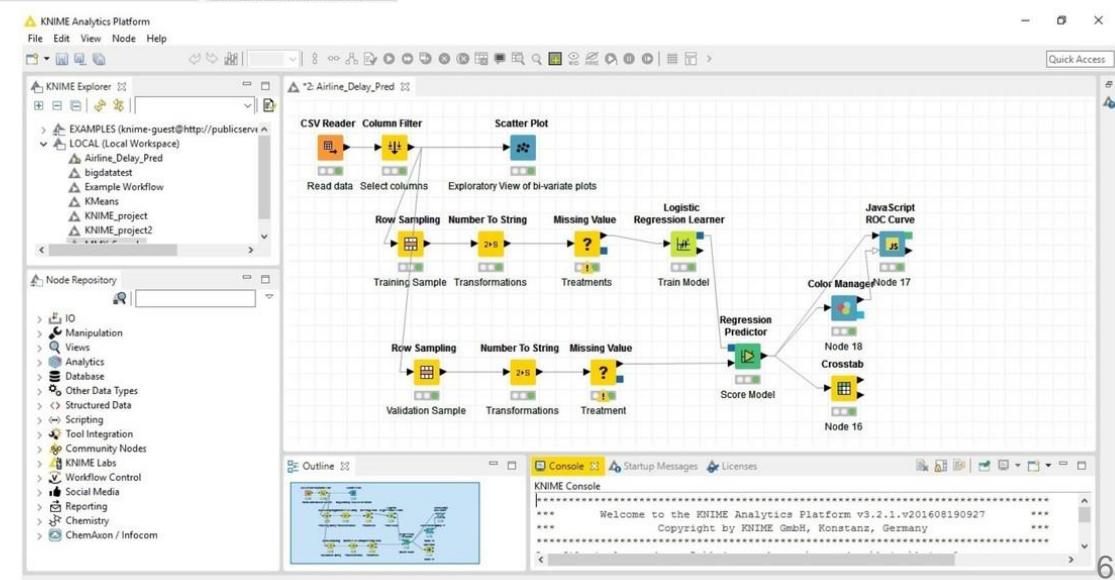




Graphical Tools (ML/DS)



RapidMiner

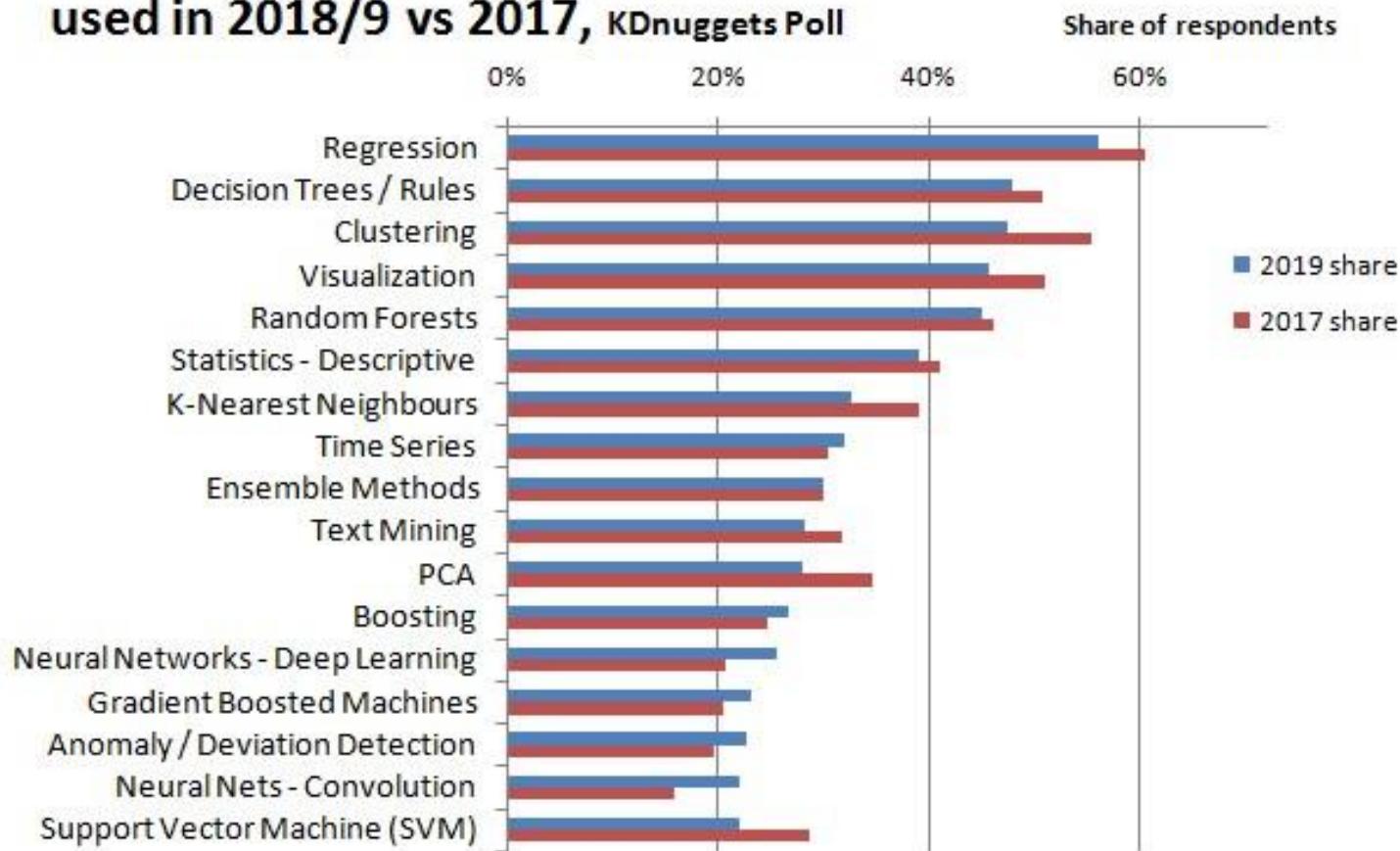


KNIME



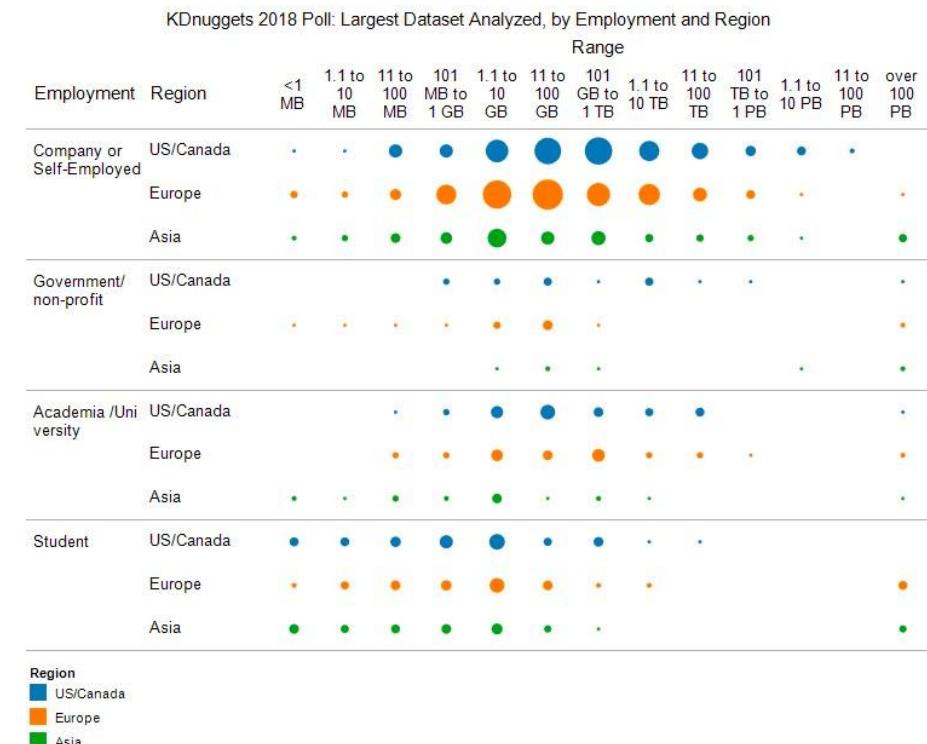
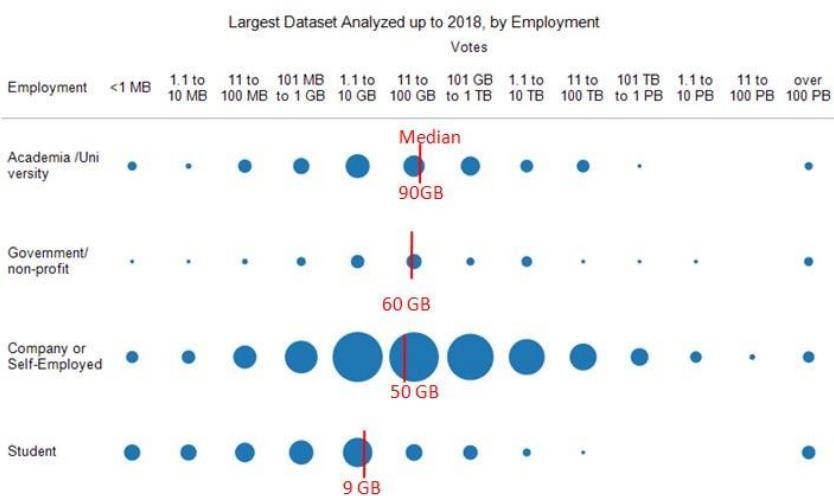
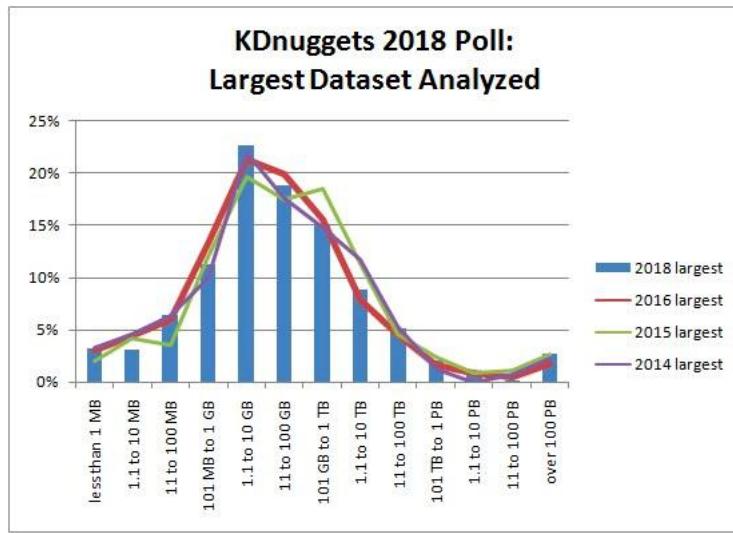
Top Methods/algorithms

Top Data Science, Machine Learning Methods, Algorithms used in 2018/9 vs 2017, KDnuggets Poll





Largest Datasets Analysed



Hands on AI

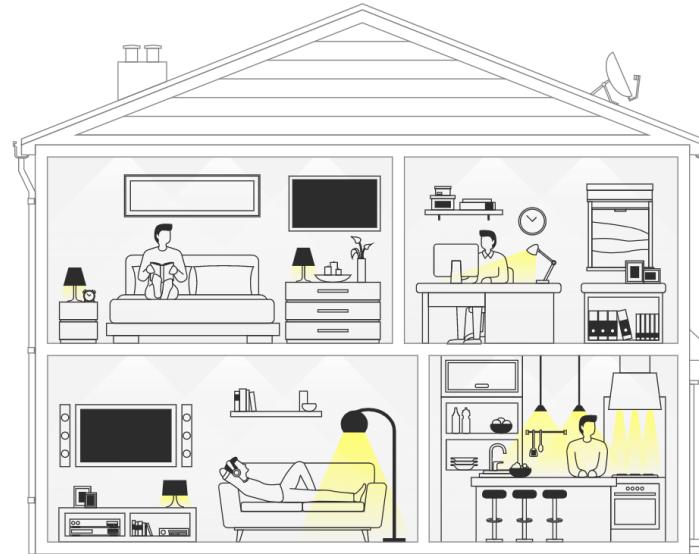


Using AI to make video content better.

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.





Text Analytics

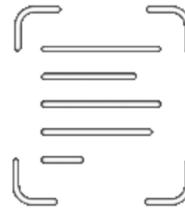
Step #1: Enter Your Message

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 >](#)

Step #2: Sentiment & Key Phrases

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

[Next Step >](#)

Step #3: Entity Linking

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

[Next Step >](#)

Step #4: Bing Entity Search

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

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

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



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 Step](#)

• Read text in imagery

• Read handwriting in imagery

• Recognize celebrities & landmarks

Select an image





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.

Resources:

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

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

IBM Watson Discovery Beta Demo

Watson Discovery Query Demo

Let's see how Watson Discovery's results compare to a traditional keyword search across documents.

 Car Manuals

User guides, maintenance info, and recall data

 Student Loans

Now select a Natural Language Query and see what Discovery returns versus a corresponding keyword search

Discovery search

 natural language query

Traditional search

 corresponding keyword



<https://ibm.co/36SOnTN>

60 mins Lunch Break

Some interesting videos

<https://www.youtube.com/watch?v=bmNaLtC6vkU>

https://www.youtube.com/watch?v=Nnf8P5A_saE

Gentle Reminder:

1. Get your google account ready.
2. Get your Telegram account ready.
3. Download and unzip the images from:
bit.ly/2UYWtYS

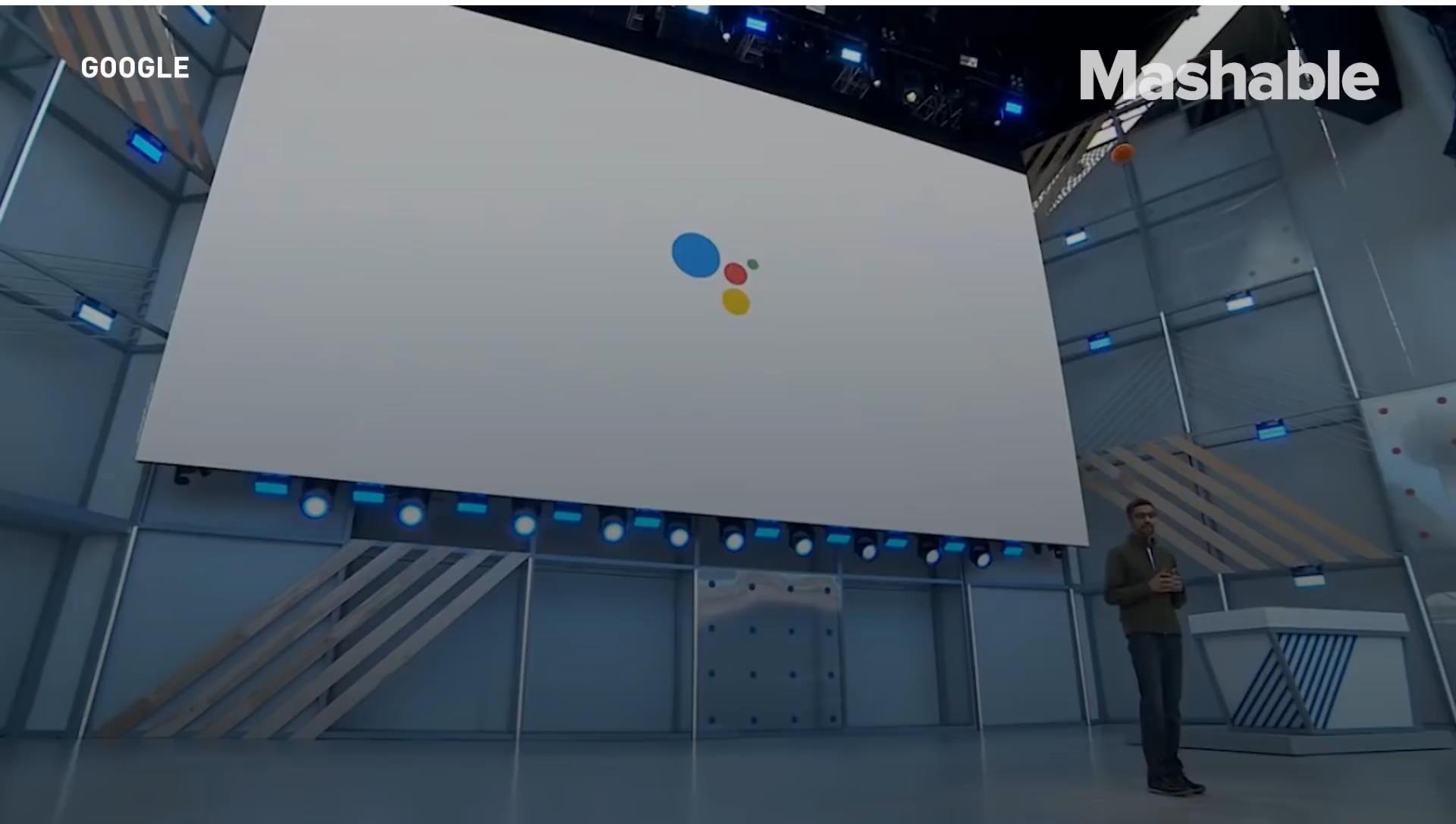
LUNCH BREAK



Where is AI applied?



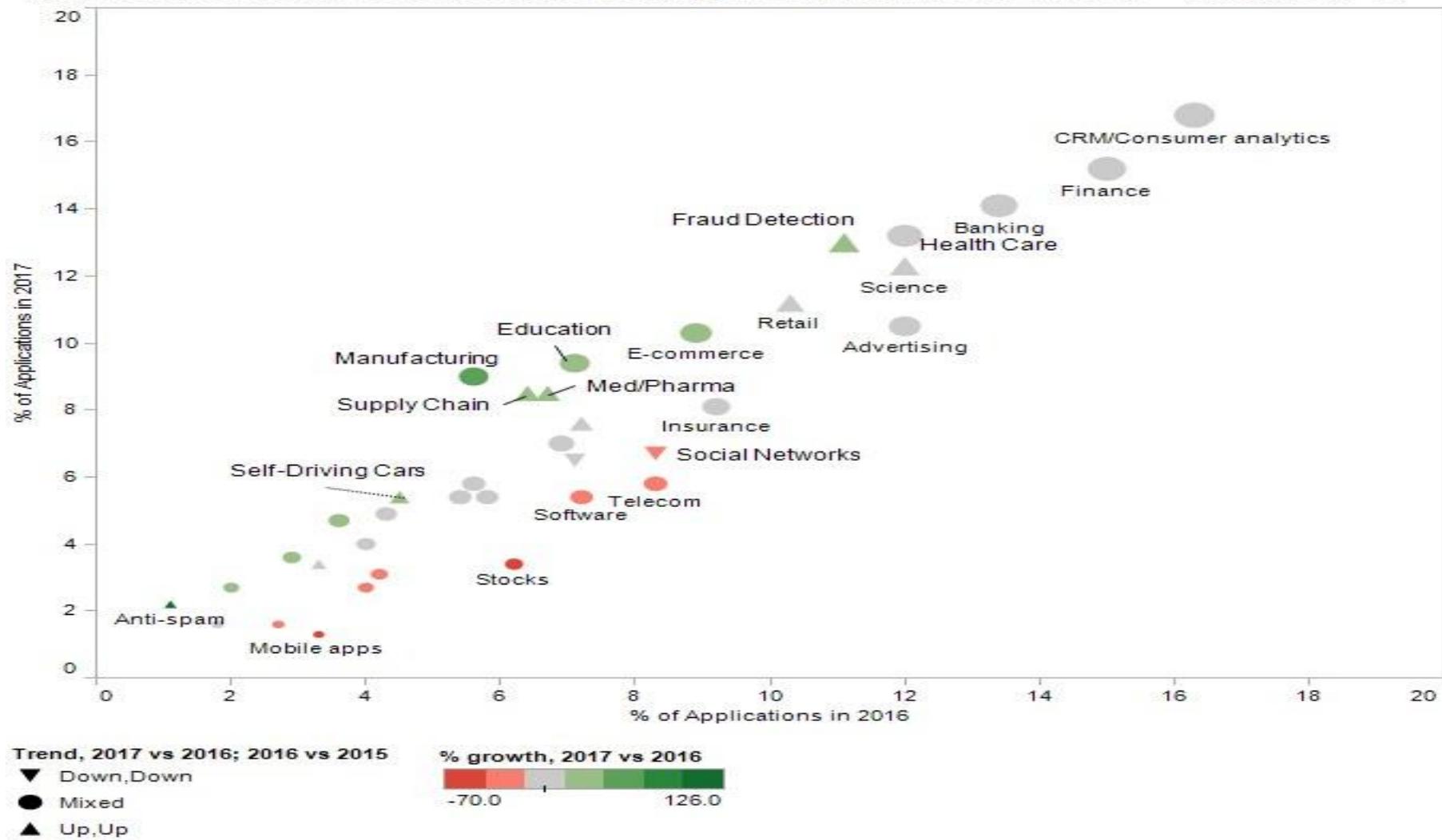
AI assistant make real phone call





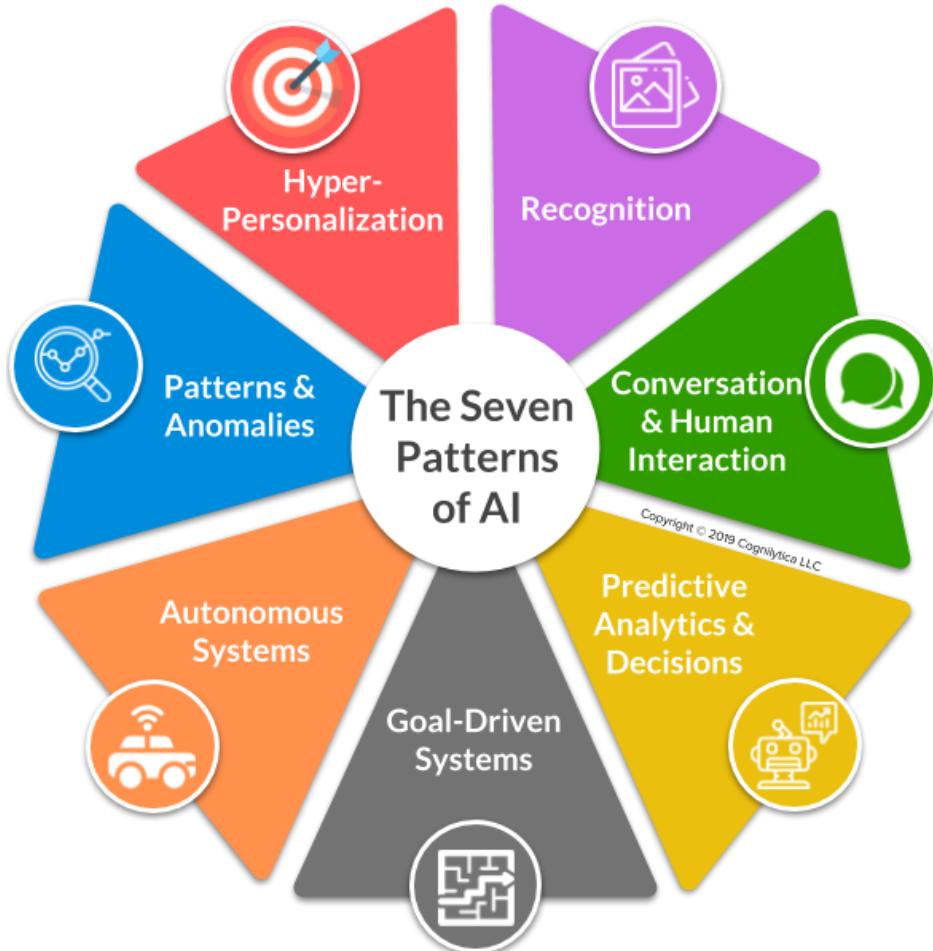
Where is AI applied?

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





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).

HYPERSERIALIZATION



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 no 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 events 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



Hyperpersonalization



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REAL-WORLD, INDUSTRY & ADOPTION FOCUSED
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: CG0066



Autonomous System



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MARKET RESEARCH AND INTELLIGENCE ON AI

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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DOC ID: CGI@062



Predictive Analytics



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MARKET RESEARCH AND INTELLIGENCE ON AI

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.



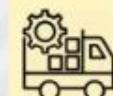
ASSISTED SEARCH

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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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: CGIG060



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 enhanced 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: CGIG0061



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: CGI@065

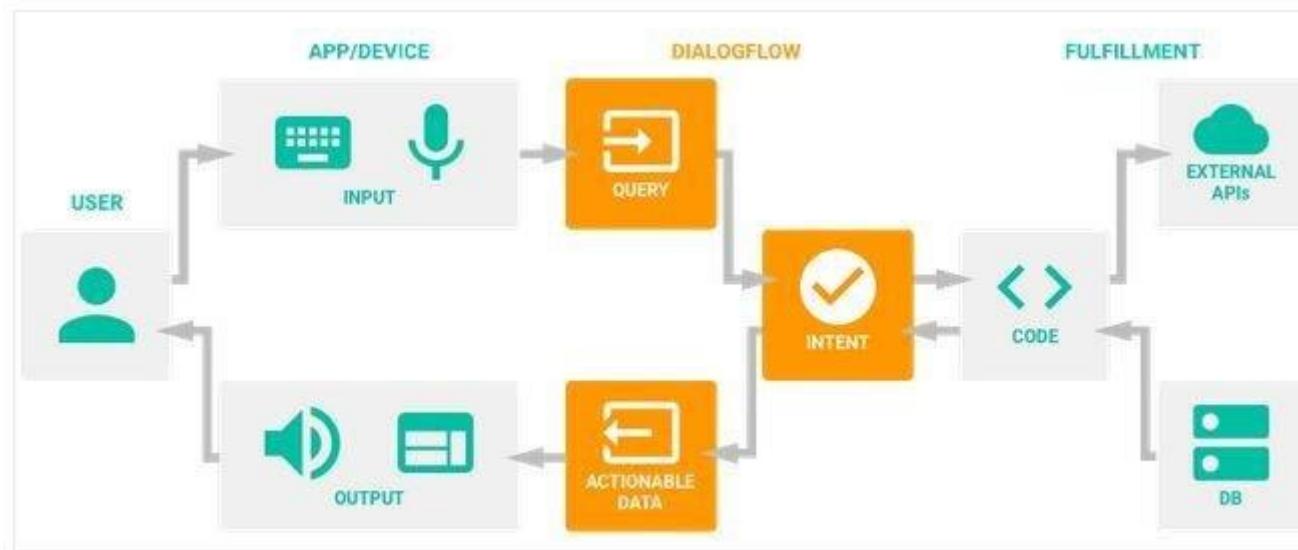


Solving Rubiks Cube





Hands on - Chatbot





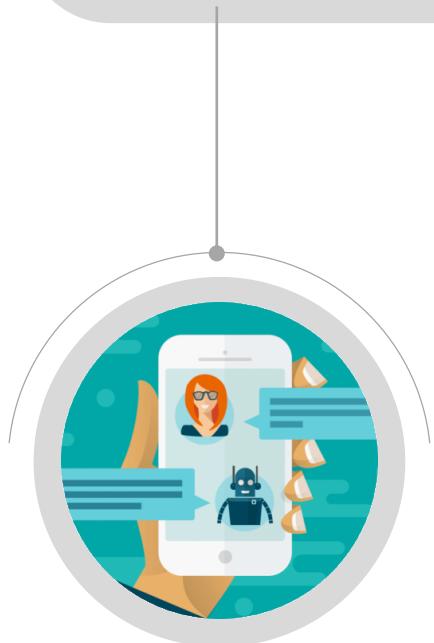
QnA Source

- <https://www.comm100.com/blog/top-10-chatbot-faqs.html>



Building a QnA Chatbot

QnA Chatbot



- 01
- 02
- 03
- 04
- 05
- 06

Setup

Create DialogFlow account
Prepare your questions and answers

Create QnA Knowledge Base

Gather training and validation images from internet or other sources.
Add personality

Train the Knowledge Base

Allow the KB to build up database.

Publish the Knowledge Base

Once tested, allow your KB to be used by the bots

Create a QnA Bot

Connect your KB to a Bot

Connect your bot to agent

Use popular apps like Telegram and Messenger to chat with your bot

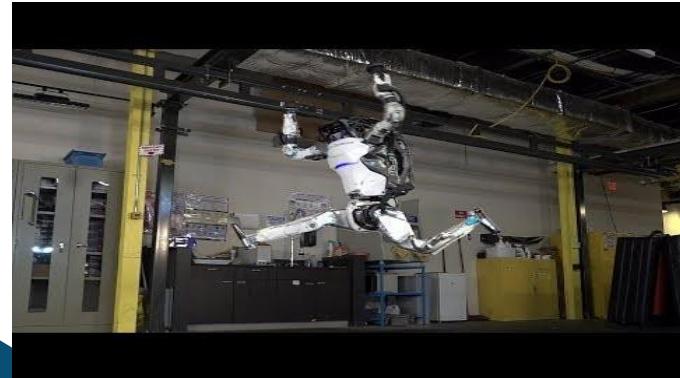


<https://youtu.be/ooqiY7hFWE8>



15 Mins Break

https://youtu.be/_sBBaNYex3E



Download the files and unzip:
<http://bit.ly/2RCLYEV>



Training an image classifier

Training an image classifier



Fruits Classifier

- 01 **Setup**
Create Clarifai account
- 02 **Prepare images**
Gather training and validation images from internet or other sources
- 03 **Train the classifier**
Allow the classifier to know what constitutes a given class.
- 04 **Evaluate the classifier**
Check for accuracy, recall and probability threshold.
- 05 **Test your model**
Use unseen data to test your classifier.
- 06 **Improve your classifier**
Use various techniques to improve your classifier.

Many Examples of how AI is applied



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

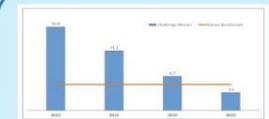


Cameras like Amazon DeepLens* or Google Clips* use object detection to determine when to take a photo.

Ride sharing



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.



AI in Fraud Detection





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





Risk Management

Traditionally: New regulations force tighter control on financial institutions.

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



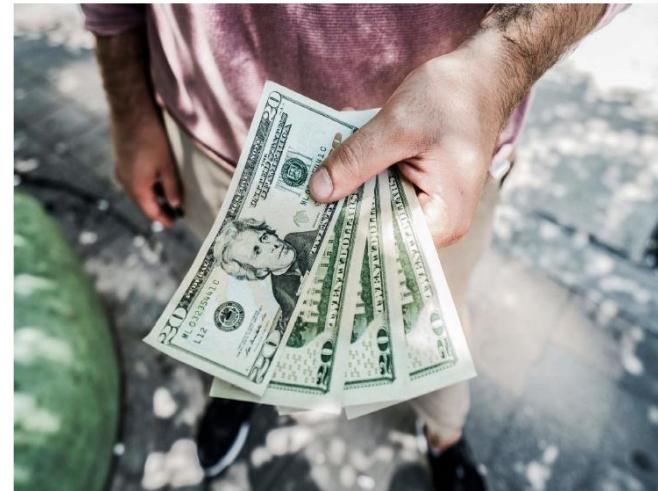
Now with AI: ML can help discern the credit worthiness of potential customers

- 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.





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.



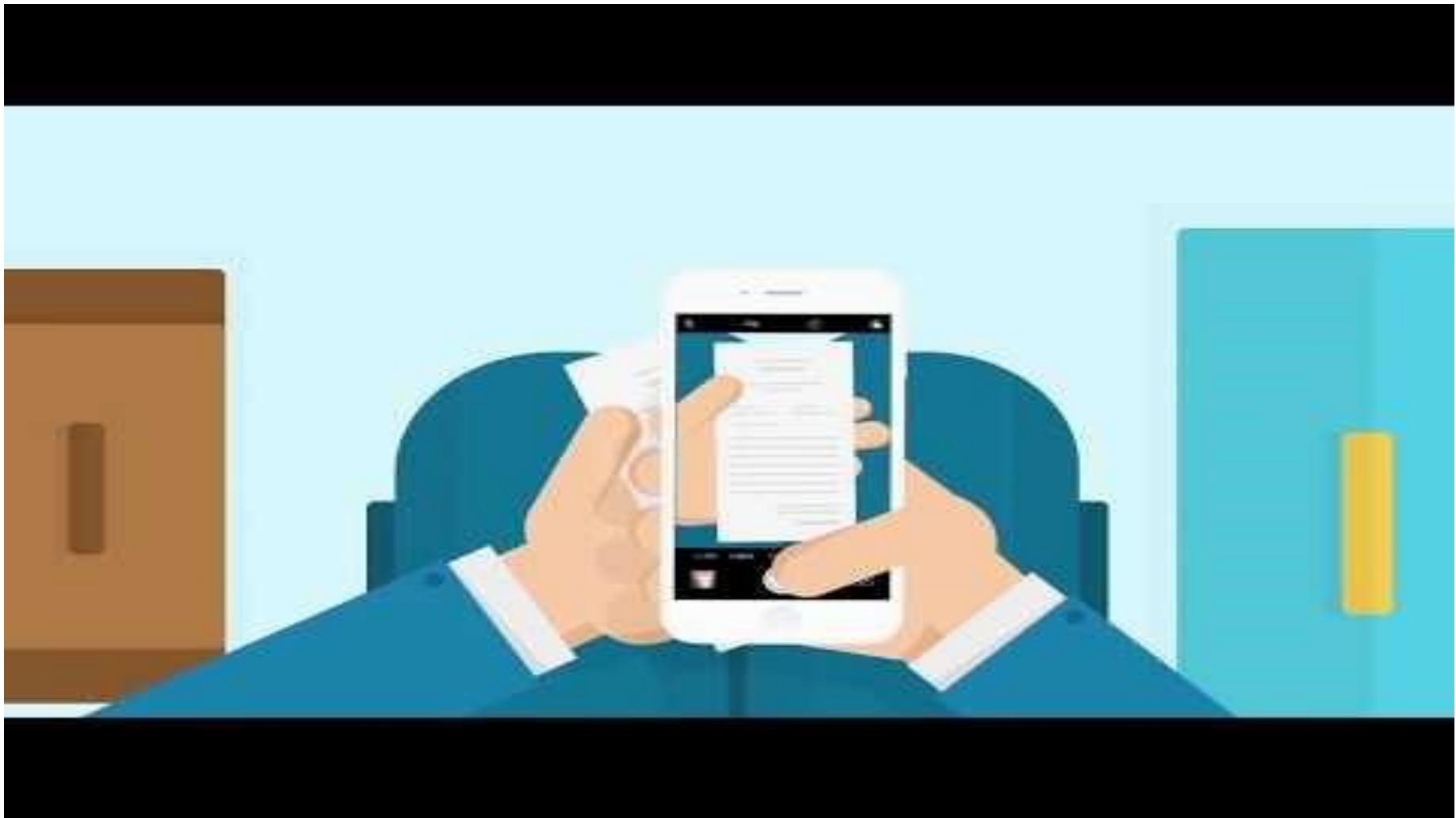
Example: Sentient Technologies, and Learning Evolutionary Algorithm Framework (LEAF*)

- 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.





AI in Travel





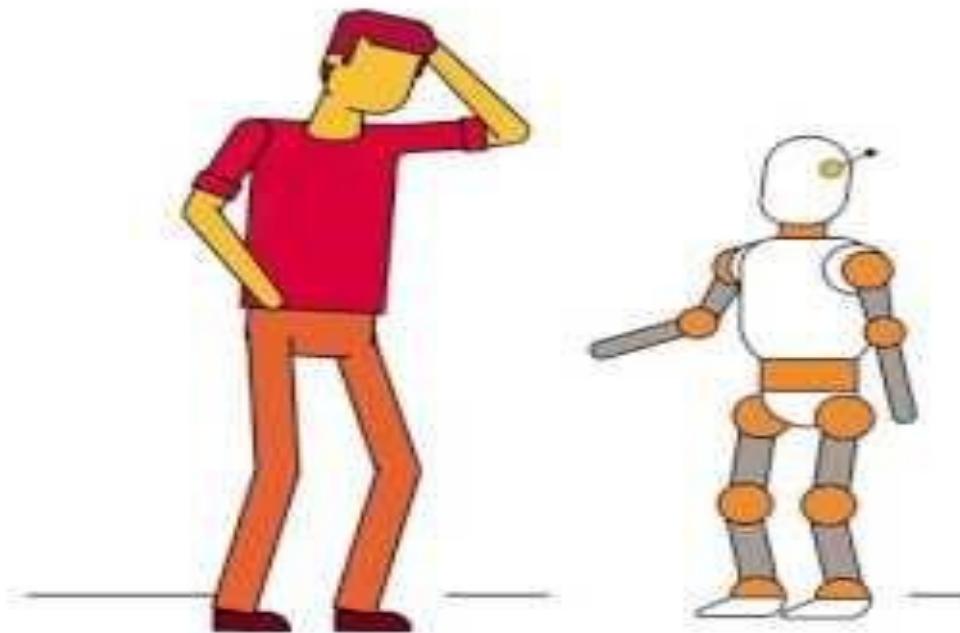
Travel

- 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





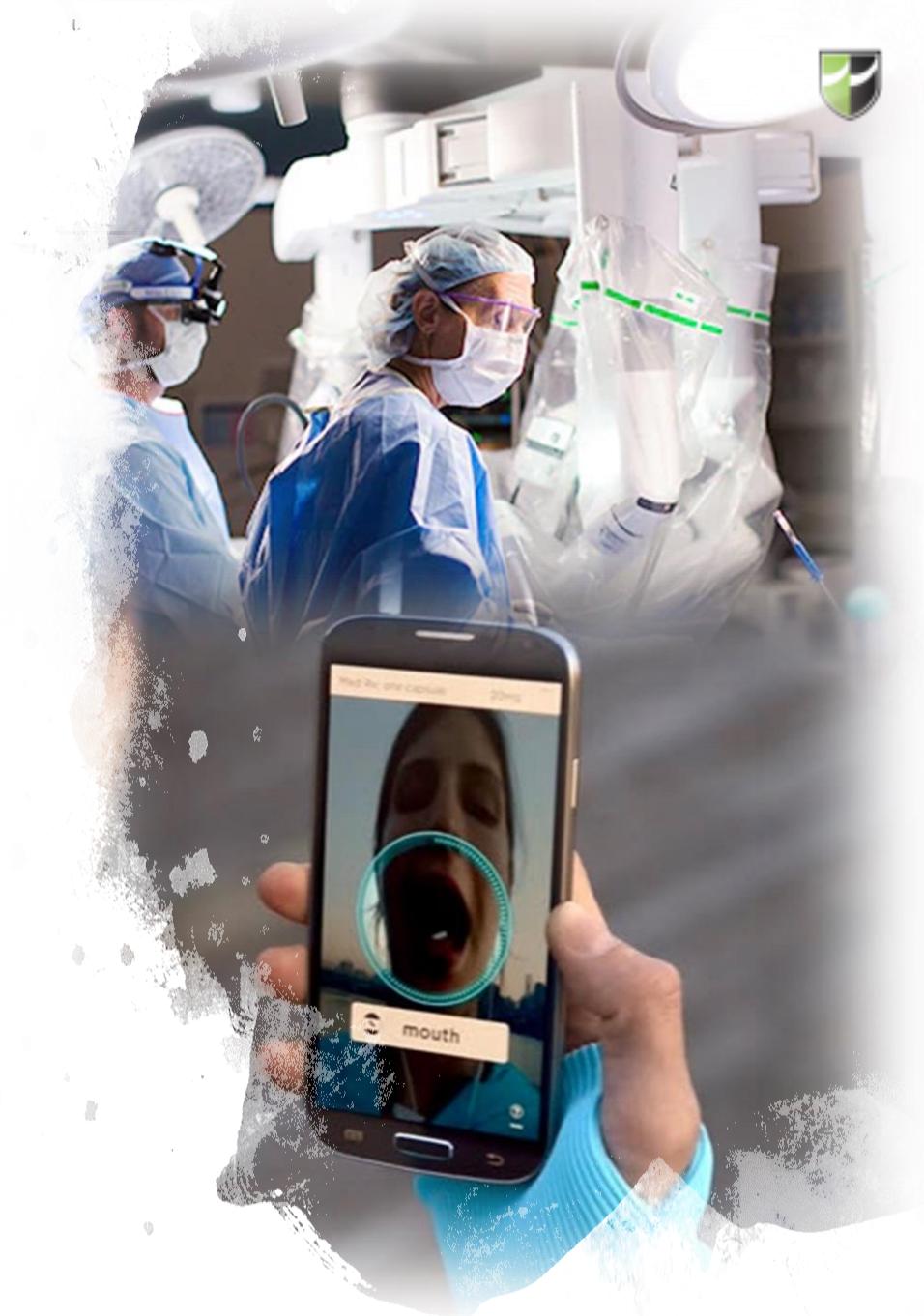
AI in Healthcare





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



Machine learning program analyzes patients' health remotely via mobile device, compares it to medical records, and recommends a fitness routine or warns of possible disease

Autonomous diagnostic devices using machine learning and other AI technologies can conduct simple medical tests without human assistance, relieving doctors and nurses of routine activities



AI-powered diagnostic tools identify diseases faster and with greater accuracy, using historical medical data and patient records

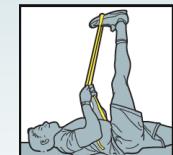
AI algorithms optimize hospital operations, staffing schedules, and inventory by using medical and environmental factors to forecast patient behavior and disease probabilities



AI tools analyze patients' medical histories and environmental factors to identify people at risk of an illness and steer them to preventive care programs



Personalized treatment plans designed by machine learning tools improve therapy efficiency by tailoring treatment to specific patients' needs and medical



AI insights from population health analyses give payers an opportunity to reduce hospitalization and treatment costs by encouraging care providers to manage patients' wellness



Virtual agents in the form of interactive kiosks register patients and refer them to appropriate doctors, improving their experience and reducing waiting time





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)



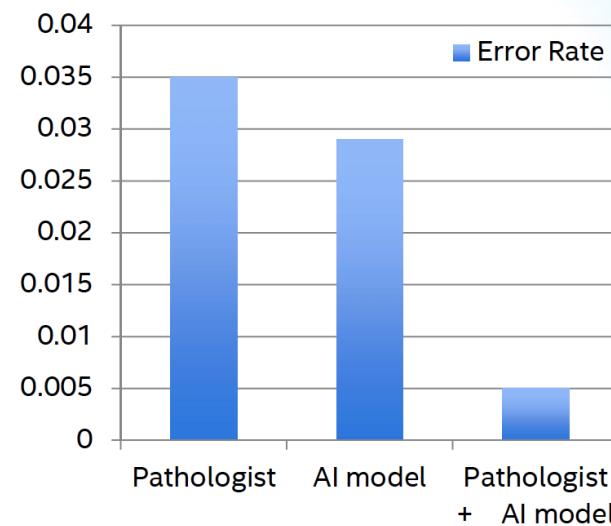
Now with AI : Doctors can provide diagnoses more efficiently and accurately, with the availability of:

- 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

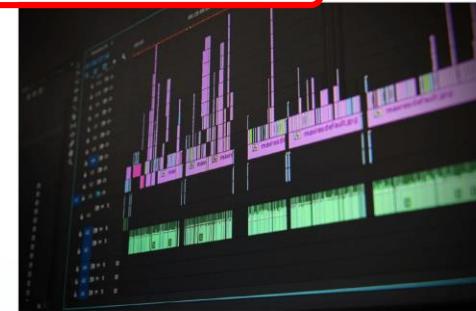
Traditionally : Doctors would diagnose a condition and recommend a treatment based on what historically worked for most people.

- 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.





Robot/AI Surgery



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.

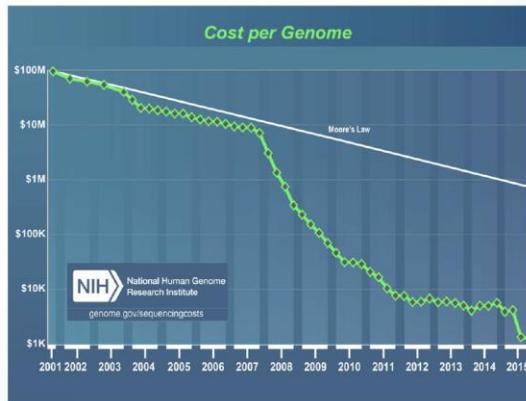




Healthcare – Genome Sequencing

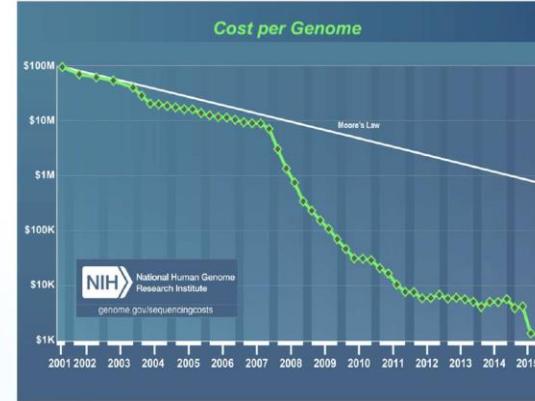
In 2001: Full human sequencing cost \$100 million.

- 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





AI in Transport



**Chinese
jumbo
drone
flies
humans**



Autonomous Car

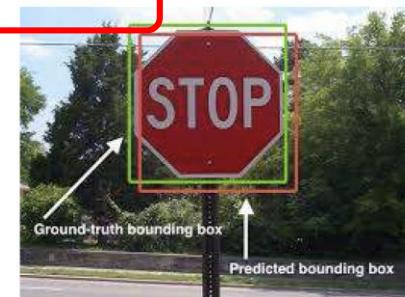
Traditionally: Despite having safer cars, the number of deadly car accidents have been on the rise the last few years.

- 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



JUST WALK OUT
TECHNOLOGY



AI in Retail

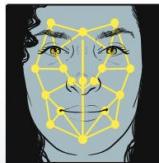
INTRODUCING
amazon go



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



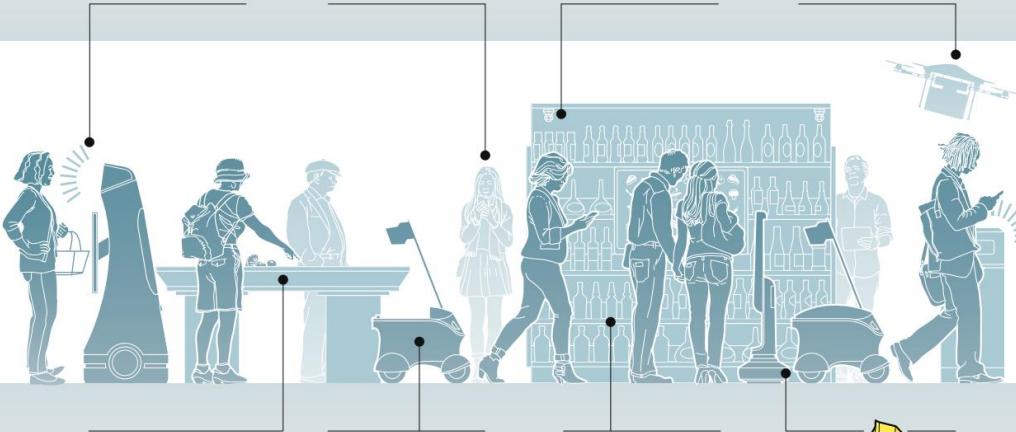
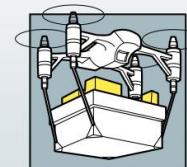
Facial recognition software, machine learning, and natural language enable virtual agents to greet you personally, anticipate orders, and provide directions

Machine learning personalizes promotions to match shoppers' profiles; in-store beacons send offers to their smartphones as they browse through the store

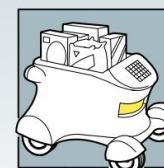


Computer vision with deep learning identifies articles bagged by shoppers; adding data from sensors, AI allows non-stop checkout and automatic payment

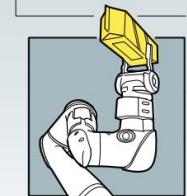
Autonomous drones using deep learning technology complete last-mile delivery, and are able to handle obstacles or absent recipients



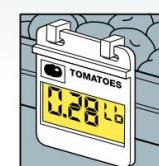
Interactive screens and tabletops enabled with computer vision and deep learning can identify articles and recommend complementary products and uses that fit shoppers' lifestyle profile



Stores update and optimize prices in real time, with machine learning leveraging data on competitors' prices, weather, and inventory levels to maximize revenues



An autonomous shopping cart follows you in the store, and can find its way to your vehicle or to a robot or drone for home delivery



AI-enhanced robots continuously track inventory, recognize empty shelves, and replenish them; other robots fill bags in the warehouse



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





AI in Customer Experience and Supply Chain





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





AI in F&B



<https://www.youtube.com/watch?v=CAJJbMs0tos>

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.



AI in Education





Agriculture Industry

- Agricultural Drones
- Autonomous Tractors
- Vertical Farms



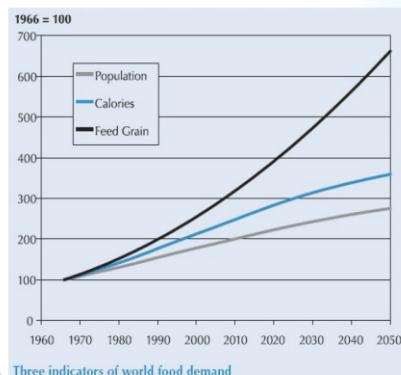




AgTech

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.



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.

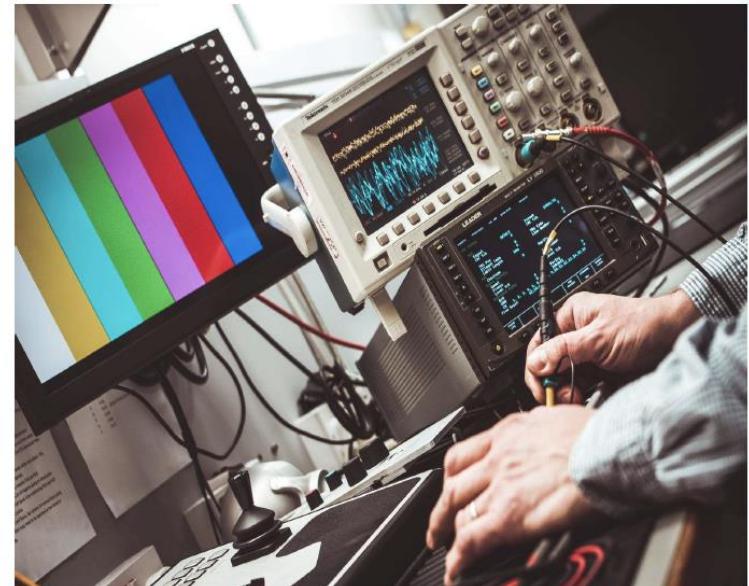




AI for Music Generation

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.

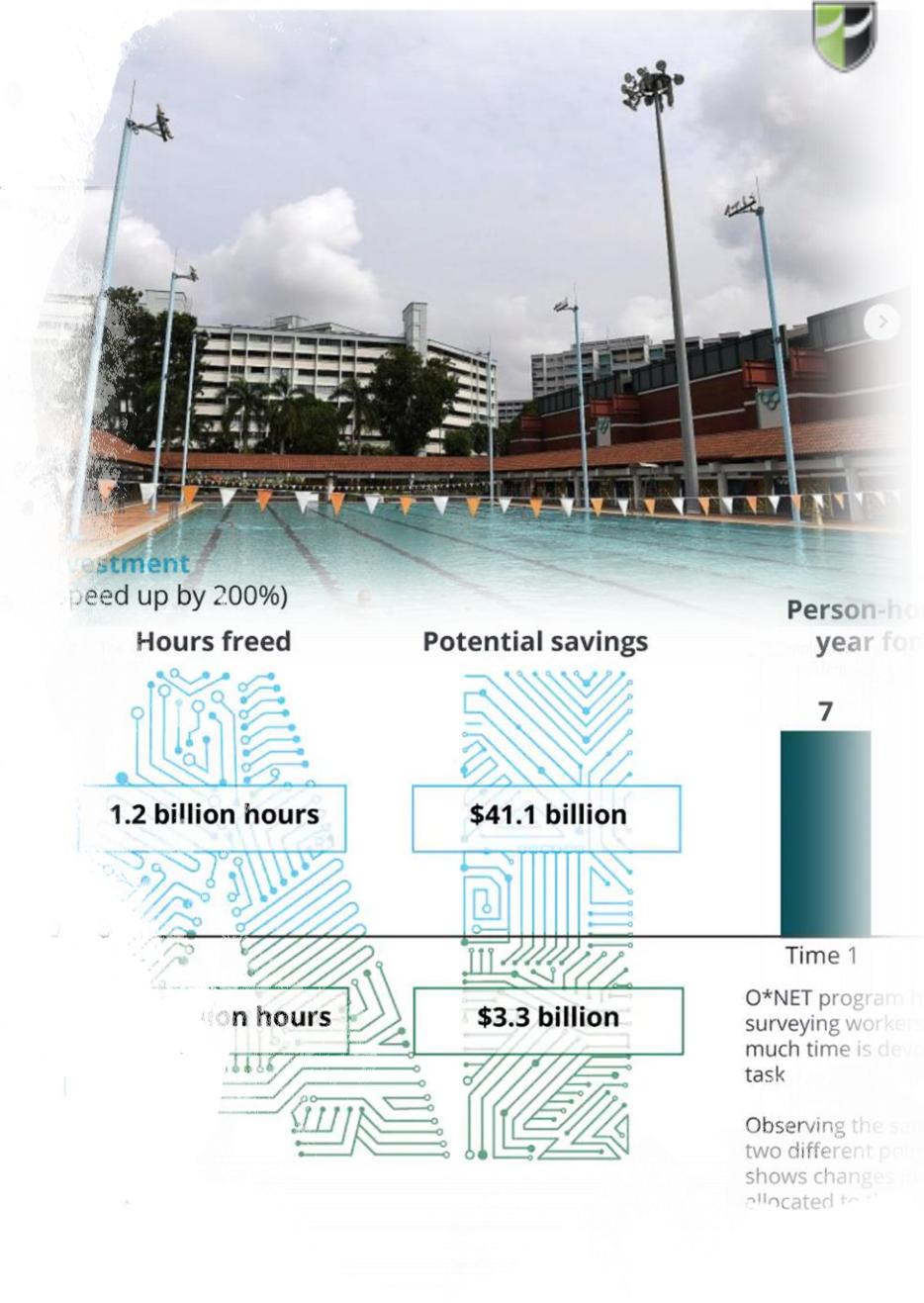


The instrumentation was composed with artificial intelligence, lyrics and vocal melodies written by Taryn. Let us know what you think in the comments!



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

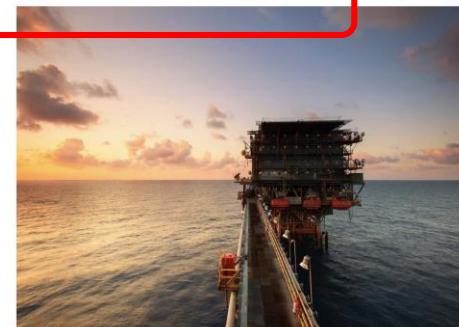
Traditionally: Shrinking oil reserves force companies to operate in remote and possibly hostile areas.

- 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.



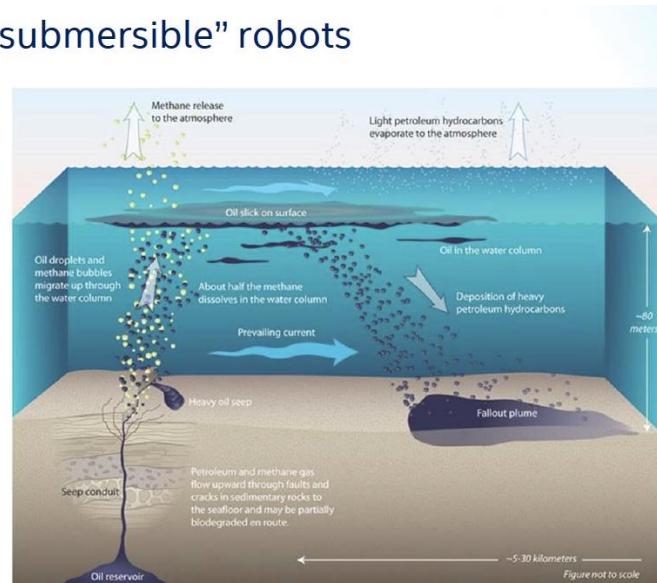
Now with AI: AI uses economic, political and weather data to forecast optimum production locations.

- 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.

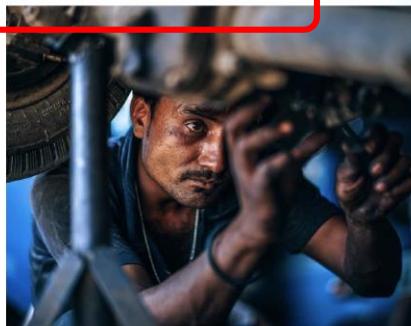




Preventive Maintenance

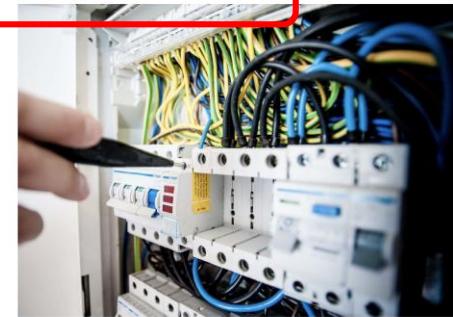
Traditionally: Relied on historical data to provide basis for preventative maintenance schedule.

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



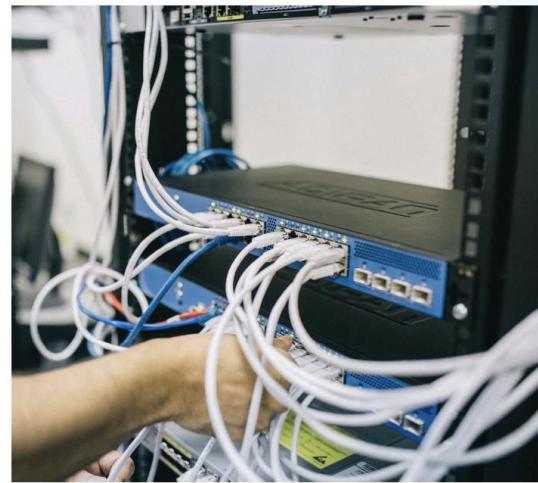
Now with AI: Internet of Things (IoT) sensors help to optimize maintenance scheduling.

- 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





AI in Fault Detection



**HOW AI
REVOLUTIONIZES
DEFECT DETECTION**



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.

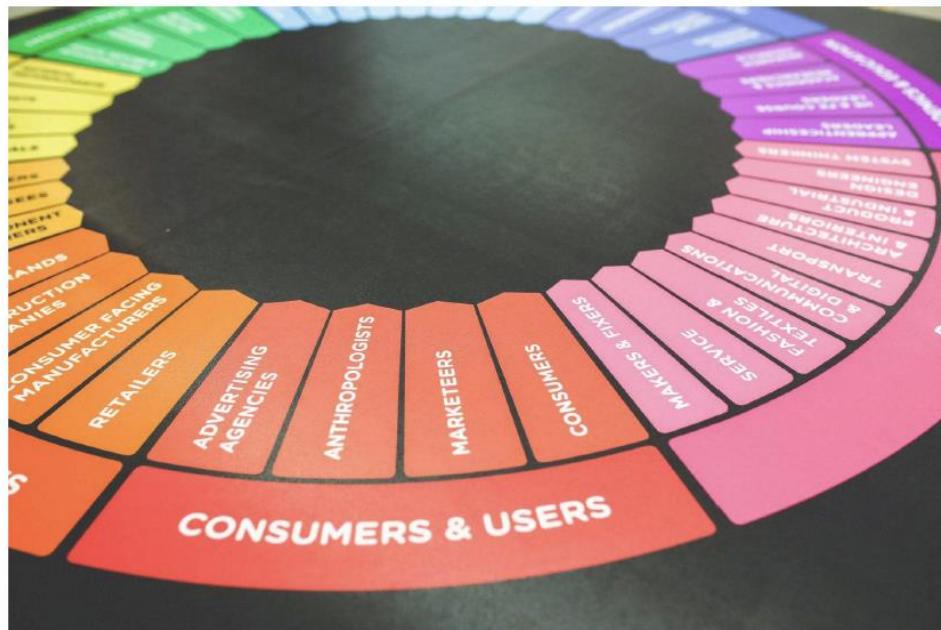




AI and Customer Service

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

AI Services



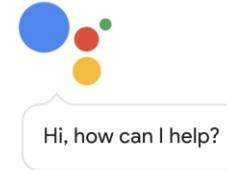
- Google Search
- Google Assistant ([hands on](#))
- Google Photo (image recognition)
- Speech Recognition

- 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/>



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.



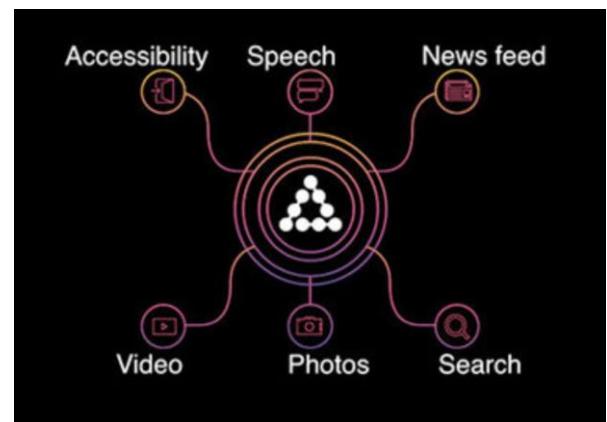
Vision Kit

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/>



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

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

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

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

LEARNING TOOLS

Get deep with machine learning

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.
- Load your own Amazon SageMaker and then train, test, and iterate on the track using the AWS DeepRacer 3D 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 »](#)





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 »](#)



Amazon Rekognition

Amazon Rekognition Video をご紹介します。



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/sg-en/products/cognos-analytics>
- 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)

The screenshot shows the IBM Watson Developer Cloud interface for the Tone Analyzer service. It includes a sidebar with resources like Documentation, API Reference, and Fork on GitHub, and a main panel for 'Tone Analyzer' with a description and sample use cases.

This screenshot displays a list of sample use cases for the Tone Analyzer, including tweets, online reviews, email messages, product reviews in French, and your own text. It also shows a preview of analyzed customer engagement data.

The screenshot shows the Visual Recognition service for insurance classification. It features a main image of a vehicle with graffiti and a list of custom classifier categories and their scores. Below the main image are smaller images of car parts, and a note about Belron's use of the service for vehicle glass repair.

Category	Score
vandalism	0.64
flat_tire	0.53
broken_windshield	0.11
motorcycle_accident	0.06



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

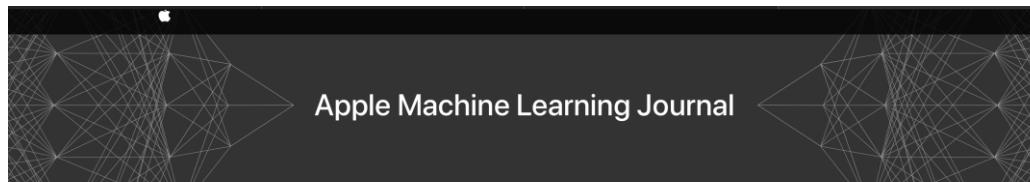
October 18, 2017

71,188 views | Dec 26, 2016, 07:05am

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.



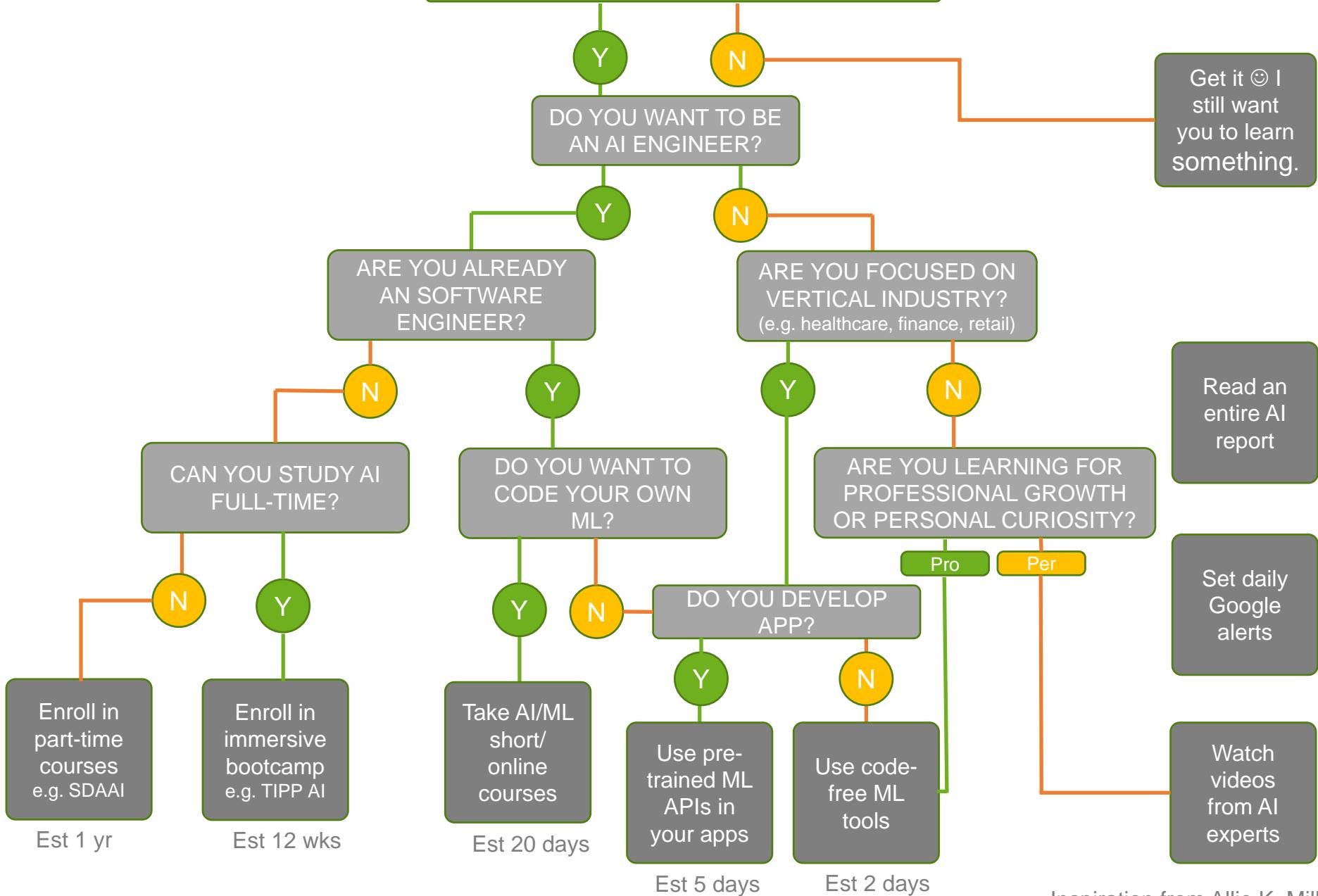
Function specific AI services

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/

So what's next after this lesson?



DO YOU WANT TO LEARN AI?





Where to go from here?

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

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

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

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

Udemy (freemium course)
<https://t.me/freecourse>

The screenshot shows the edX homepage. At the top, there is a navigation bar with links for "Courses", "Programs & Degrees", "Schools & Partners", and "edX for Business". A search bar and "Sign In / Register" buttons are also present. A large banner on the right features a woman looking at a tablet and the text "Accelerate your future. Learn anytime, anywhere." Below the banner is a search bar with the placeholder "What do you want to learn?". At the bottom, there is a promotional banner for "CYBER MONDAY" with the text "THE COUNTDOWN IS ON! Get 15% off your purchase." and a "Start Exploring" button. Logos for MIT, Harvard, Berkeley, and other partner universities are visible.



\$5000 ELP SIGN-ON INCENTIVE



**Specialist Diploma in
APPLIED ARTIFICIAL INTELLIGENCE**

ARTIFICIAL Intelligence (AI) is a frontier technology that has been identified in Singapore's Industry Transformation Map (ITM) as an enabler of growth and jobs in Singapore. To achieve this objective, manpower skilled with AI knowledge and abilities is required to contribute and develop the AI ecosystem in Singapore.

The Specialist Diploma in Applied Artificial Intelligence (SDAAI) at Republic Polytechnic will equip participants with the requisite concepts and theories that underpin AI and to develop in participants, the fundamental practical skills and knowledge for developing AI solutions. Participants will undertake practical hands-on case studies and projects in clearly identified areas in which AI is applied today, namely the application of recommender systems, virtual assistants and pattern recognition and anomaly detection.

REGISTER NOW
<http://bit.ly/2lArFXw>

COMMENCEMENT DATE:
OCT 2018

SkillsFuture Earn and Learn Programme (ELP) information:
<http://bit.ly/2lArFXw>

SOI SINGAPORE
For more info:
Email: ACE-help@rp.edu.sg
Tel: 6510 3000

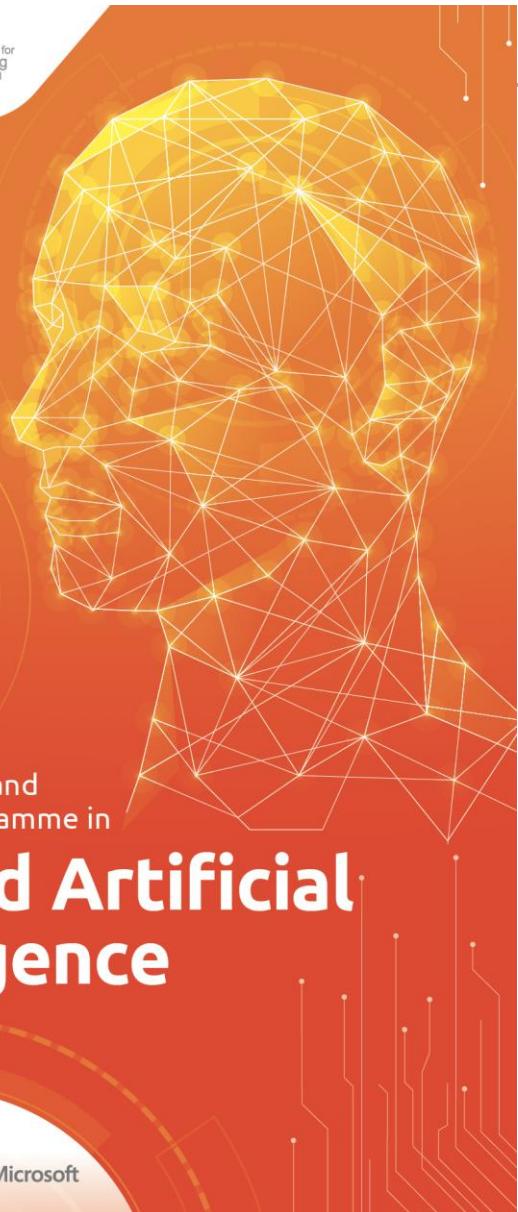
<h2>Specialist Diploma in Applied Artificial Intelligence</h2> <p>Total Hours = 270 hours Time to Complete = 12 months</p>	
PDC in Fundamentals of Artificial Intelligence (120 hours)	PDC in Applications of Artificial Intelligence (150 hours)
Math for Machine Learning (30 hours)	Pattern Recognition and Anomaly Detection (30 hours)
Introduction to Programming (30 hours)	Recommender Systems (30 hours)
Introduction to Data Management for Machine Learning (30 hours)	Virtual Assistants (30 hours)
Machine Learning Fundamentals (30 hours)	Capstone Project* (60 hours)



Tech Immersion and Placement Programme in

Applied Artificial Intelligence

In Collaboration With



Programme Overview



THIS programme is designed to equip participants with practical, industry-relevant skills and knowledge to undertake the role of an AI Application Developer or System Integrator or as an AI or Machine Learning Engineer.

It is structured as a 3-month / 12-week programme where participants complete 10 modules. The first 9 modules will be conducted during an 8-week facilitation and e-learning training phase before leading up to the final 4-week Industry Capstone Project.

Participants who successfully complete the programme will be awarded a Professional Certificate of Completion in Applied Artificial Intelligence from Republic Polytechnic (in collaboration with AI Singapore and Microsoft).

Programme Structure

8 WEEKS TRAINING:

- 1 Foundations to Artificial Intelligence
- 2 Python for Data Science
- 3 Mathematics for Machine Learning
- 4 Ethics and Law in Data and Analytics
- 5 Research Methods for Data Science
- 6 Machine Learning Fundamentals
- 7 Deep Learning Fundamentals
- 8 Reinforcement Learning Fundamentals
- 9 Applied AI Solutions Development

4 WEEKS PROJECT:

- 10 Applied AI Industry Capstone Project

Key Features

- Collaborative programme between Republic Polytechnic, AI Singapore and Microsoft Singapore
- Industry-relevant programme outcomes based on the Skills Framework for Infocomm Technology (ICT) professionals for AI
- Practical and innovative pedagogy that infuses classroom learning with real-world applications
- Real-world and industry-sourced Capstone Projects
- Guest talks and seminars from industry experts and practitioners
- Bundled Microsoft's Professional Program in Artificial Intelligence certification vouchers
- Jobs placement opportunities and facilitation upon completion of programme
- Subsidy support under IMDA's Tech Immersion and Placement Programme (TIPP)

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

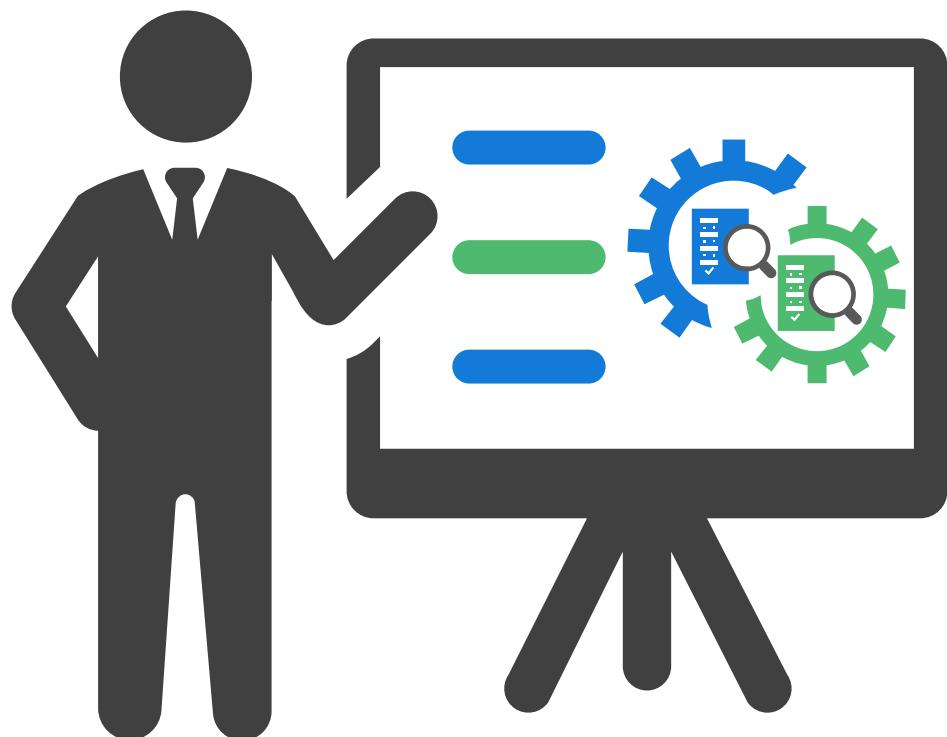
+ Artificial Intelligence for Everyone - A Practical Experience (1 day Beginner)

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

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



Summary



Email
Zack_toh@rp.edu.sg

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

Source code:

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Survey Time!

Please help to complete the survey before you leave the session. ^_^
(TRAQOM)



Thank you