

Digitalisation for Everyone!



INTRODUCING
amazon go



What Does the Consumer of Tomorrow Want?



*FairPrice*ON

fairpriceon.com.sg 

To

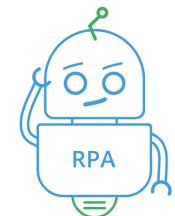
*FairPrice*GO

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As a Company, What Are the Benefits?



What Technology is Used and How Does The Technology Work?



How Does it Affect
ME ?!



Digitalisation – An Introduction	9.00 – 9.30 am (30 mins)
Robotic Process Automation	9.30 – 10.30 am (1 hour)
Tea Break	10.30 – 10.50 am (20 mins)
Analytics and Visualisation	10.50 – 12.20 pm (1.5 hour)
Review / Reflection	12.20 – 12.30 pm (10 mins)
Lunch	12.30 – 13.30 pm (1 hour)
AI / Machine Learning	13.30 – 15.30 pm (2 hour)
Tea Break	15.30 – 15.50 pm (20 mins)
Cloud-Based Solutions / Services - Cloud-based AI Service	15.50 – 16.30 pm (40 mins)
Review / Reflection and What Next	16.30 – 17.00 pm (30 min)

THE FUTURE IS IN YOUR HANDS WITH

RPA

ROBOTIC PROCESS AUTOMATION



Digitalization for
Everyone



Agenda

What is RPA?

Why RPA?

What can RPA do?

How does RPA work?

RPA application areas

Select the right process

RPA project demo

RPA + AI



What Is RPA?

RPA stands for Robotic Process Automation

RPA replicates the actions formed by a user in the user interface of an application

Robots interact with software

Virtual robotic workforces





Why RPA?

- **Singapore office workers least productive among 11 countries polled**
- “*2 months* out of a year is spent doing administrative and repetitive tasks”





Potential Benefits

Accuracy

The right result, decision, or calculation the first time

Consistency

Routine task are performed the same way each and every time

Productivity

Complete work faster and at a lower rate

Improve Employee Morale

Free up human resources for higher value tasks

Scalability

Able to instantly ramp up and down to handle process' peaks and troughs

Low Technical Barrier

Possible for non-IT worker to maintain and/or configure the bot

Customer Experience

Customising communication and faster response

New Value Creation

Through new capabilities developed

Source: Govtech for WoG RPA Playbook Draft

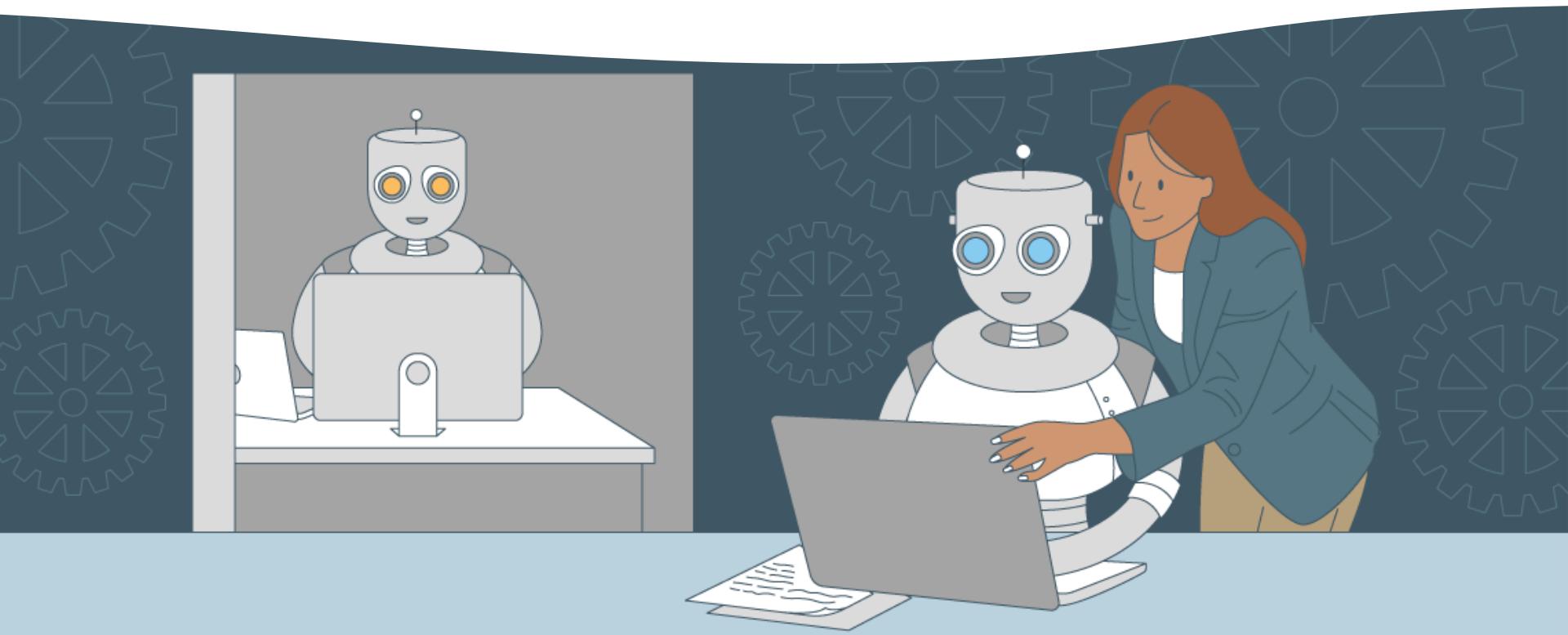


What Can RPA Do?

<p>Log into any application</p>	<p>Connect to system APIs</p>	<p>Copy and paste data</p>
<p>Move files and folders</p>	<p>Extract and process structured and semistructured content from documents, PDFs, emails and forms</p>	<p>Read and write to databases</p>
<p>Open emails and attachments</p>	<p>Scrape data from the web</p>	<p>Make calculations</p>

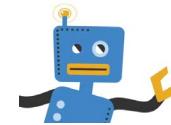


Attended vs Unattended





How Does RPA Work?





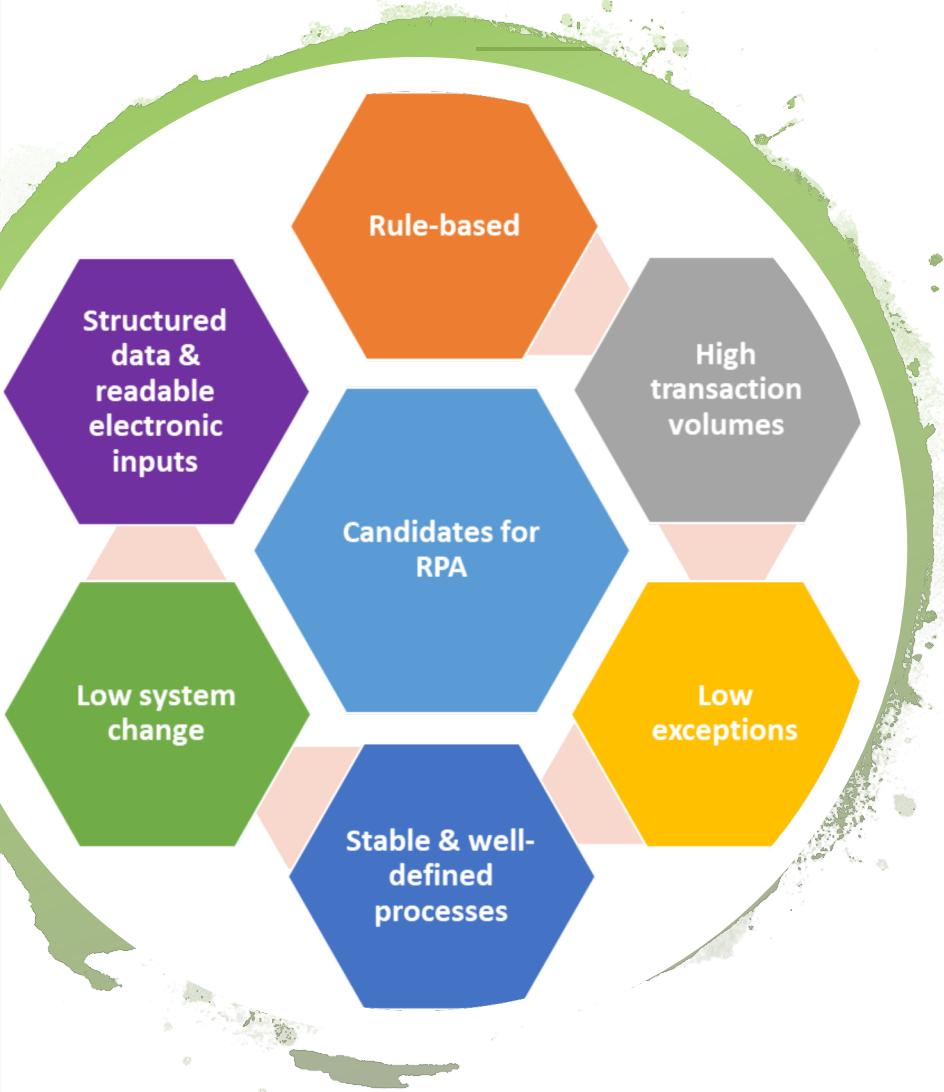
RPA Application Areas

- RPA has already been implemented in some business areas to perform repetitive and time-consuming tasks.

<p>HR Services</p>  <p>Example processes:</p> <ul style="list-style-type: none">• Recruitment• Payroll• Personnel Administration	<p>Finance and Accounting</p>  <p>Example processes:</p> <ul style="list-style-type: none">• Procurement to Pay• Order to Cash• Vendor Management	<p>IT Services</p>  <p>Example processes:</p> <ul style="list-style-type: none">• Password reset• Account unlock• Chatbot integration	<p>Supply Chain</p>  <p>Example processes:</p> <ul style="list-style-type: none">• Inventory Management• Invoice / Contract Management• Work Order Management
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Select The Right Process



“Good or Bad” Process for RPA Automation?



- **IG Management – E-Form A Submission**
 - Collation of receipts from IG.
 - Scan the receipts and tag the number
 - Fill up the receipt details and IG details in the E-Form A.
 - Email the E-Form A to the club Advisor for Endorsement.
 - Number of case per month is 25, avg handling time is 30 mins.

**Bad, not readable input (scanned image,
could be hand-written), not standard
input (various receipt format)**

“Good or Bad” Process for RPA Automation?



- **Sales Order Processing**

- Download the attached Sales Order (readable PDF) from emails.
- Extract data from sales order file such as customer info, order info and details.
- Enter data on the web-based Sales Order Management System.
- Create new order record
- Create customer record for new customer
- Fill in order details until it reach the end of data.
- Number of case per month is 1000, avg handling time is 15 mins.

**Good, rule-based, high-volume, standard
and readable e-input, low exception rate.**

“Good or Bad” Process for RPA Automation?



- **Advanced planning for shift-based workers (HR)**
 - Evaluate the demand for next month.
 - Determine the resources by location, shift duration & availability.
 - Identify factors that might impact employee availability. For example, 3-day weekend.
 - Regulation and policies that might affect the resource availability.
 - Other factors such as seniority, overtime status, location and certifications that can trigger special rules.

Bad, not rule-base, require human judgement, too complex, volume is low as an monthly activity.

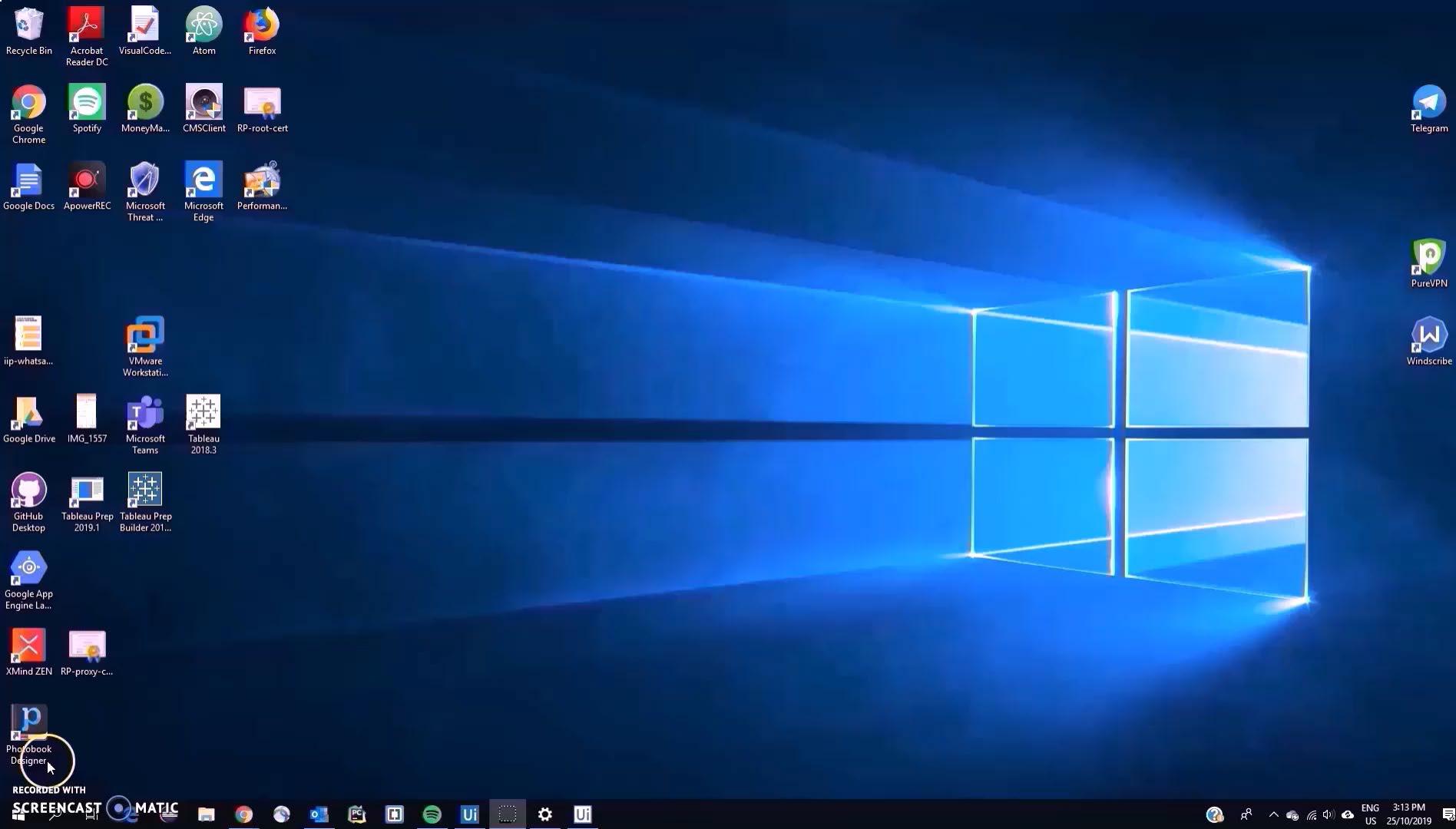


Top RPA Tools

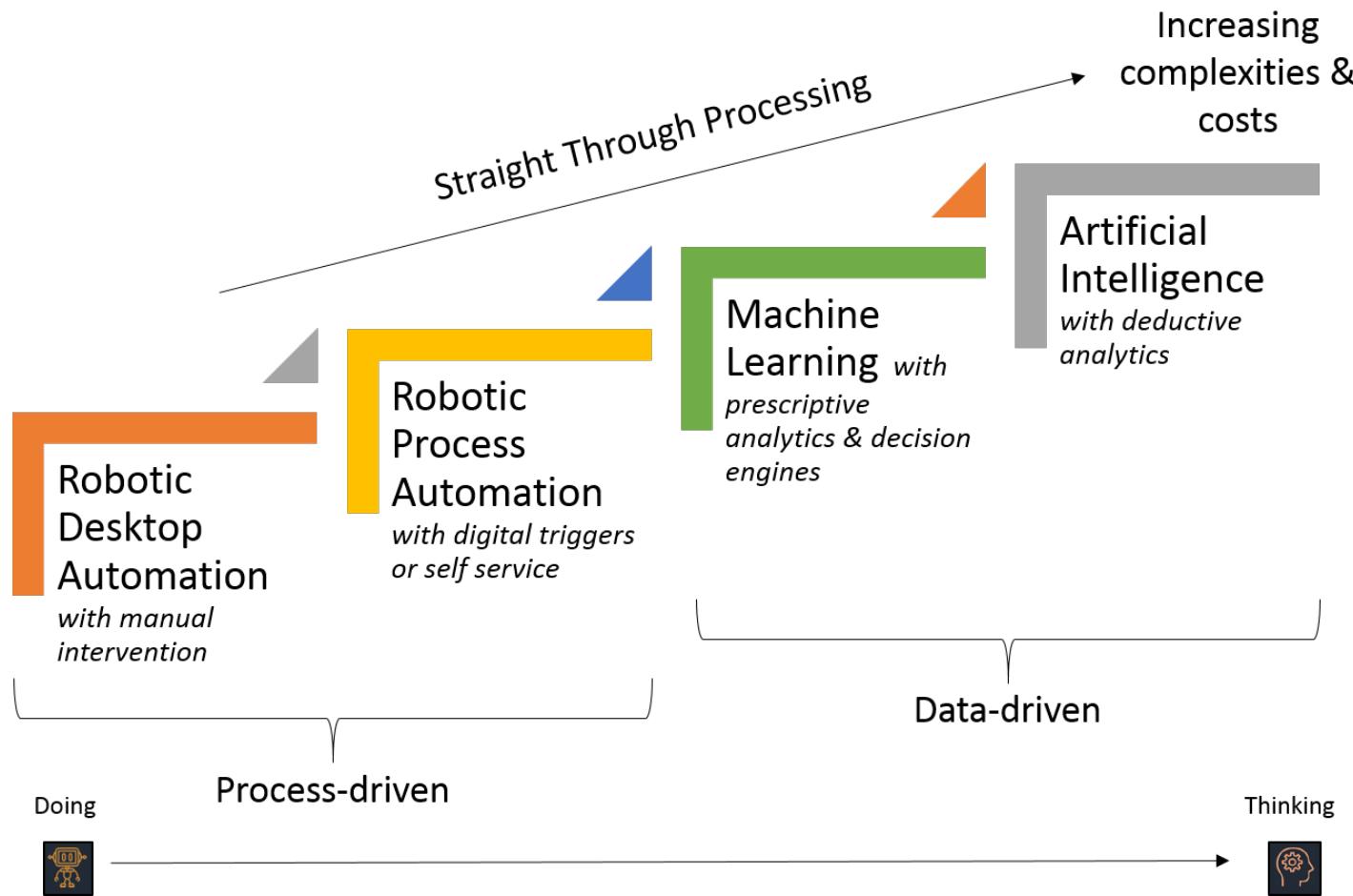




Demo: Sales Order Entry Robot

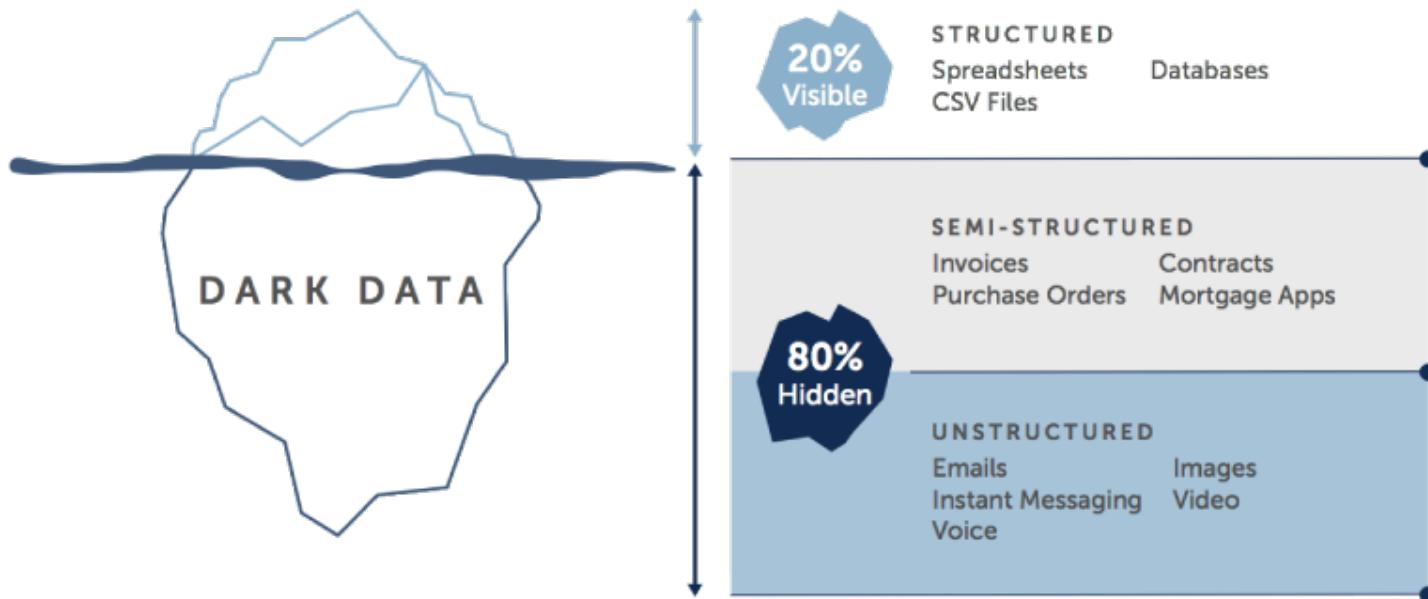


RPA and AI: The Brawn and Brains





Intelligent Document Processing





IQ Bot



Thank you

Overview of Data Analytics

Making sense of data for insights and to facilitate decision making

17 Nov 2020



That is me.... *your trainer*

Vincent Ong

Senior Lecturer
School of Infocomm,
Republic Polytechnic

Vincent_ong_sit@rp.edu.sg



Focus Areas

- Data Science
- Software Development
- IT Education

Experience/Education

- 30 years in IT industry and IT Education
- MNetComp, MBS, BSc (Hons)



What you will learn?

- Why the growth of Data Analytics (DA)
- What are the different levels of Data Analytics
- Importance of data and its type
- A industry methodology for DA projects
- Some examples of Data Analytics techniques

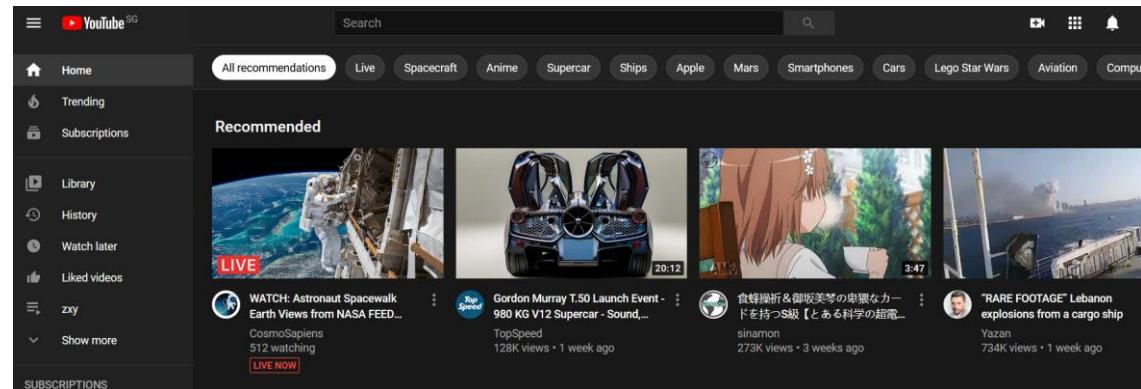
Some real life examples



YouTube videos recommendation

- On the user's home page, you will normally see a list of recommended videos which YouTube thinks that you maybe interested in.
 - ✓ YouTube analyze what you've been watching and searching for recently. It tracks the content topics you viewed and searched. It then use this knowledge to recommend you videos of same or related topics which you might be interested.
 - ✓ YouTube collects tons of users' data and **leverage on data analytics** to gain insights of users' behavior and use these insights to make decisions

**So you are not alone
When you are watching
alone !**

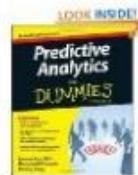




Amazon's recommendation engine

- Amazon.com tracks all your buying history, your browsing history, and the buying patterns of people who bought the items you are browsing and come up with some pretty good recommendations to push more products to you.

Customers Who Bought This Item Also Bought



Predictive Analytics For
Dummies
› Anasse Barri
★★★★★ 29
Paperback
\$17.72



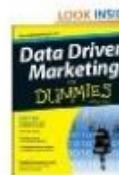
Predictive Analytics: The
Power to Predict Who...
› Eric Siegel
★★★★★ 229
#1 Best Seller in
Econometrics
Hardcover
\$16.88



Quantifying the User
Experience: Practical...
› Jeff Sauro
★★★★★ 8
Paperback
\$40.63



Marketing Analytics:
Strategic Models and...
› Stephan Sorger
★★★★★ 29
Paperback
\$50.52



Data Driven Marketing For
Dummies
› David Semmelroth
Paperback
\$20.49

Power of data analytics !



Of Beer and Diapers...

The story goes like this...

- Many years ago, Walmart noticed that on Fridays, men would head to the store, pick up some diapers for their babies and grab a six-pack of beer at the same time.
- To take advantage of this, Walmart placed the diaper and beer aisles adjacent to each other, resulting in skyrocketing sales for both items.





The rise of Big Data

- Today, there is a rapidly growing capacity to collect, store and analyze massive amounts of data, far more than an individual mind could process on its own. This enormous volume of information has been called Big Data.
- Every day, 2.5 quintillion bytes of data are created, with 90 percent of the world's data created in the past two years alone.
- Data production is 44 times greater in 2020 than in 2009.
- The volume of business data worldwide is expected to double every 1.2 years.
- Wal-Mart processes one million customer transactions per hour, stored in databases estimated to contain more than 2.5 petabytes of data.

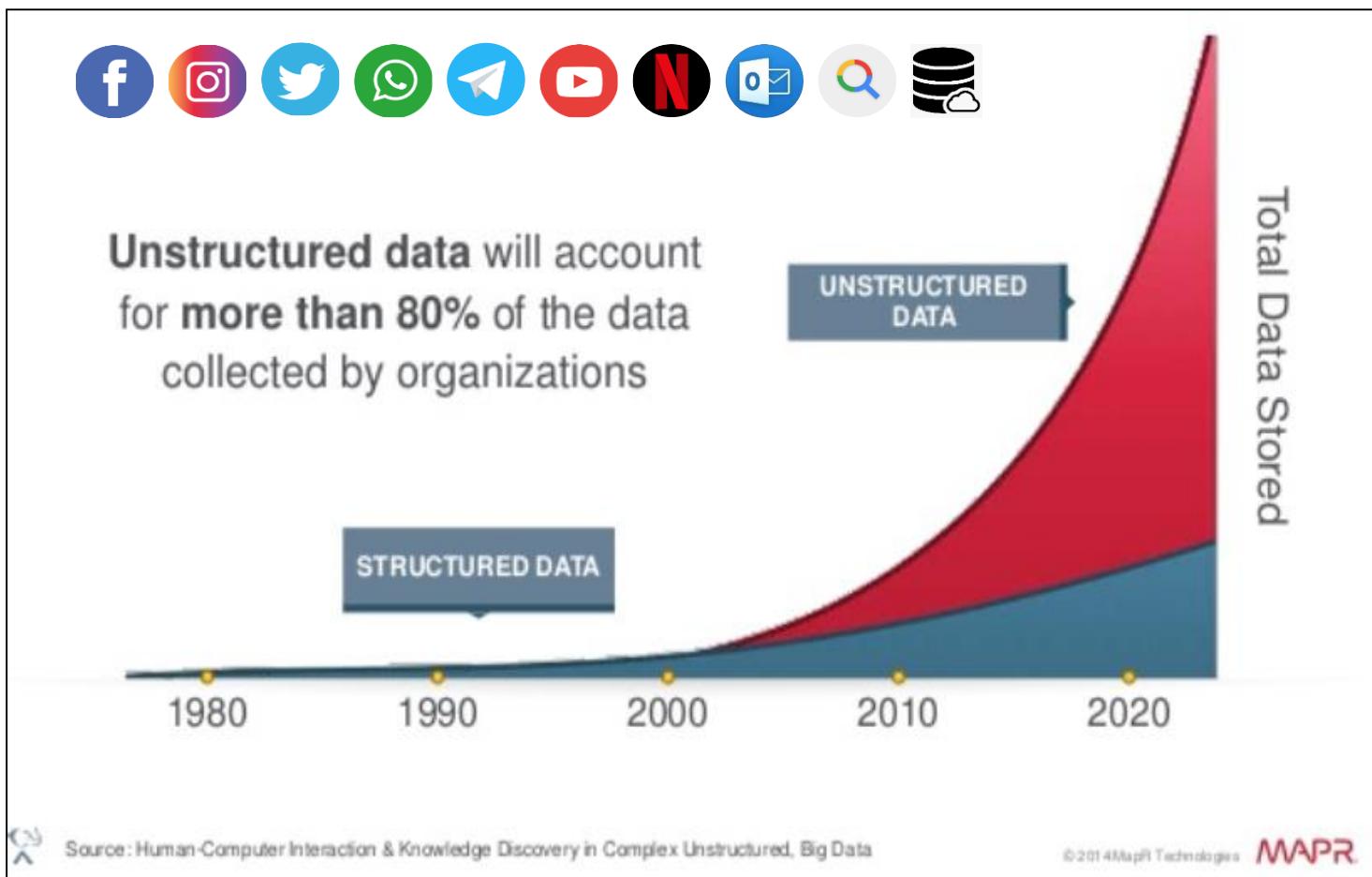
“The amount of data generated in two days is as much as all data generated in human history before 2003.”

~ Google CEO Eric Schmidt at a 2010 Techonomy conference

Why Data Analytics now?



Unprecedented Growth of digital data



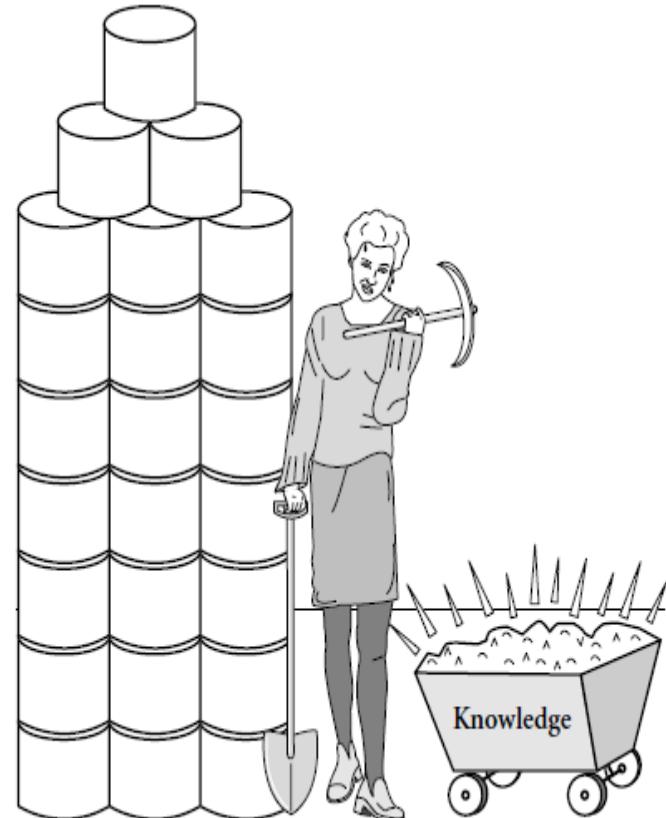
The huge data ecosystem provides great opportunity for data mining



Increased interest in Data Mining

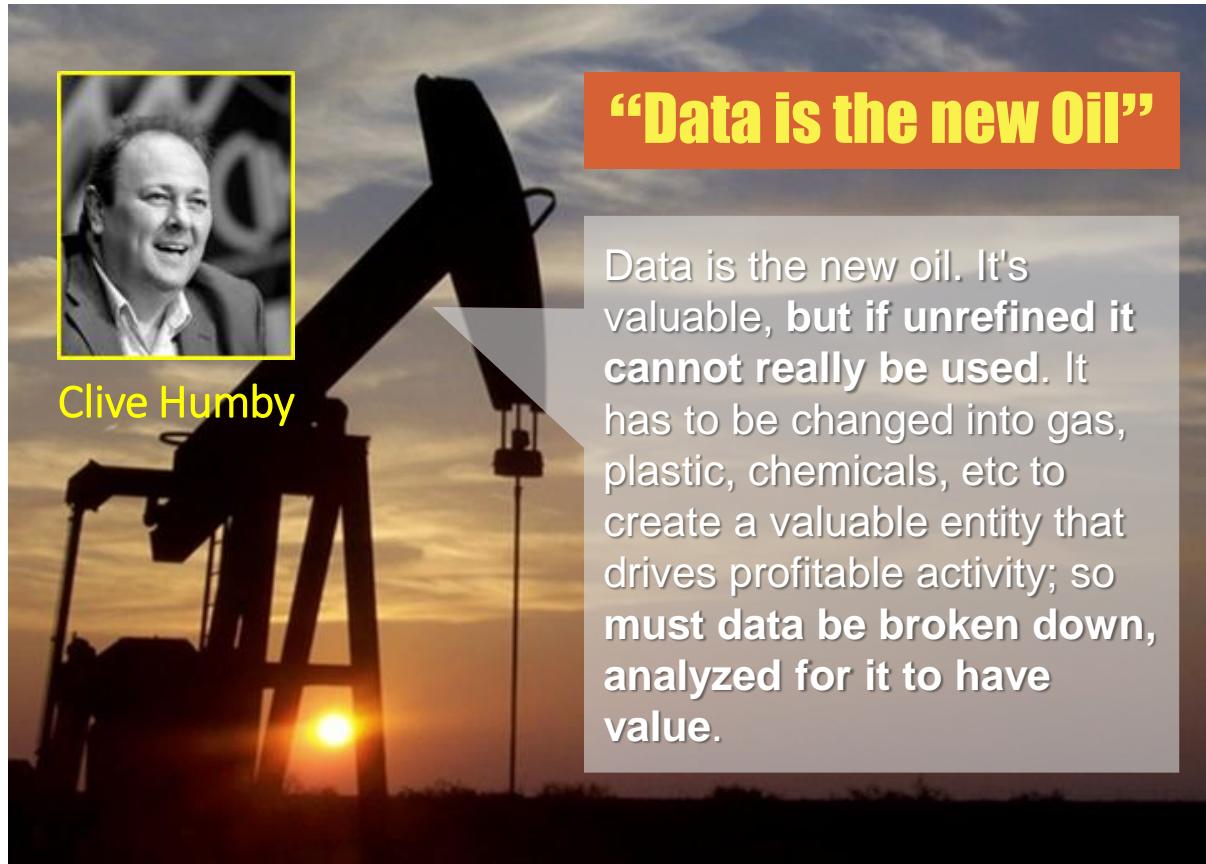
Data Mining refers to the **extraction** or “mining” of knowledge from large amount of data.

The knowledge comes from the **discovery of patterns** in these data which are useful for decision making and predicting the future





Data is the new Oil



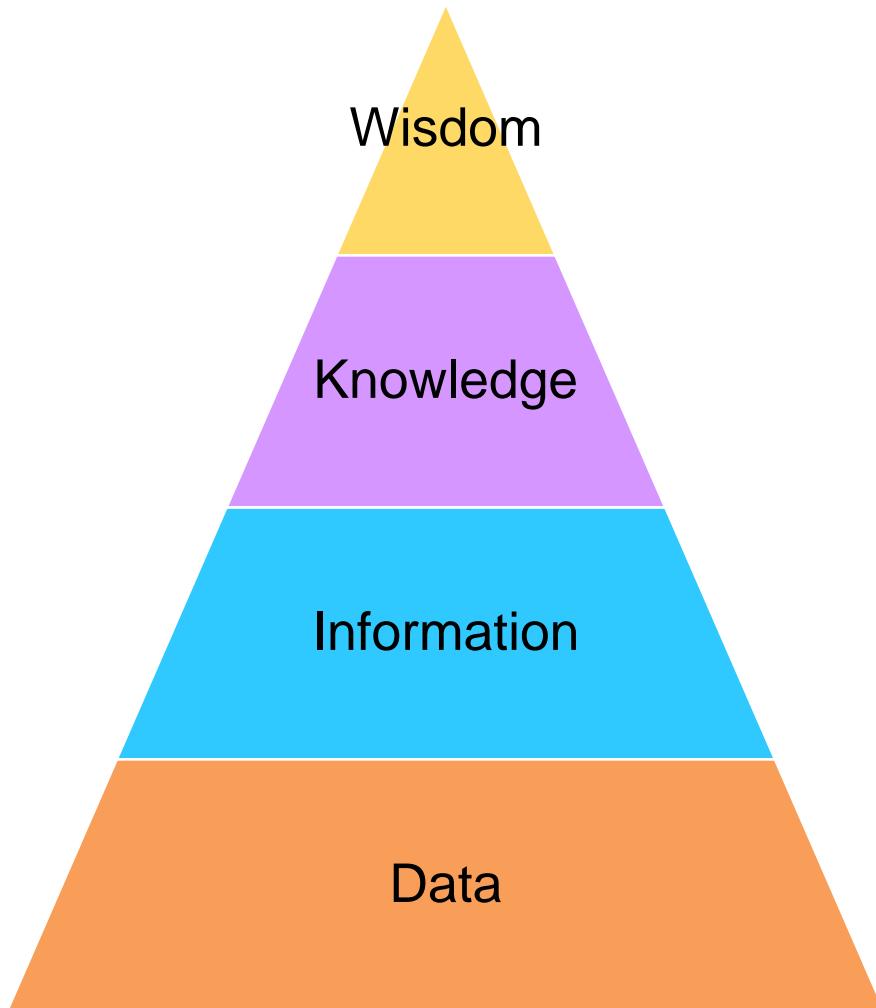
- Coined in 2006 by British Mathematician, Clive Humby.
- This now famous phrase was embraced by the World Economic Forum in a 2011 report



How is knowledge extracted from raw data (oil)?



The DIKW Hierarchy



- **Wisdom:**
 - Application of knowledge that can be carried out for decision making.
- **Knowledge:**
 - Relate one information to another information to reveal patterns and relationships of different pieces of information.
- **Information:**
 - Data that is defined, organized, categorized and presented that gives meaning to users.
- **Data:**
 - Raw numbers or texts which are collected.



The DIKW Hierarchy- Example 1

- **Data**

4 8 ; 1 2 ; 8 16 ; 16 32; 2 4 ;

- **Information**

X	1	2	4	8	16
Y	2	4	8	16	32

- **Knowledge**

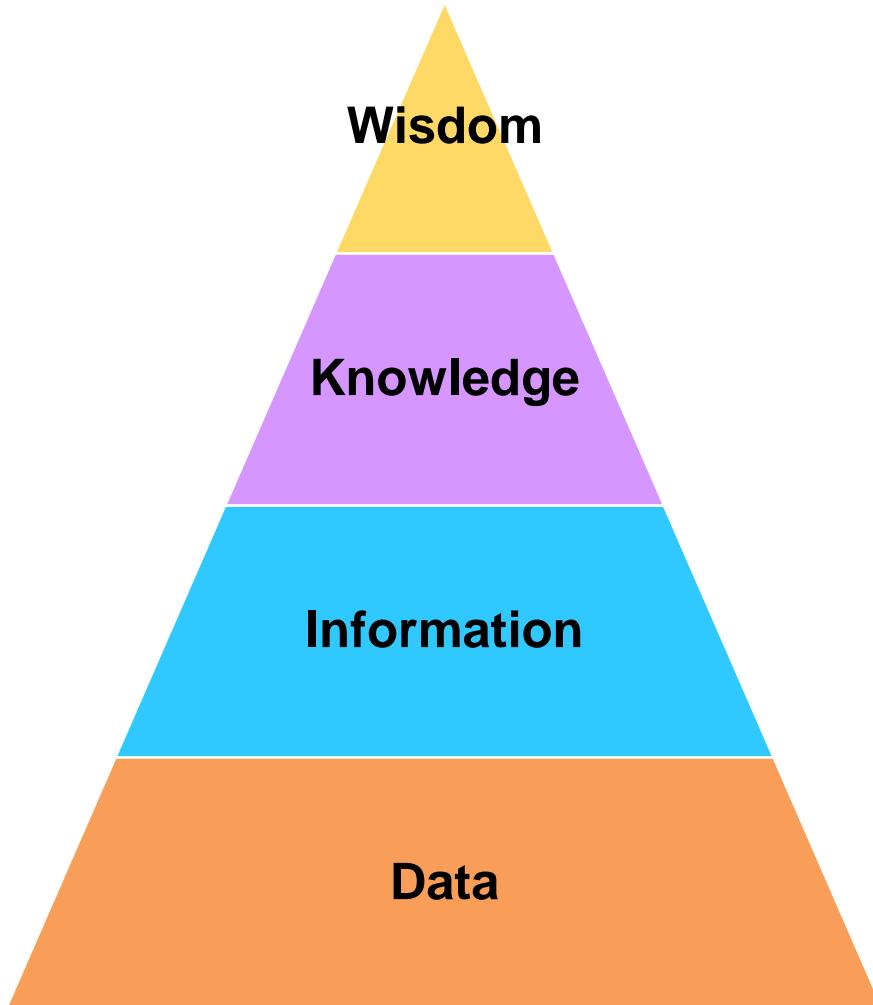
"Y = 2X"

- **Wisdom**

"If X=30, Y must be 60" ← application of knowledge



The DIKW Hierarchy- Example 2 (HR recruitment)



- **Wisdom:** To manage and increase the production capacity of a product model for 2 years, we need to hire more people or increase the salary by 20% in order to retain existing staff and new hires. (*Apply the knowledge learned*).
- **Knowledge:** Most staff in the production department
- stayed from 6months to one year (*Relate one information to another information*).
- **Information:** The shortest length of stay is **5 months** and the **longest is 22 years** (*Organized and ranked*).
- **Data:** Length of employment, 9mths, 3yrs, 5mths, 22yrs, 10yrs, 7yrs (*Raw Data*).



What is Data Analytics ?

Data Analytics

Is about mining and transforming data
into information which will allow us to
discover actionable knowledge



Big Data Analytics (video)





Data Analytics - the enabler



We are data rich, but information poor.

Levels of Data Analytics



4 Levels of Data Analytics





Levels of Data Analytics (video)



Levels of Business Analytics

AnalyticsXplained



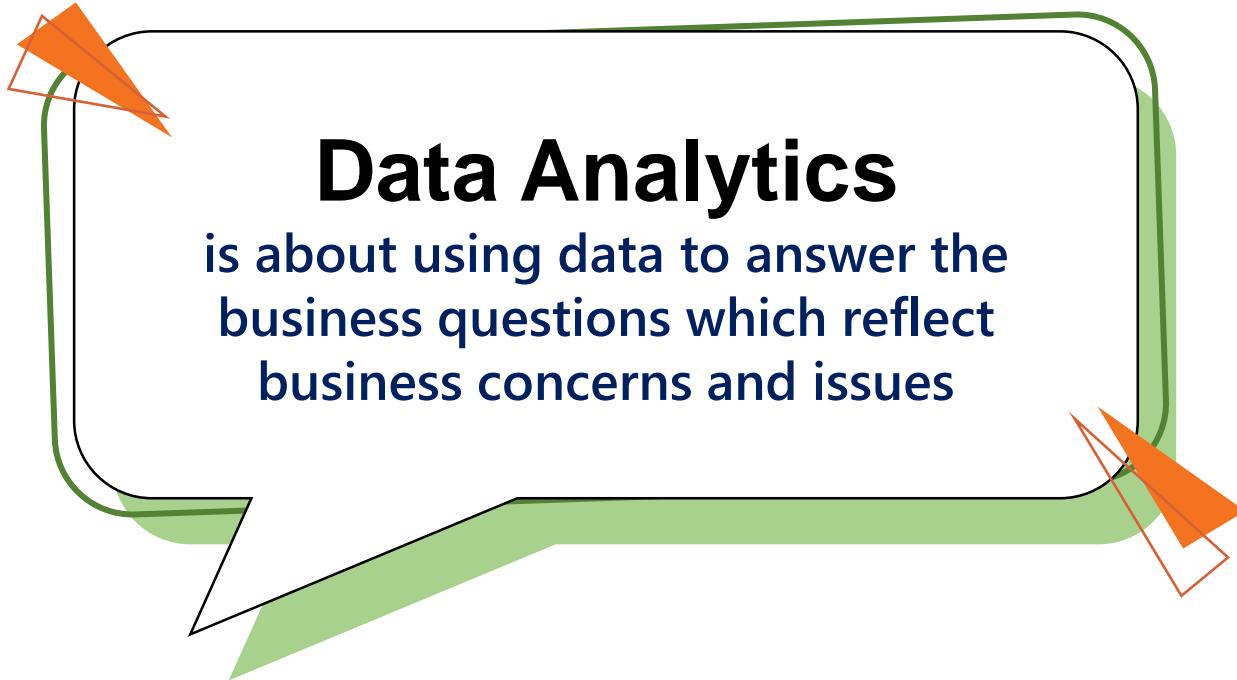


Levels of Data Analytics

Level of Analytics	Question Answered	Example (car sales)
Descriptive Analytics	<i>What happened?</i>	How many cars did we sell last year?
Diagnostic Analytics	<i>Why did it happen ?</i>	What is the cause of the decrease in the car sales last year?
Predictive Analytics	<i>What will happen?</i>	If we increase the expenditure on advertisement, will the car sales increase?
Prescriptive Analytics	<i>How can we make it happen?</i>	What do we need to do to increase the car sales?



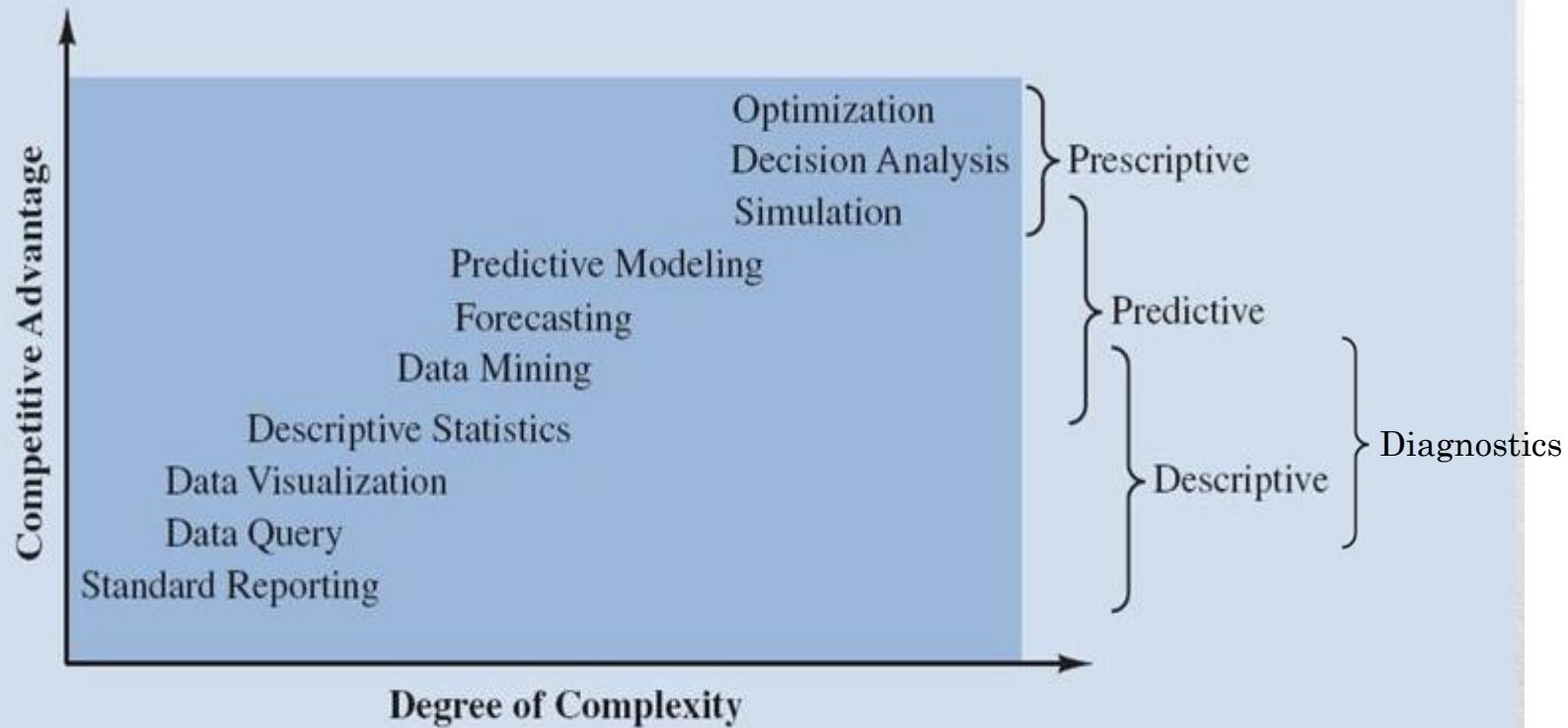
What is Data Analytics ?



So, if Data Analytics result does not answer these questions, it is either the data used is wrong or the analytics approach is wrong !



Techniques commonly used in Data Analytics

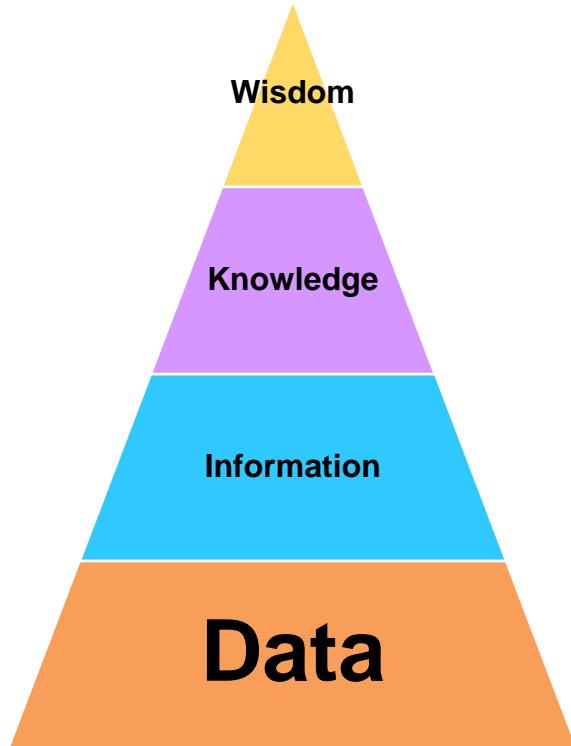


Source: Adapted from SAS.

Data



Data - key input to Data Analytics



- In any organization, there are essentially 2 types of data :
 - **Structured**
 - **Unstructured**

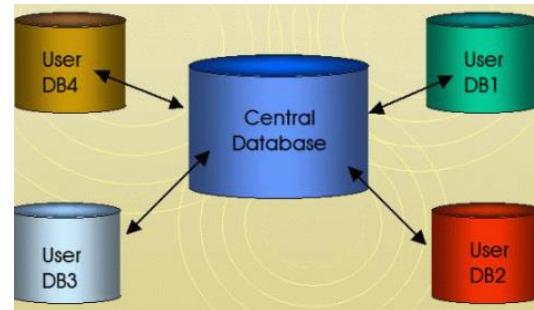




Structured Data

- **Structured data** refers to *data that is identifiable* because it is organized in a structure.
- The most common form of structured data is a database or Excel spreadsheets where specific information is stored in columns and rows and relational database

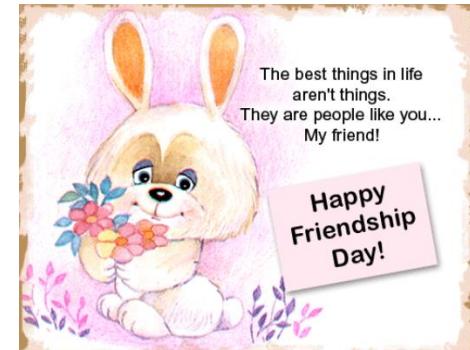
Gender	Systolic BP	Weight	Disease Code
M	175	65	3
F	141	72	1
...
F	160	59	2





Unstructured Data

- **Unstructured data** refers to any data that has no identifiable structure.
- Examples include images, videos, email, documents and text
- About 80% of the organization data is unstructured!





Class Activity

(on data analysis)



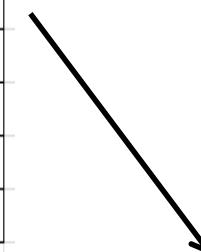
Analysis of Structured Data

What type of analysis are we likely to do

A	B	C	D	E	F	G	H	I	J	K	L	M
Customer_ID	Employee_ID	Order_Date	Delivery_Date	Order_ID	Order_Type	Product_ID	Quantity	Total_Retail_Price	CostPrice_Per_Uni	Discount	Shipping	Profit
63	121039	11Jan2003	11Jan2003	1230058123	1	220101300017	1	\$16.50	\$7.45		\$6.95	\$9.05
5	99999999	15Jan2003	19Jan2003	1230080101	2	230100500026	1	\$247.50	\$109.55		\$24.75	\$137.95
45	99999999	20Jan2003	22Jan2003	1230106883	2	240600100080	1	\$28.30	\$8.55		\$6.95	\$19.75
41	120174	28Jan2003	28Jan2003	1230147441	1	240600100010	2	\$32.00	\$6.50		\$8.95	\$19.00
183	120134	27Feb2003	27Feb2003	1230315085	1	240200200039	3	\$63.60	\$8.80		\$10.95	\$37.20
79	99999999	02Mar2003	03Mar2003	1230333319	2	240100400005	1	\$234.60	\$115.95		\$23.46	\$118.65
23	99999999	03Mar2003	08Mar2003	1230338566	2	240800200062	1	\$35.40	\$16.15		\$8.95	\$19.25
23	99999999	03Mar2003	08Mar2003	1230338566	2	240800200063	2	\$73.80	\$16.85		\$10.95	\$40.10
45	99999999	09Mar2003	11Mar2003	1230371142	2	240500100004	2	\$127.00	\$28.00		\$15.95	\$71.00
45	99999999	09Mar2003	11Mar2003	1230371142	2	240500200003	1	\$23.20	\$11.10		\$6.95	\$12.10
56	121059	15Mar2003	15Mar2003	1230404278	1	220200300002	2	\$75.00	\$17.05		\$10.95	\$40.90
183	120149	22Mar2003	22Mar2003	1230440481	1	230100600005	1	\$129.80	\$63.20		\$15.95	\$66.60
16	99999999	24Mar2003	26Mar2003	1230450371	2	230100600018	2	\$128.40	\$32.20		\$15.95	\$64.00
79	99999999	24Mar2003	25Mar2003	1230453723	2	240500200056	1	\$24.10	\$11.55		\$6.95	\$12.55
183	120134	25Mar2003	25Mar2003	1230455630	1	240200100233	2	\$91.80	\$22.45		\$12.95	\$46.90
2788	99999999	28Mar2003	30Mar2003	1230478006	2	230100100025	2	\$60.60	\$13.15		\$10.95	\$34.30
20	121066	01Apr2003	01Apr2003	1230498538	1	230100300006	1	\$68.50	\$34.35		\$10.95	\$34.15
70046	99999999	02Apr2003	03Apr2003	1230500669	3	240200100131	2	\$148.60	\$41.35		\$15.95	\$65.90
12386	99999999	02Apr2003	03Apr2003	1230503155	2	220101400310	1	\$31.80	\$14.20		\$8.95	\$17.60
23	99999999	18Apr2003	23Apr2003	1230591673	2	220200200024	3	\$178.50	\$32.25		\$17.95	\$81.75
36	99999999	18Apr2003	20Apr2003	1230591675	3	240500100039	1	\$34.50	\$15.40		\$8.95	\$19.10
79	121045	18Apr2003	18Apr2003	1230591684	1	240200100076	4	\$1,796.00	\$246.55		\$179.60	\$809.80
61	99999999	24Apr2003	29Apr2003	1230619748	2	220200100092	1	\$83.00	\$41.60		\$10.95	\$41.40

Analysis of Structured Data

Region	Location	Year 2009				Year 2010			
		Rush		Posh		Rush		Posh	
		Male	Female	Male	Female	Male	Female	Male	Female
Central	AMK Hub	100	60	100	160	90	114	130	128
Central	HDB Hub	50	150	110	200	45	210	165	160
East	Tampines Hall	150	50	50	70	60	95	45	56
North	Causeway Point	190	180	50	80	171	252	45	64



- Structured data are normally numerical or categorical and presented in spreadsheet format (rows and columns)
- This facilitates the use of classical data mining techniques (**statistical**) for analysis

Present Information for Analysis	<u>By Customers</u>	2009	2010	% (+ -)
		Female	1079	13.58%
	<u>Male</u>	800	751	-6.13%
	<u>By Region</u>			
	Central	930	1042	12.04%
	East	320	256	-20.00%
	North	500	532	6.40%
	<u>By Location</u>			
	AMK Hub	420	462	10.00%
	HDB Hub	510	580	13.73%
	Tampines Hall	320	256	-20.00%
	Causeway Point	500	532	6.40%
	<u>By Product</u>			
	Posh	820	793	-3.29%
	Rush	930	1037	11.51%
	<u>Overall Demand</u>	1750	1830	4.57%

Analysis of Unstructured Data

What type of analysis are we likely to do?

Ng Huiwen
The Straits Times
Feb 27, 2019

SINGAPORE - The 35-year-old woman who died in a bus accident at the Tuas Checkpoint on Tuesday morning (Feb 26) was an employee of Hewlett-Packard (HP), the technology company confirmed on Wednesday.

The Straits Times understands that she is Ms Mok Fei Chen, a Malaysian citizen who worked in Singapore.

Ms Mo was killed after the bus she was in collided into the railings near the checkpoint at about 4am.

The impact sent her and another woman flying out of the vehicle onto the ground. Ms Mok was pronounced dead at the scene.

Fifteen other people, including her husband and some HP employees, were hurt.

On Wednesday, a HP spokesman said in a statement: "We are deeply saddened to confirm that a HP employee passed away yesterday in a traffic accident."

The spokesman added that most of the other employees who required medical treatment have been discharged from hospital.

"Our focus is on supporting our colleagues and their families in this difficult time," the spokesman said.

"The safety of all employees is our highest priority and we continue to work with our transportation vendor to ensure safety of the vehicles."

Ms Mok and her husband, who is also believed to be an HP employee, have two daughters, according to her Facebook profile.

The couple, who are from Johor Baru, were believed to be on the way to work when the accident happened.

On her Facebook page, Ms Mok often shared photos of her family celebrating special occasions, such as Christmas and birthdays.

They were also pictured on a recent family trip to Taiwan in August 2018.

Chinese-language newspaper Lianhe Wanbao reported on Wednesday that Ms Mok's husband and three relatives arrived at the mortuary in a Malaysia-registered car at about 10am.

The four of them spoke to an investigation officer for about 10 minutes before they left.

The police have arrested the 59-year-old bus driver for causing death by rash act.

Analysis of Unstructured Data

What type of analysis are we likely to do?

Information Extraction

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**The type of data determines what type
of data analysis technique that
we can perform**



How to carry out a Data Analytics project?



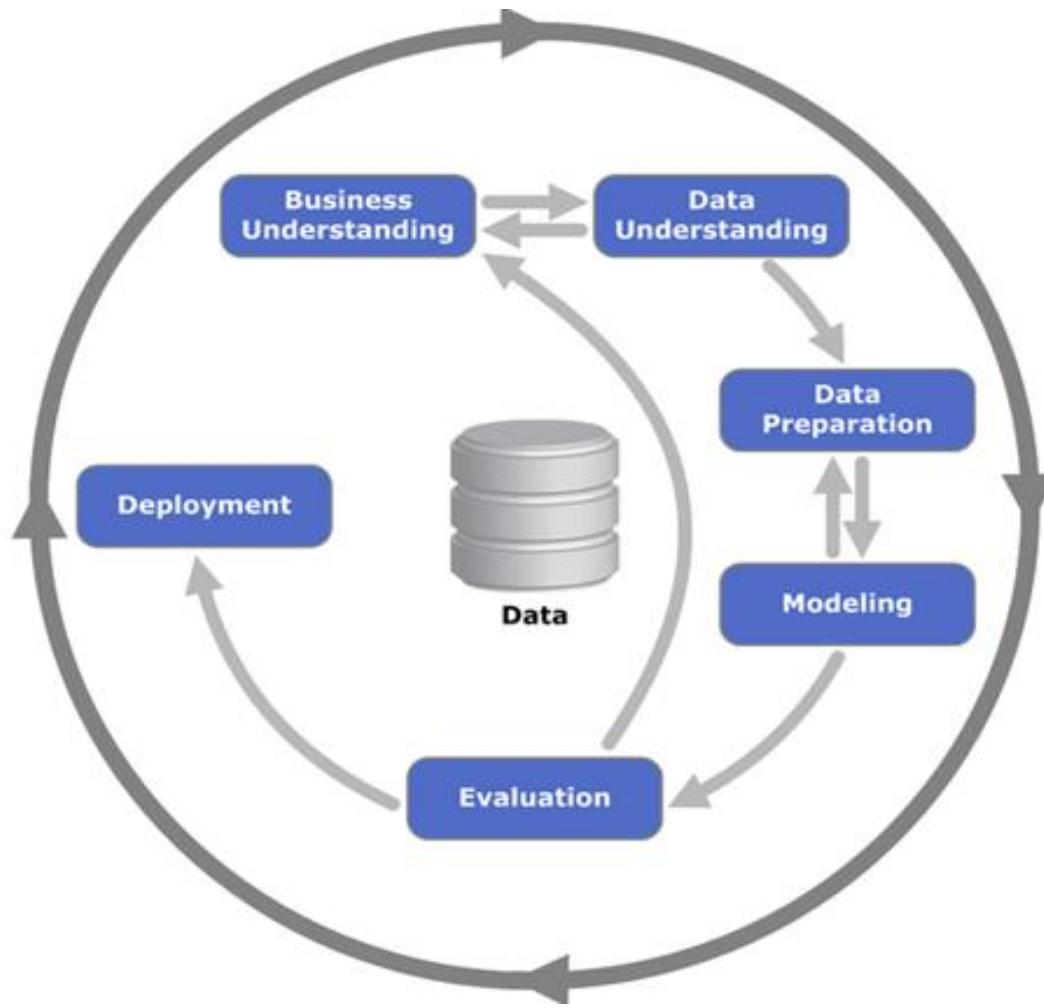
Data Mining Methodology CRISP-DM

CRISP – DM

- ✓ stands for **Cross-Industry Standard Process for Data Mining**
- ✓ an industry proven methodology to guide data mining efforts and help project planning
- ✓ a framework for defining a lifecycle of 6 phases
- ✓ the framework is adaptable for both structured and unstructured data mining tasks



Data Mining Methodology - CRISP DM





Data Mining Methodology CRISP-DM

1 Business Understanding

- ✓ Determine business goals, assess situation, determine the data mining goals, produce project plan

2 Data Understanding

- ✓ Collect initial data, describe data, explore data, verify data quality

3 Data Preparation

- ✓ Select data, clean data, construction of new data, integrate data format data



Data Mining Methodology CRISP-DM

4 Modeling

- ✓ Select modeling techniques, build model, assess model

5 Evaluation

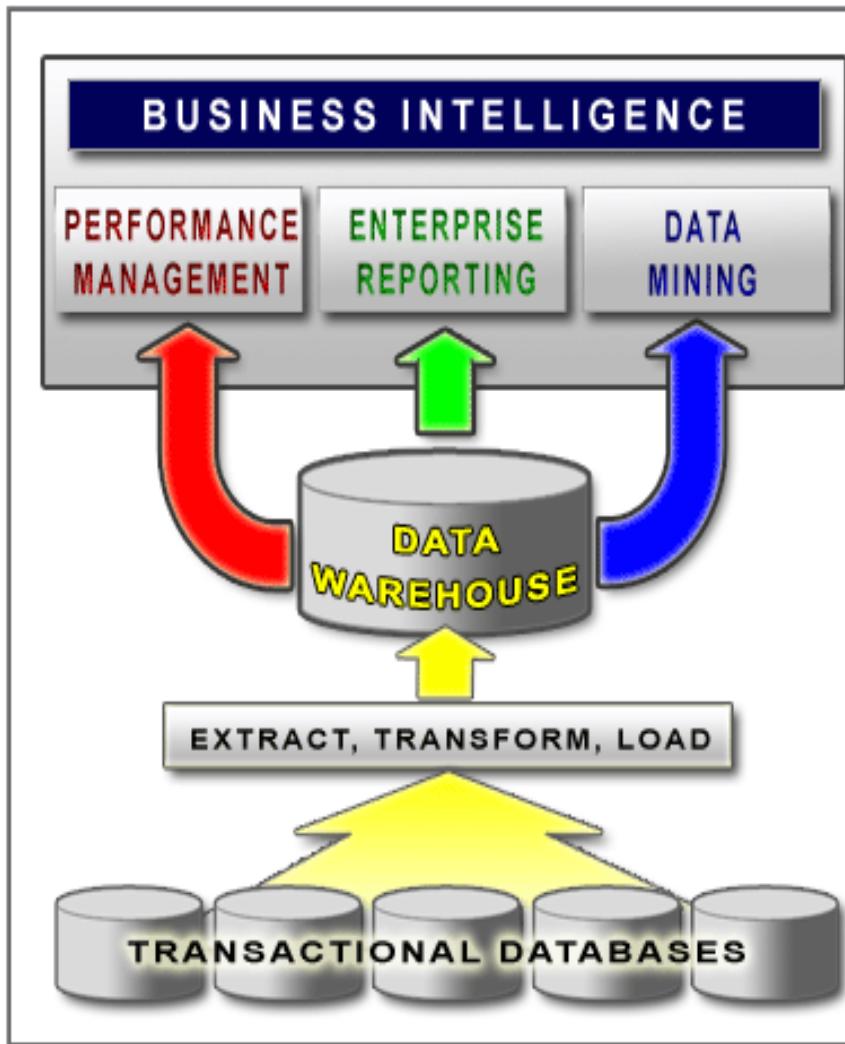
- ✓ Evaluate results, review process and decide next steps

6 Deployment

- ✓ Plan deployment, plan monitoring and maintenance, produce final report and presentation, review project



Data Analytics environment (idea)



Data Analytics tasks are performed and reports are generated

Extract data based on business requirements and data are cleansed and store (load) in data warehouse

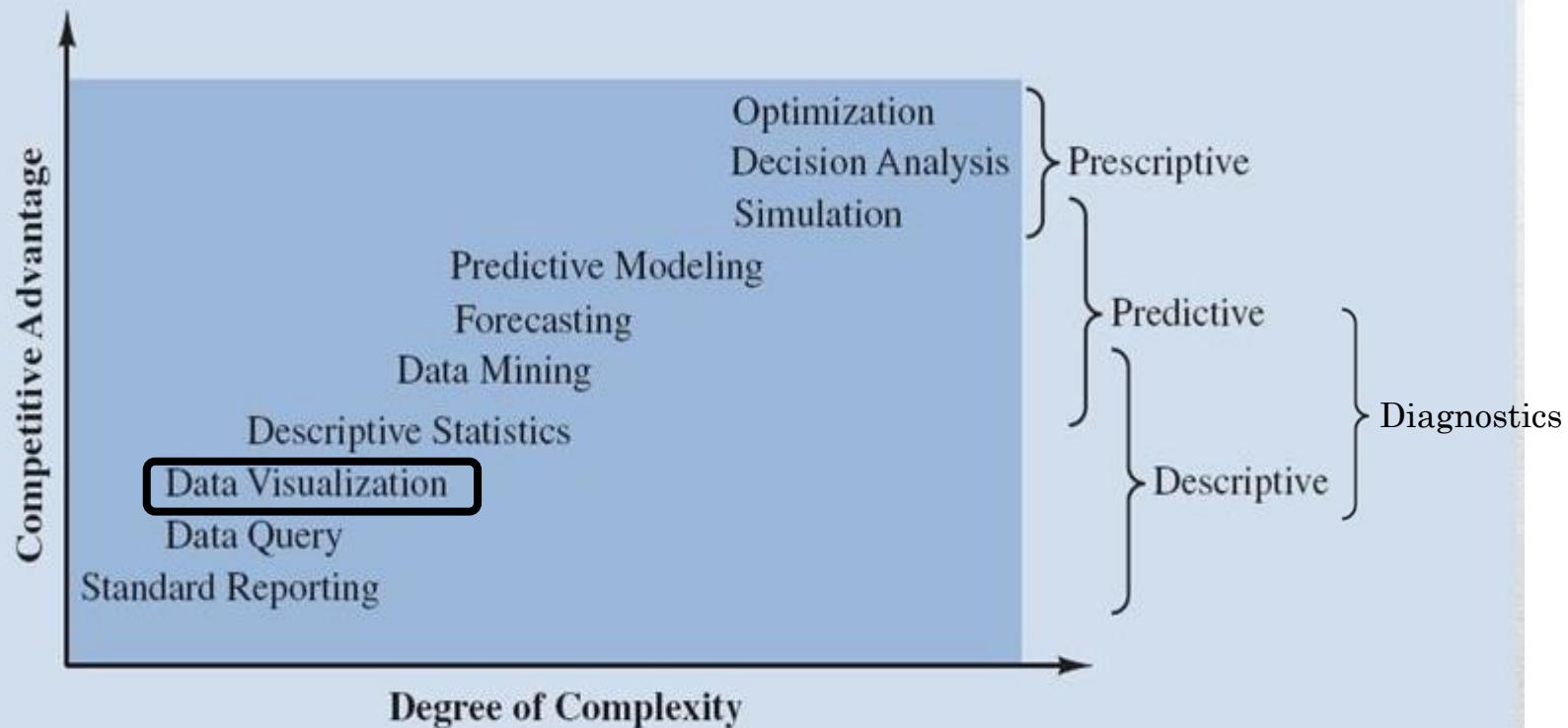
Raw data are captured by transactional data sources



Data Analytics Techniques



Techniques commonly used in Data Analytics



Source: Adapted from SAS.



Data Visualization (DA)

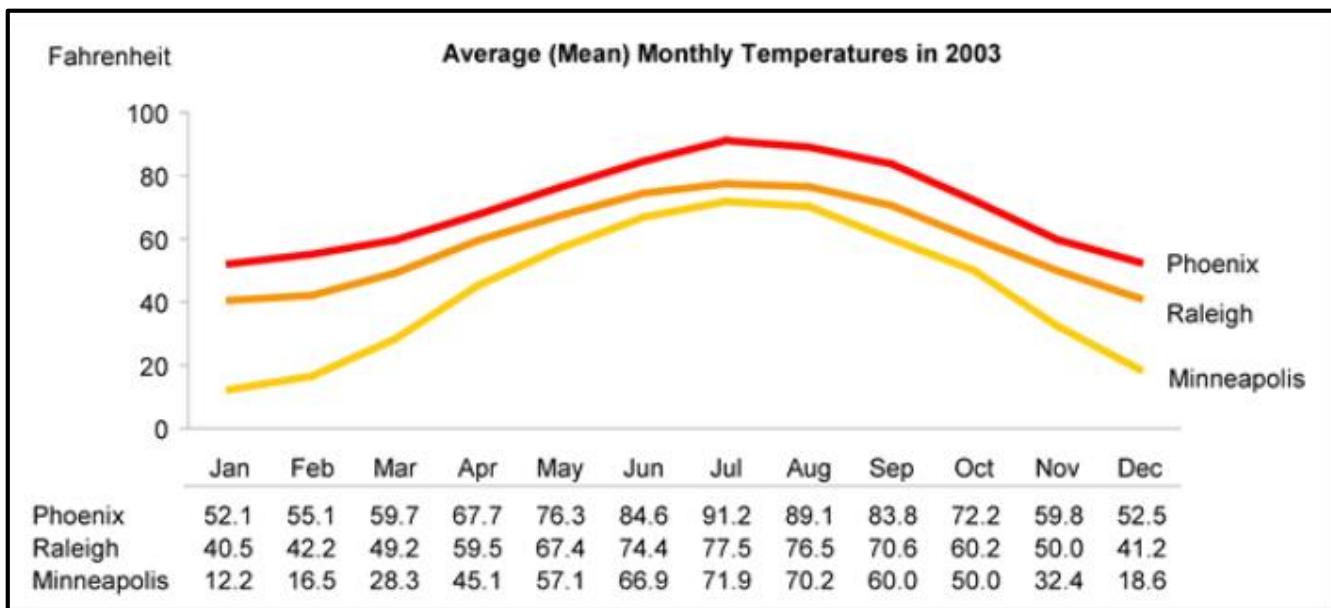
- DA is the representation of data in a visual way
- Example :
“Which city has the highest average monthly temperature throughout the year ?”

Average (Mean) Monthly Temperatures in 2003												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phoenix	52.1	55.1	59.7	67.7	76.3	84.6	91.2	89.1	83.8	72.2	59.8	52.5
Raleigh	40.5	42.2	49.2	59.5	67.4	74.4	77.5	76.5	70.6	60.2	50.0	41.2
Minneapolis	12.2	16.5	28.3	45.1	57.1	66.9	71.9	70.2	60.0	50.0	32.4	18.6



Data Visualization (DA)

- DA is the representation of data in a visual way
- Example :
“Which city has the highest average monthly temperature throughout the year ?”





Dr John Snow - Cholera Map of London (1854)

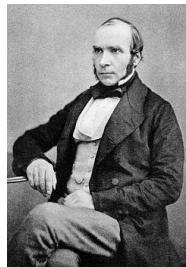
In 1854, London was gripped by cholera; many thousands were to die in the ensuing epidemic.

Most doctors at the time believed that the disease was caused by foul smelling mist "miasmas" a view contested by Dr John Snow who suspected that contaminated drinking water was the cause.

Dr Snow drew a map of Soho marking each case of cholera with a black dot.

He also marked each public water pump in the area with an "X".

Dr Snow was able to track the origin of outbreak in Soho to Broad Street.



John Snow





Data Visualization (DA) – Daily examples



DA is can be effectively used as a communication tool

- ✓ It communicates to the user what the data is saying

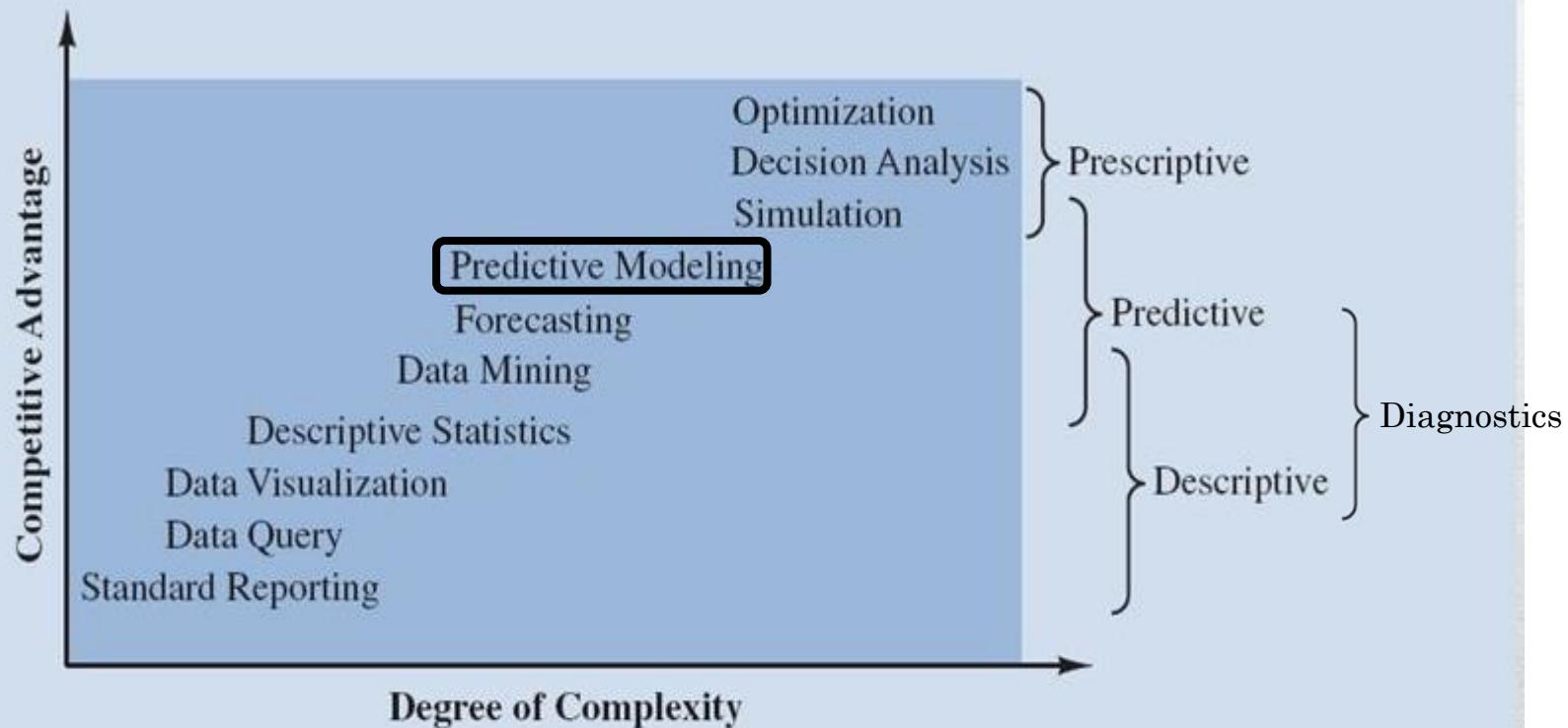


Data Visualization using Tableau (video)

The screenshot shows the Tableau desktop application interface. On the left, the Data pane displays various dimensions and measures from a data source named 'Orders (Sales)'. Dimensions include Customer Name, Customer Segment, Order Date, Order ID, Order Priority, Product Category, Product Container, Product Name, Product Sub-Category, Region, Province, Row ID, Ship Date, Ship Mode, and Measure Names. Measures include Discount on Orders, Order Quantity, Product Base Margin, Profit, Sales, Shipping Cost, Unit Price, Latitude (generated), Longitude (generated), Number of Records, and Measure Values. A yellow circle highlights the 'Detail' button in the Marks shelf, which is currently set to 'Automatic'. The Marks shelf also includes options for Color, Size, Text, Detail, and Tooltip. The main workspace, 'Sheet 1', contains two 'Drop field here' placeholder boxes. The top box is positioned above the bottom box.

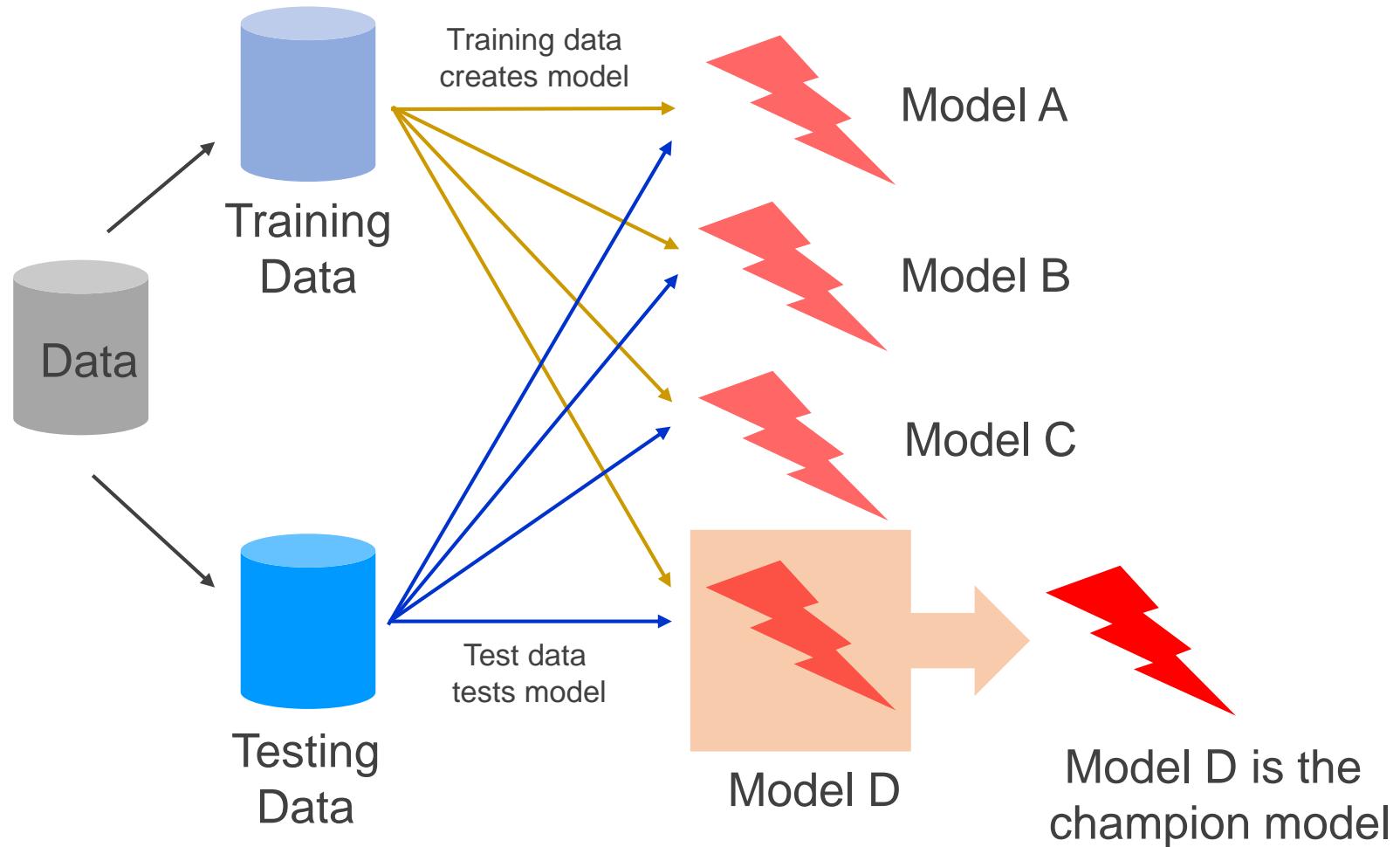


Techniques commonly used in Data Analytics



Source: Adapted from SAS.

Predictive Modeling Overview

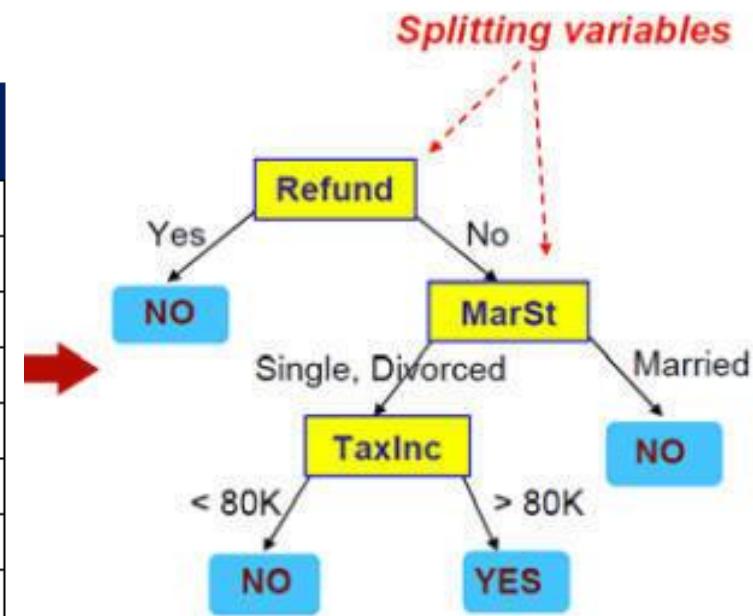


Modeling a Decision Tree

A study of cheating in tax return

ID	Taxable Income	Marital Status	Age	Refund	Profession Type	Tax Cheat
1	125k	Single	55	Yes	2	No
2	100k	Married	50	No	3	No
3	70k	Single	48	No	1	No
4	120k	Married	51	Yes	4	No
5	95k	Divorced	50	No	2	Yes
6	60k	Married	46	No	2	No
7	220k	Divorced	52	Yes	3	No
8	85k	Single	46	No	5	Yes
9	75k	Married	50	No	1	No
10	90k	Single	52	No	1	Yes

Training Data



Model: Decision Tree

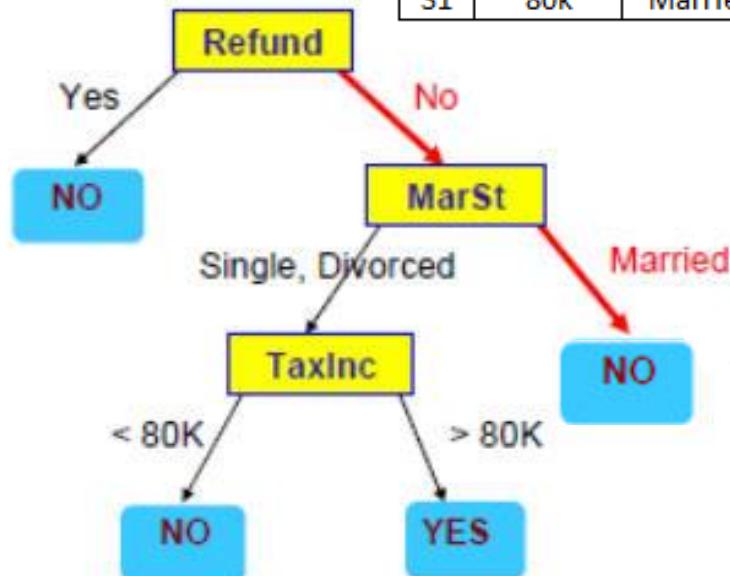
Apparently, age & Profession Type are not factors

Apply Model to Test Data

A study of cheating in tax return

Test Data

ID	Taxable Income	Marital Status	Age	Refund	Profession Type	Tax Cheat
S1	80k	Married	55	No	3	No



|



Predict Modelling – example (video)

Introduction to

Text Mining

Video Series

Presented by Jennifer Thompson, MS

Predicting Fraudulent Claims

sentiment

table

special

levels

scatterplot

two

SVB

cells

graph

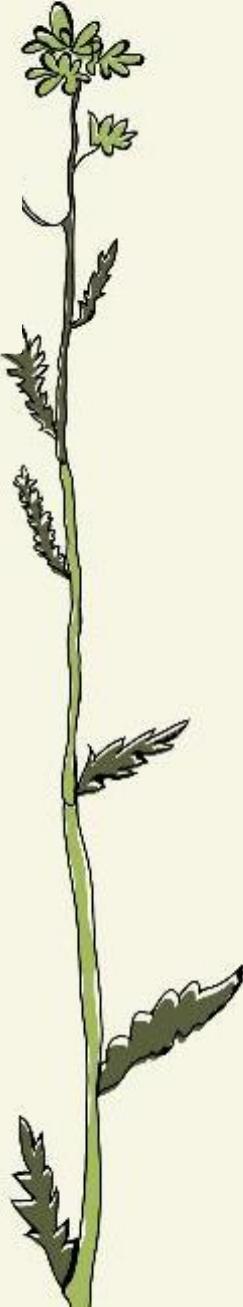
StatSoft

www.statsoft.com

Machine Learning Algorithms



Analytics in Practice



Deployment and use of Analytics:

- Financial analytics
- Human resource (HR) analytics
- Marketing analytics
- Health care analytics
- Supply chain analytics
- Analytics for government and non-profits
- Sports analytics
- Web and Social Media analytics



Conclusion - Summary

- Growth of big data that drive the data mining and analytics
- Different levels of Data Analytics
- Data and its types which determine what analysis we can perform
- Overview of how a DA project is carry out
- Some examples of DA techniques.



Thank you

Machine Learning



Introduction of trainer



Name
Tok Nam Huat

Email
tok_nam_huat@rp.edu.sg

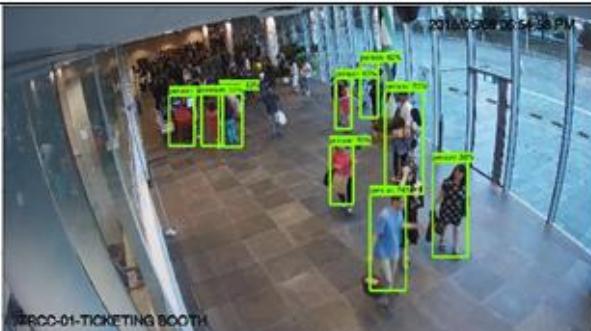


Past Projects (Crowd Detection) (18RIGO09)

SSDv1



SSDv2

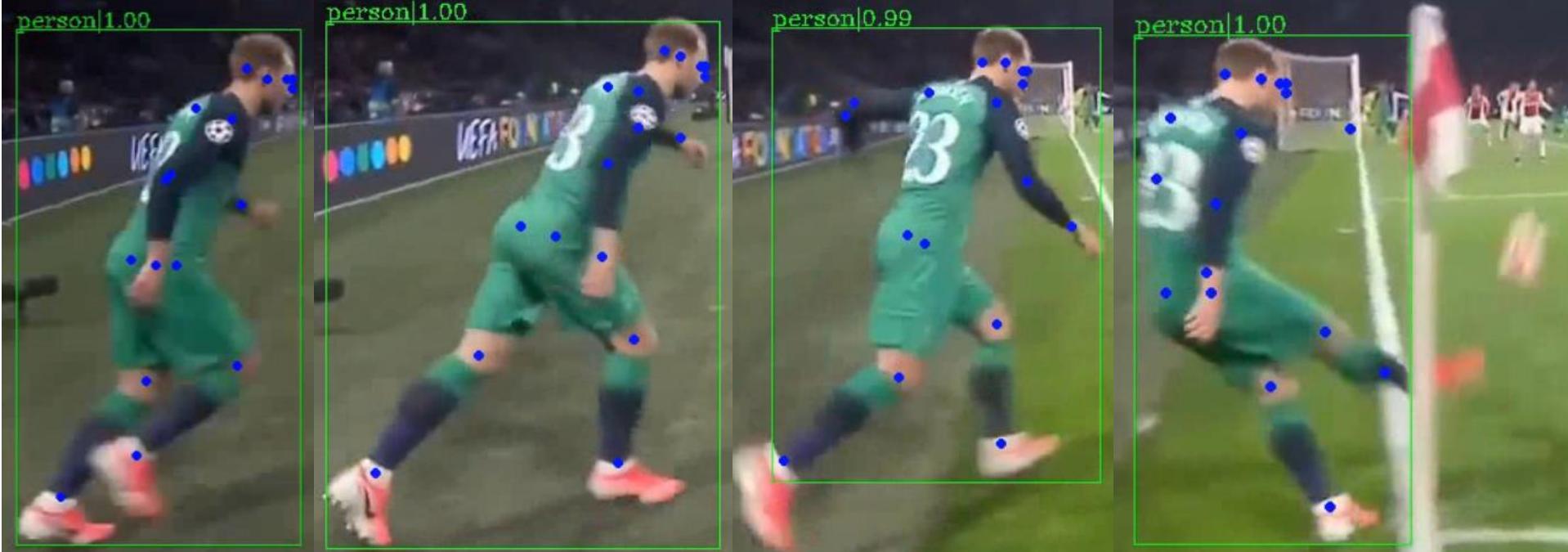


Yolo



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





Innovative Approach and Value (Current)





Talk to flower



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

What is AI?

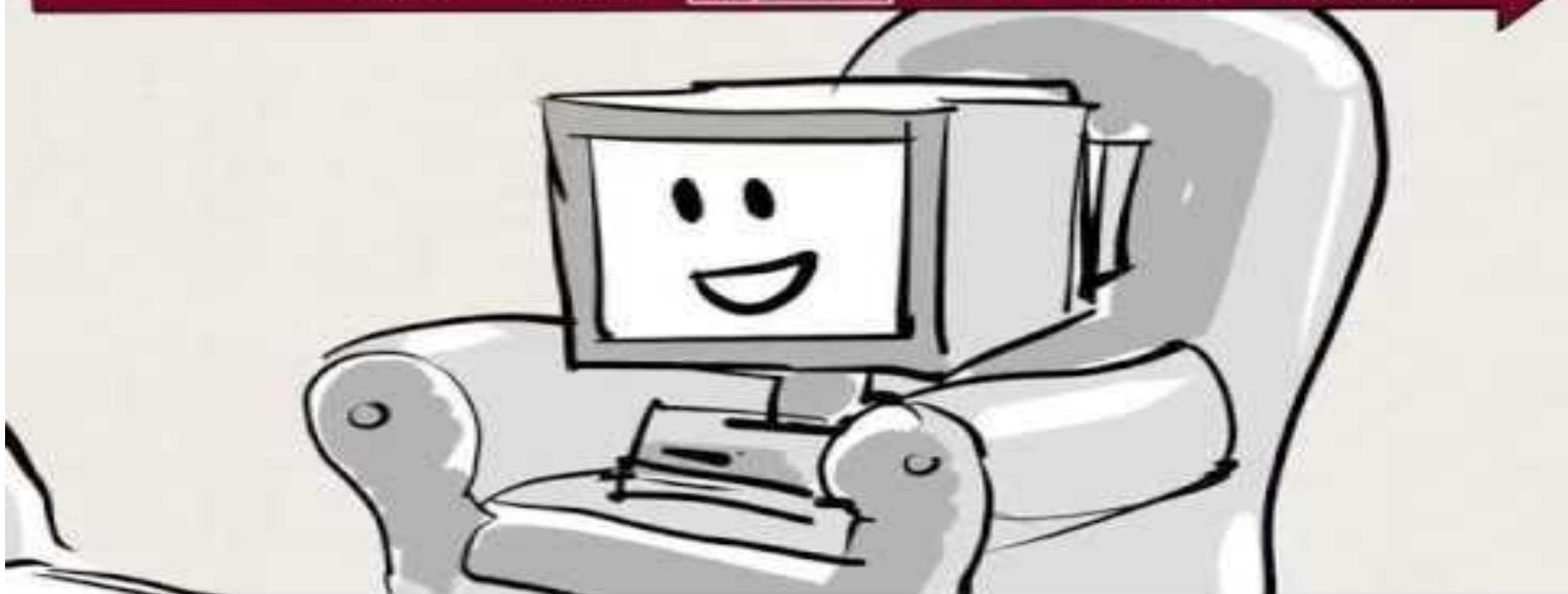
What is Artificial Intelligence?

- 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

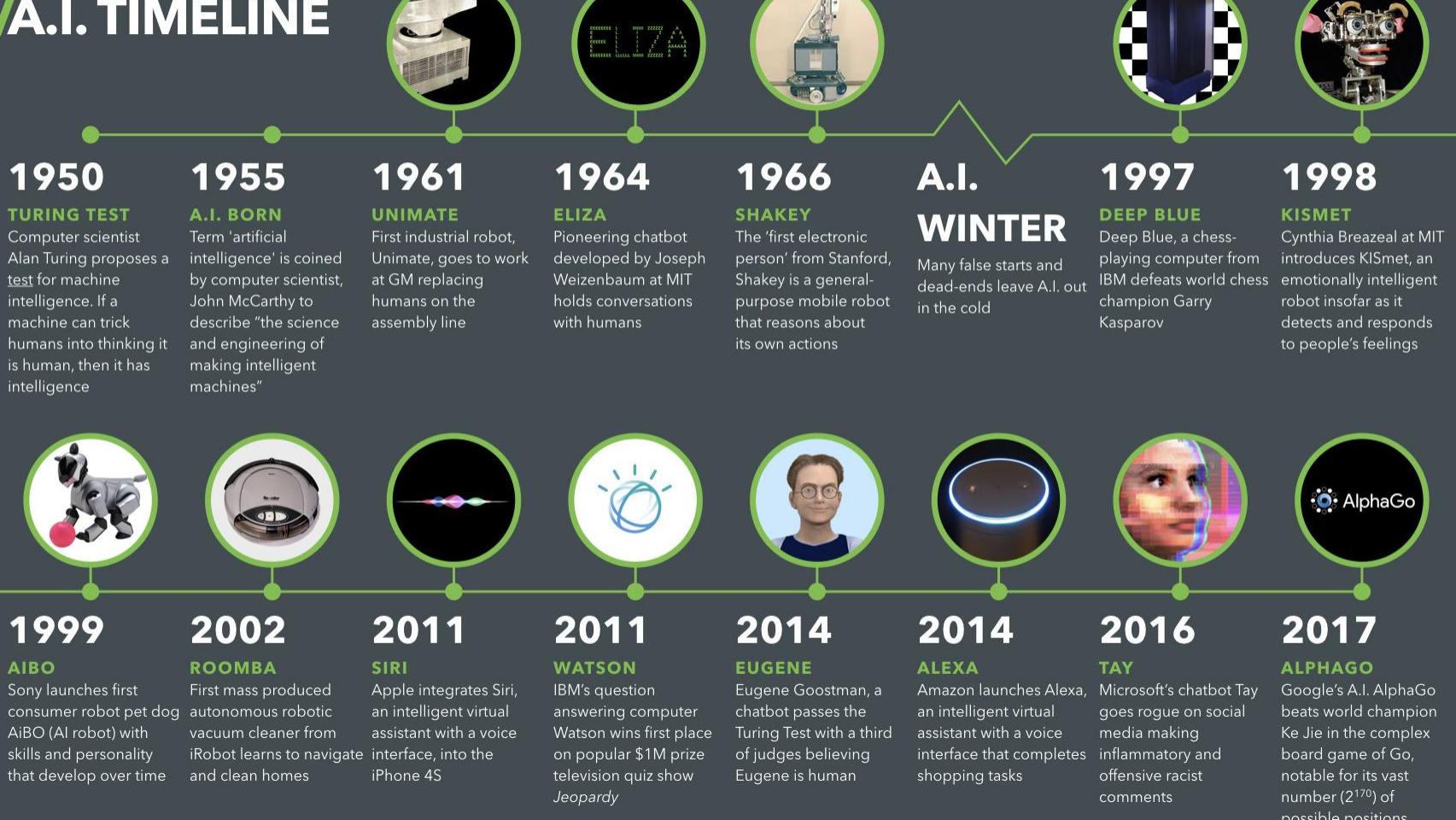
1950 1956 1960 1970 1980 1990





History of AI

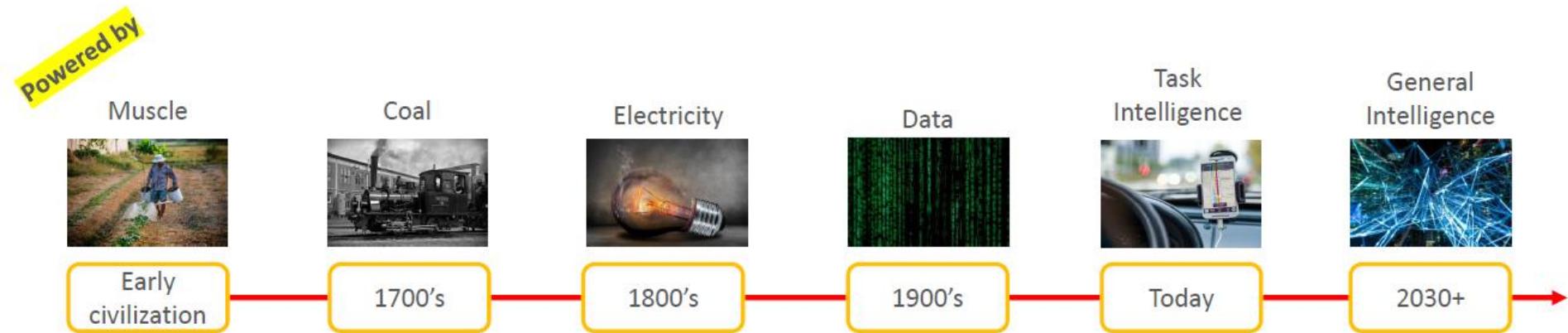
A.I. TIMELINE





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

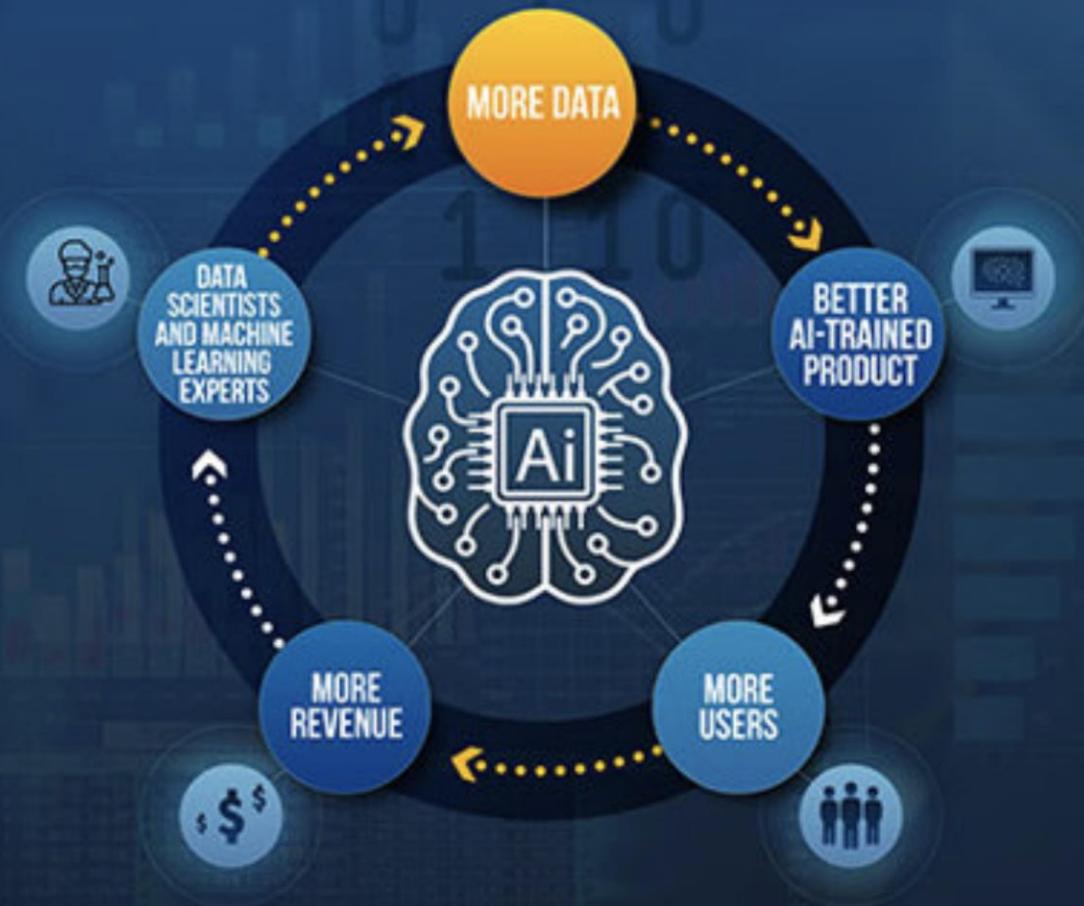
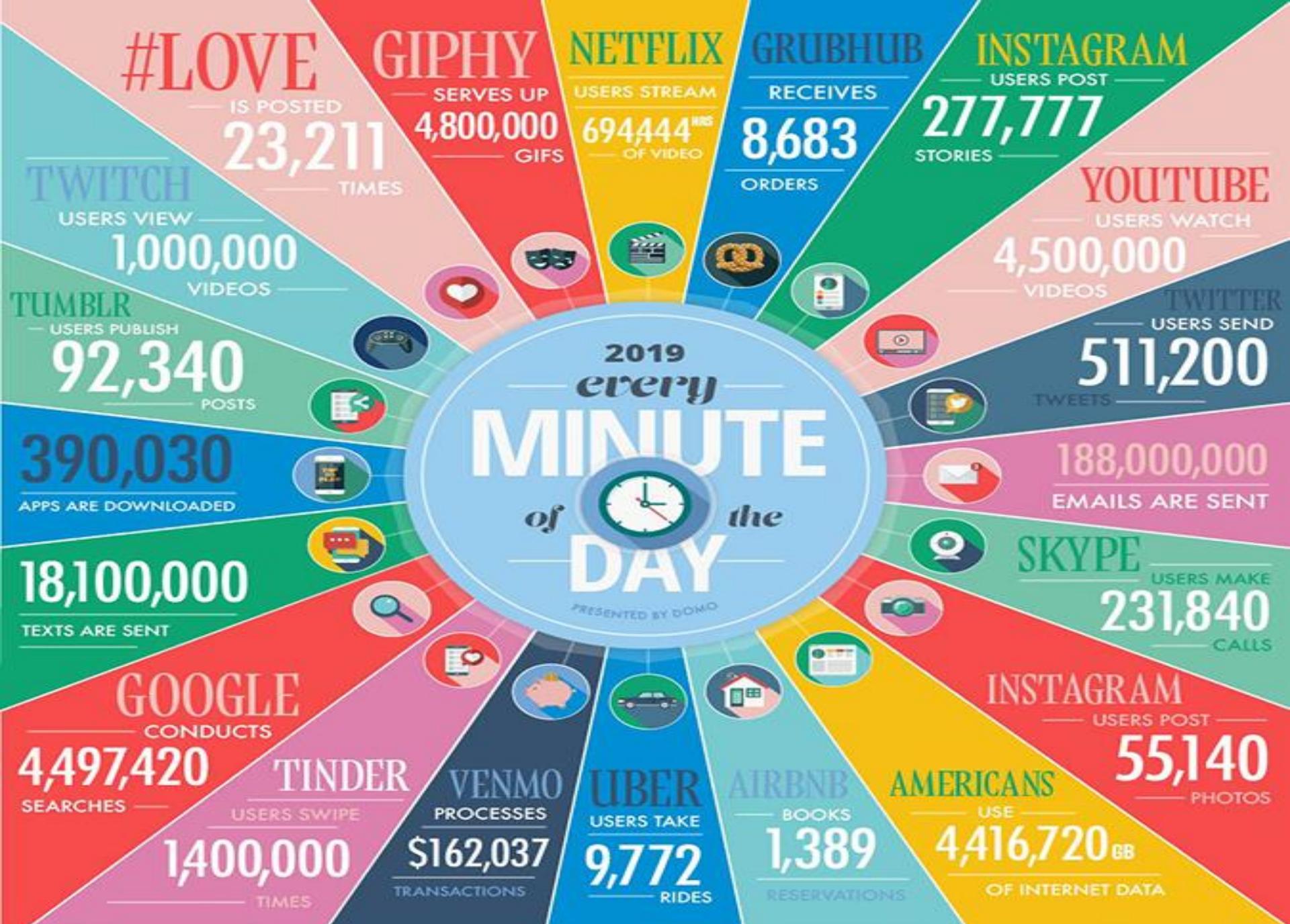
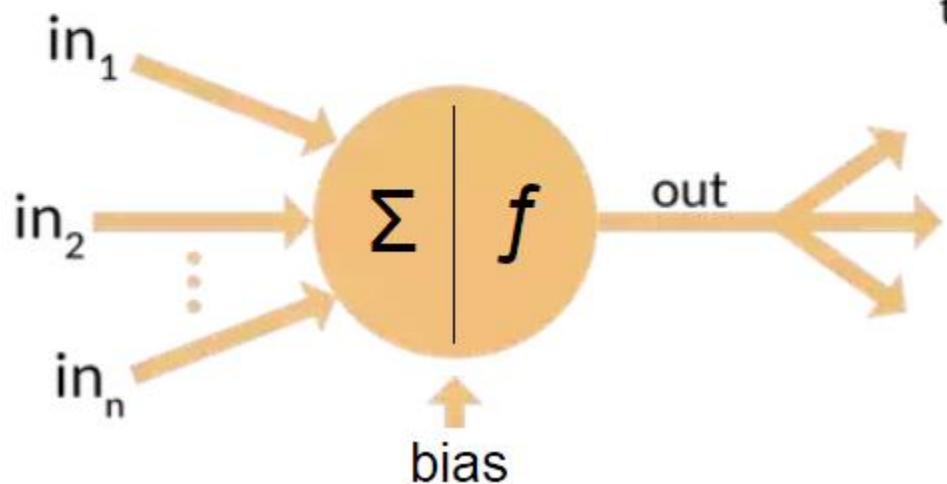
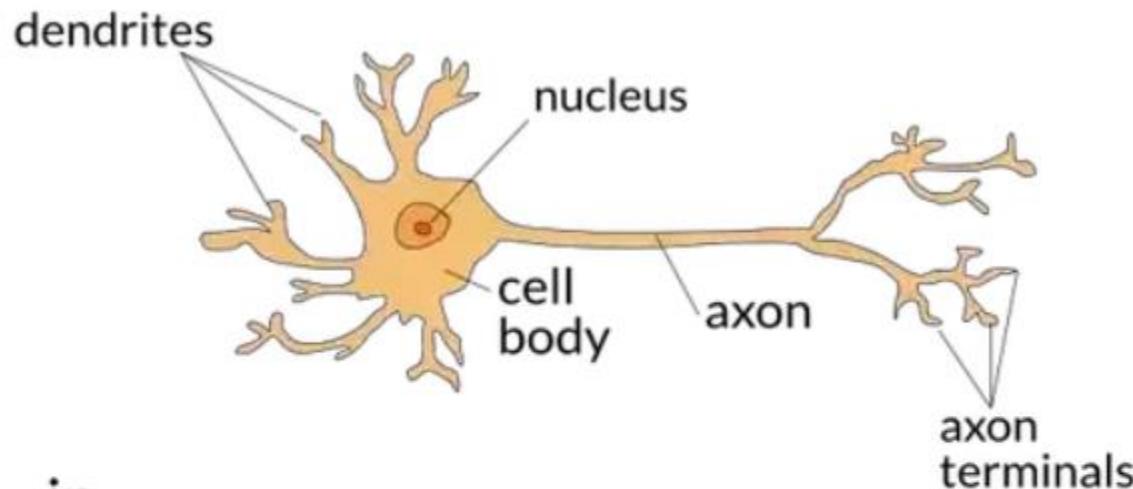


Image source: Kai-Fu Lee, Sinovation Ventures



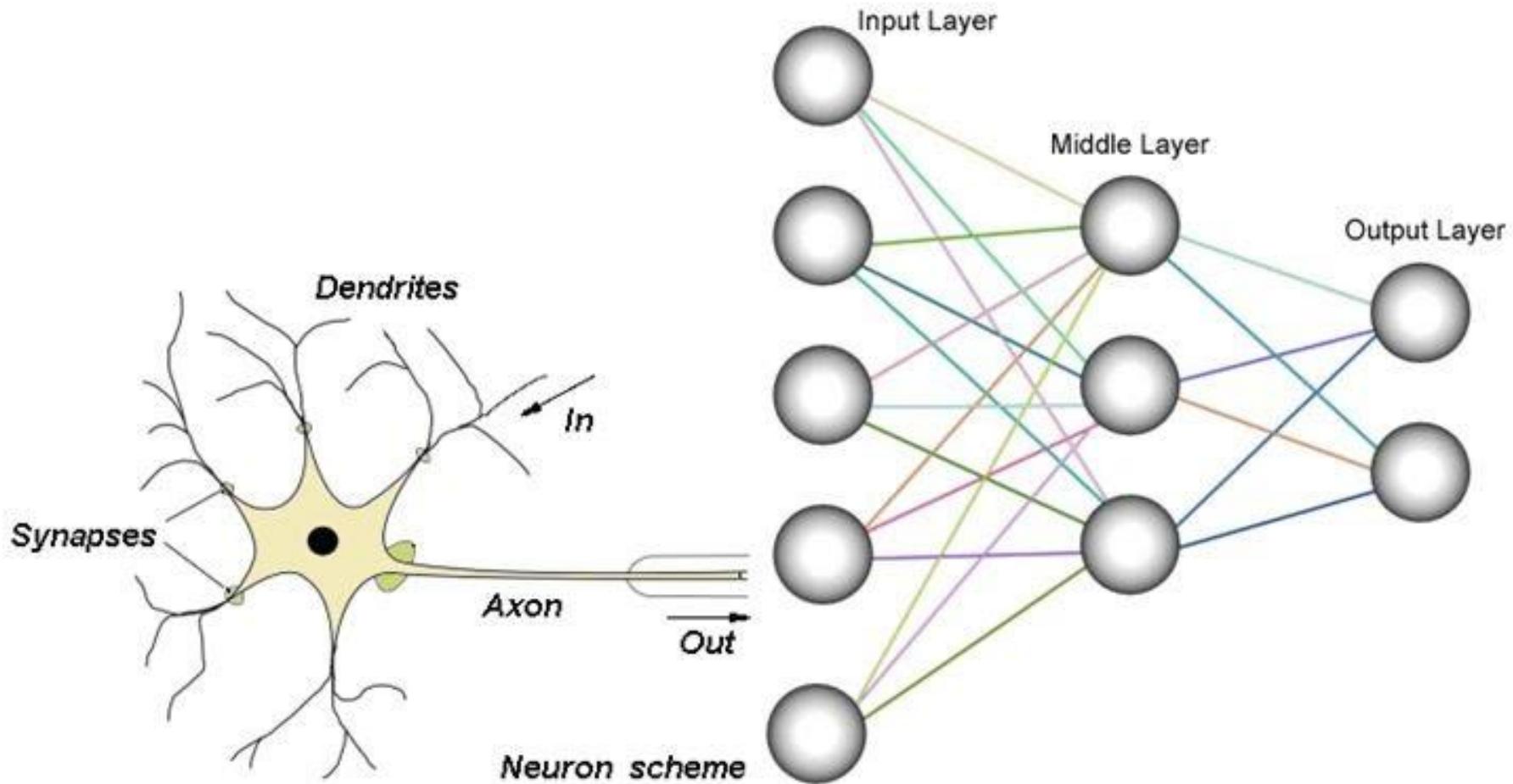


Neural Network





Neural Network



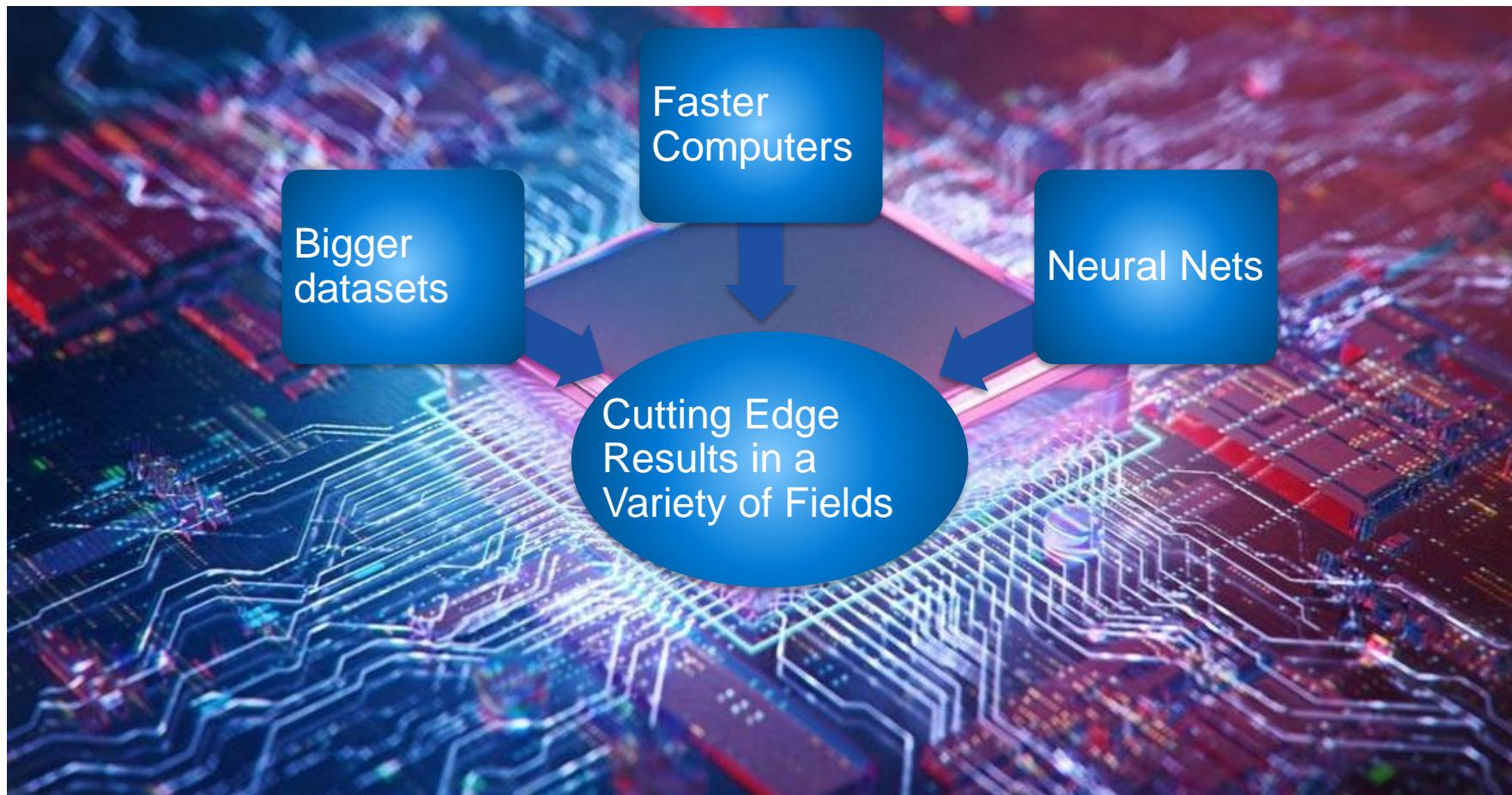


What is neural network?



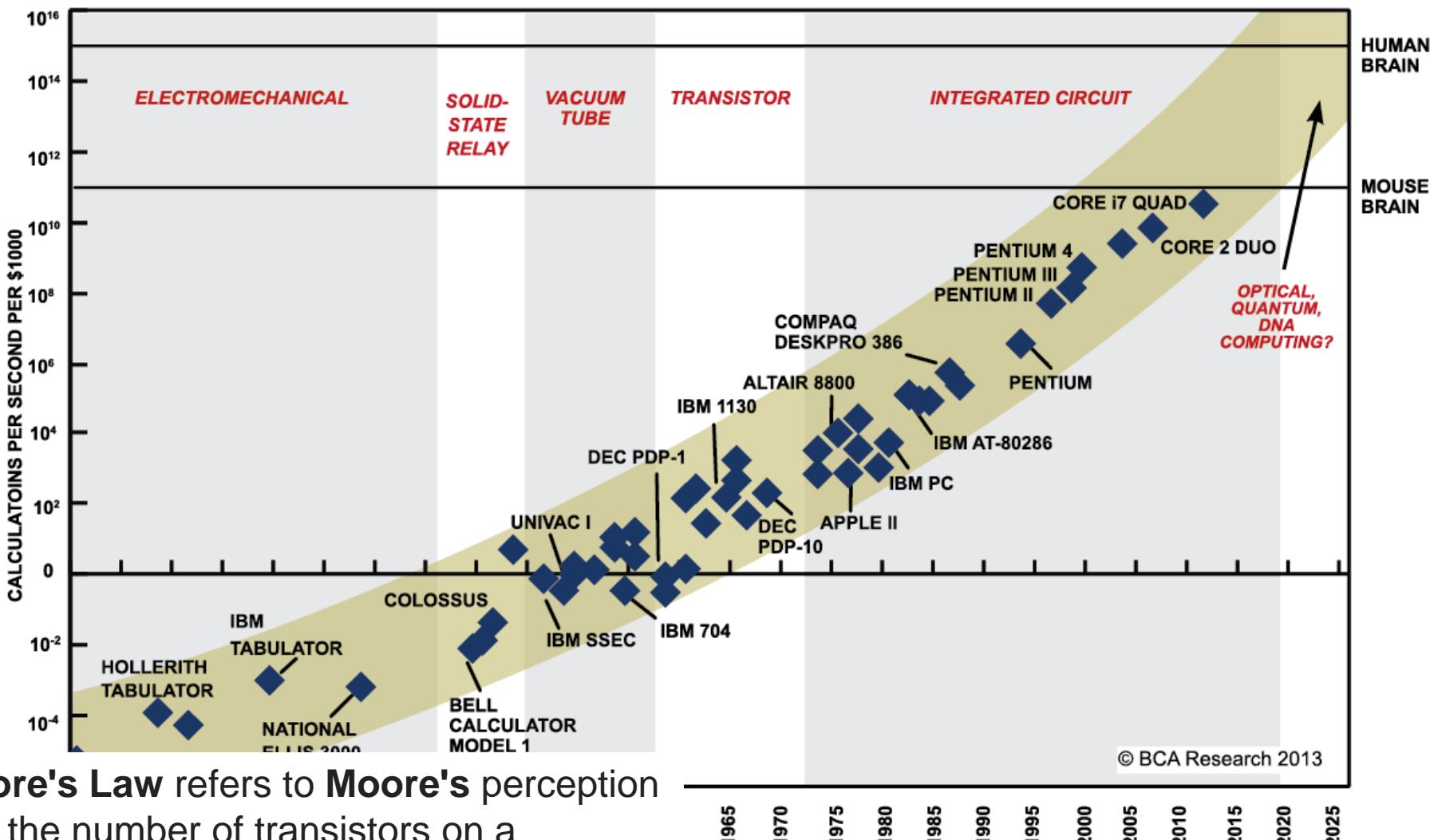
AI Hardware

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





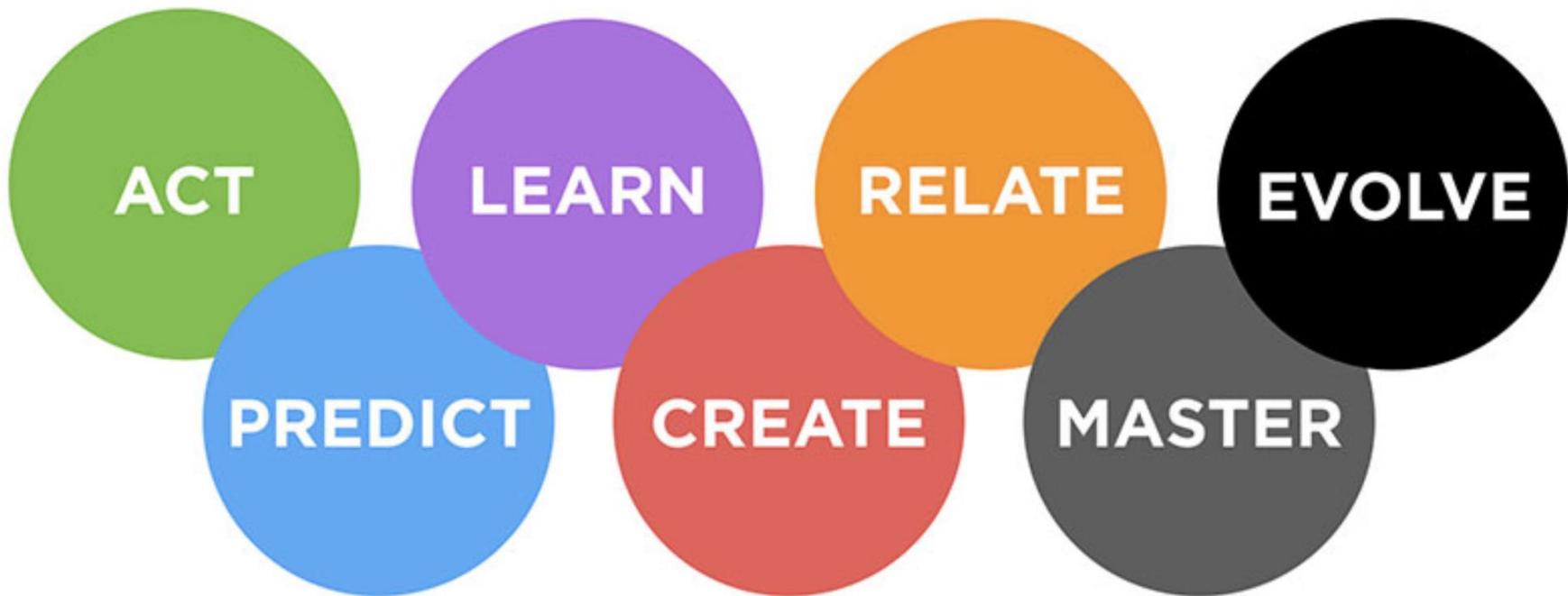
Moore's Law



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.



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.

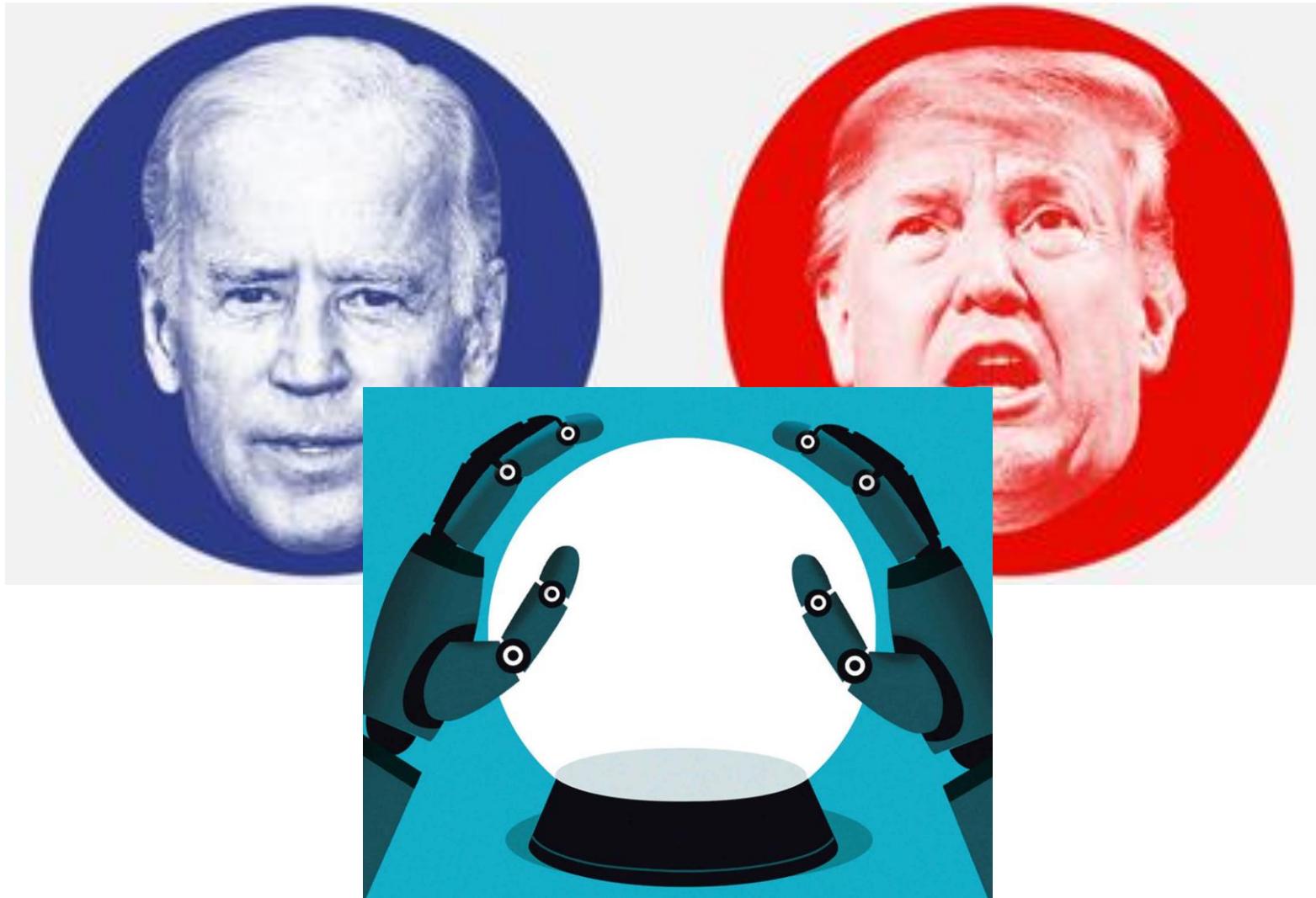


Systems that Acts



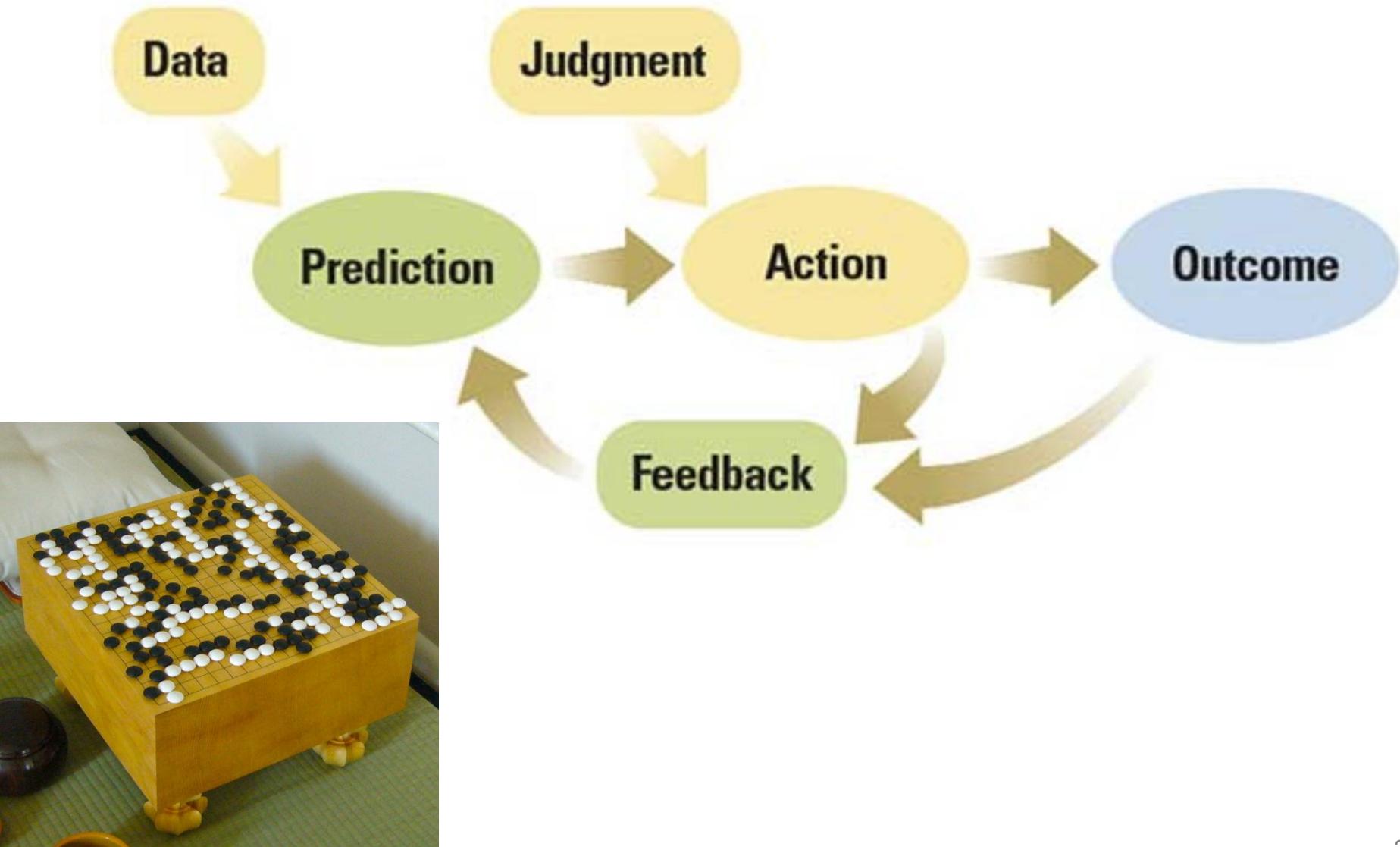


Systems that Predicts





Systems that Learns





Systems that Create

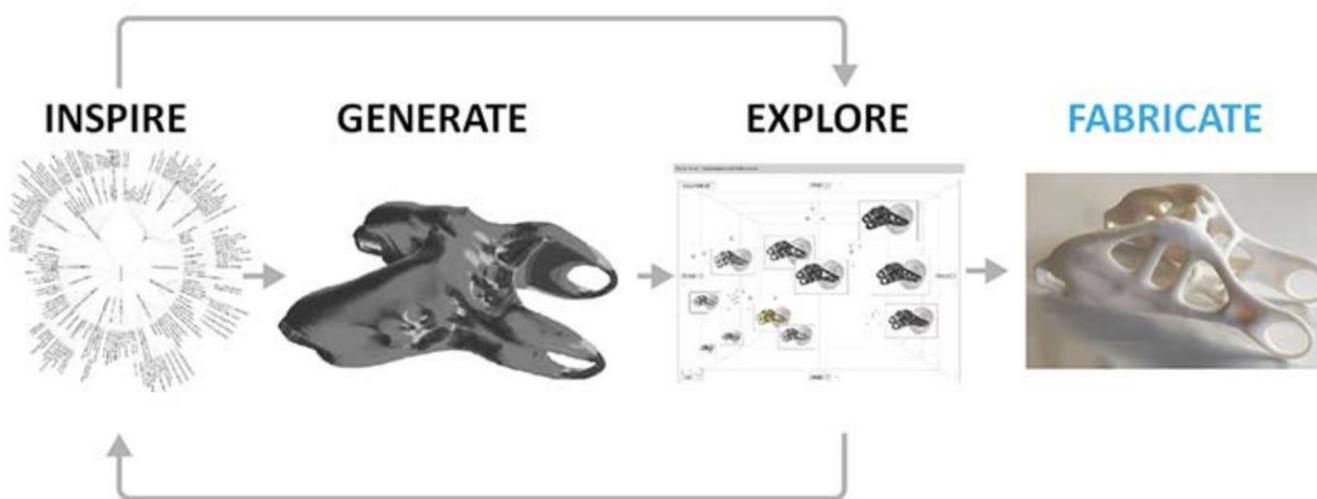
Computers now capable of producing original writing, imagery, music, industrial designs, and even AI software!



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



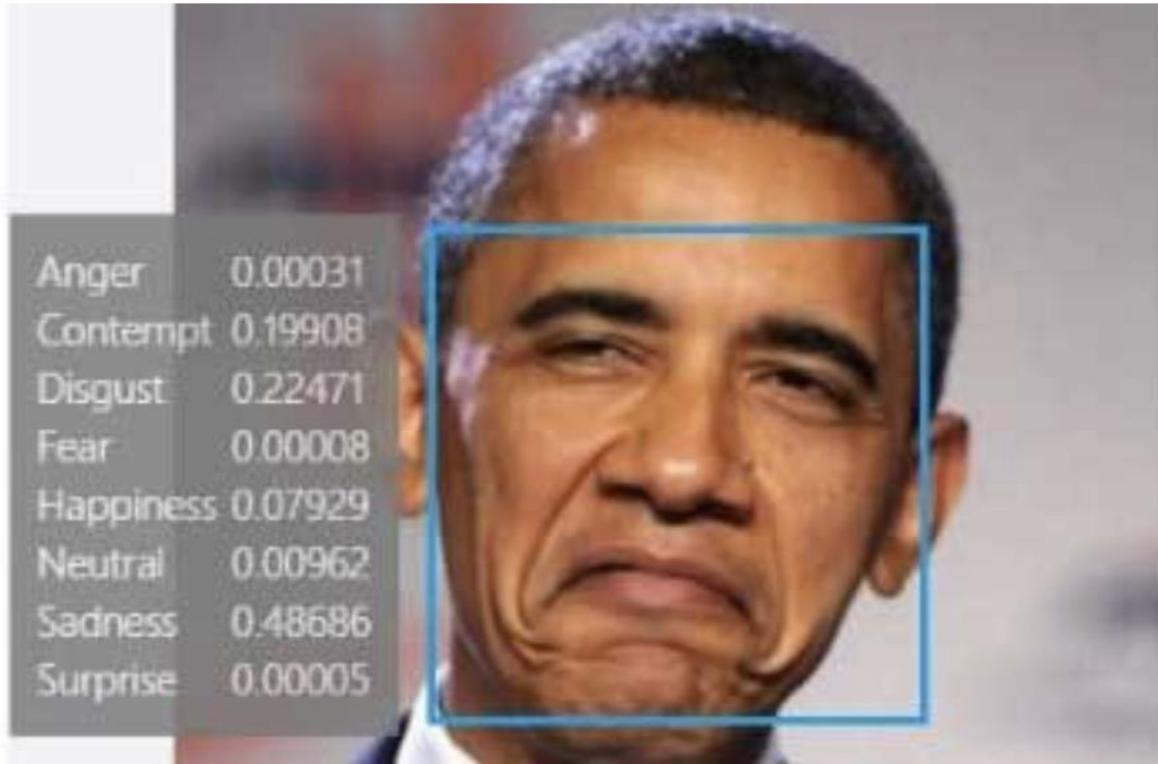
Aiva Technologies

www.aiva.ai

https://www.youtube.com/watch?v=gzGkC_o9hX6



Systems that Relate





Systems that Master



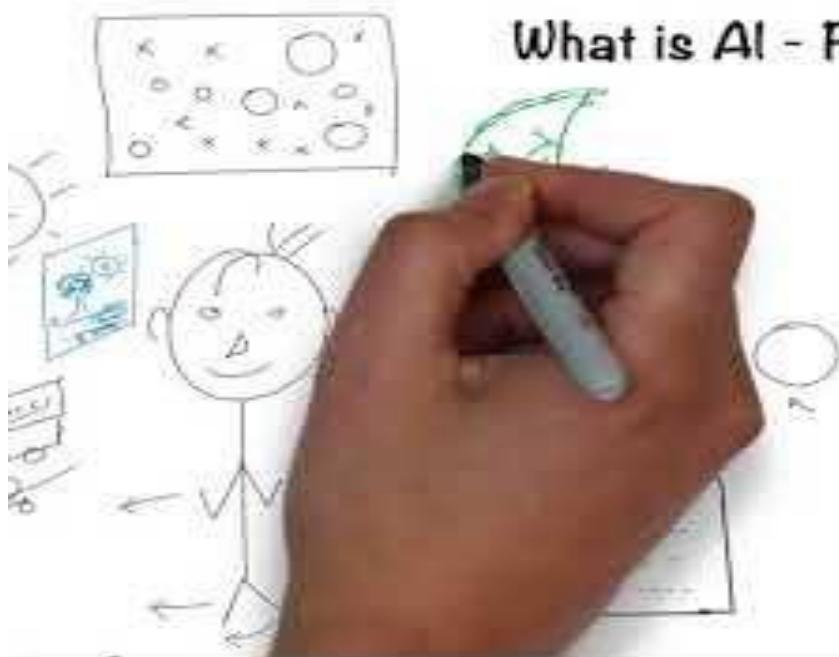
Systems that Evolve

$\log_b b^x = x$ 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.

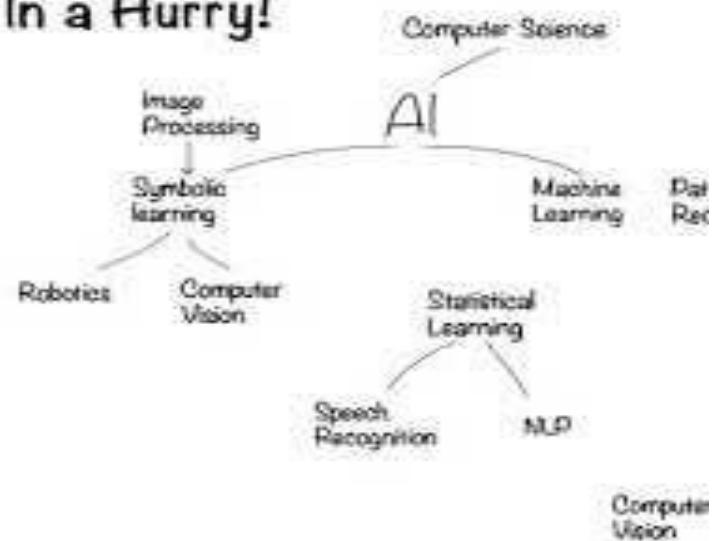
- Wikipidia



Artificial Intelligence in a Nutshell



What is AI - For People In a Hurry!

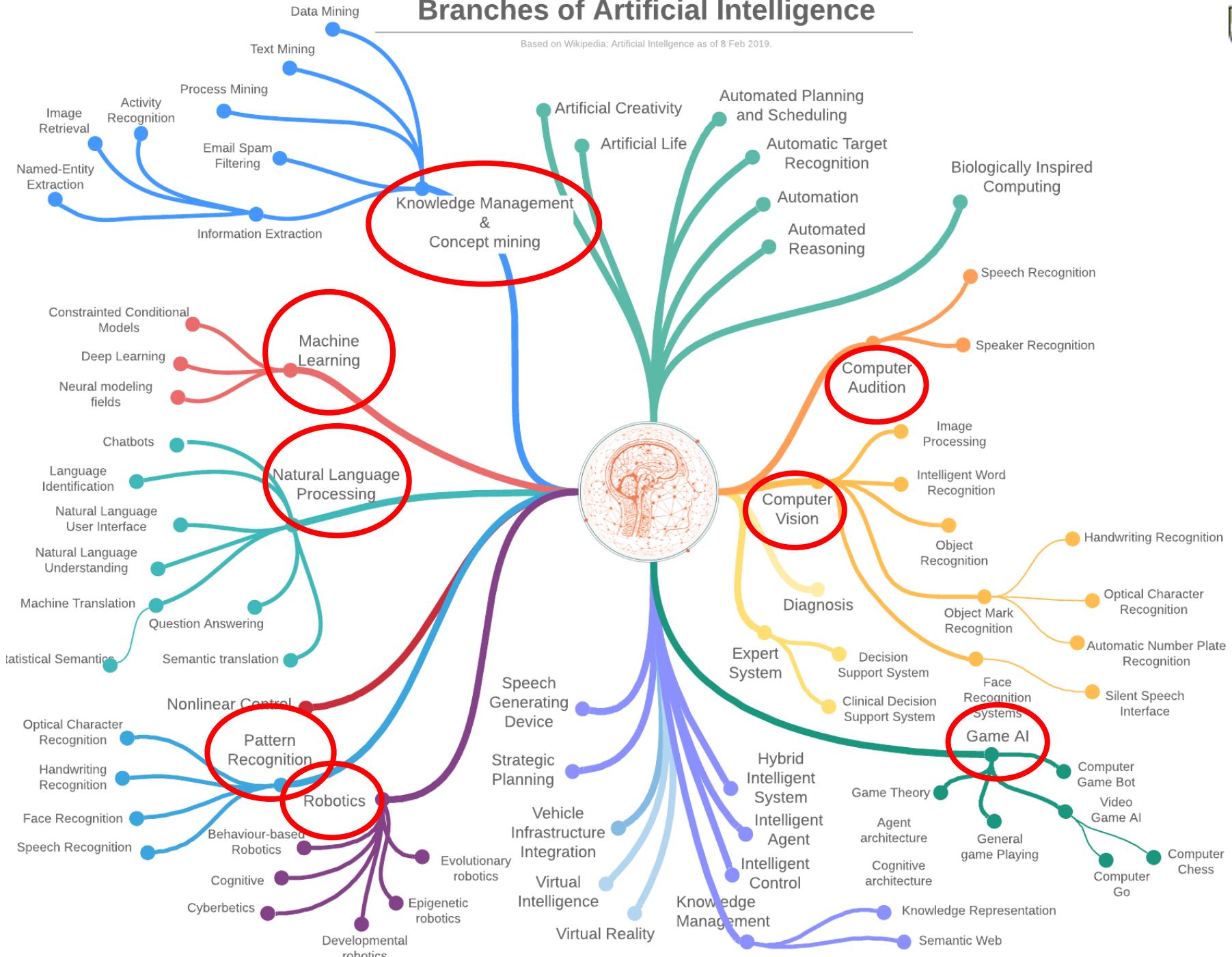


Categories of AI

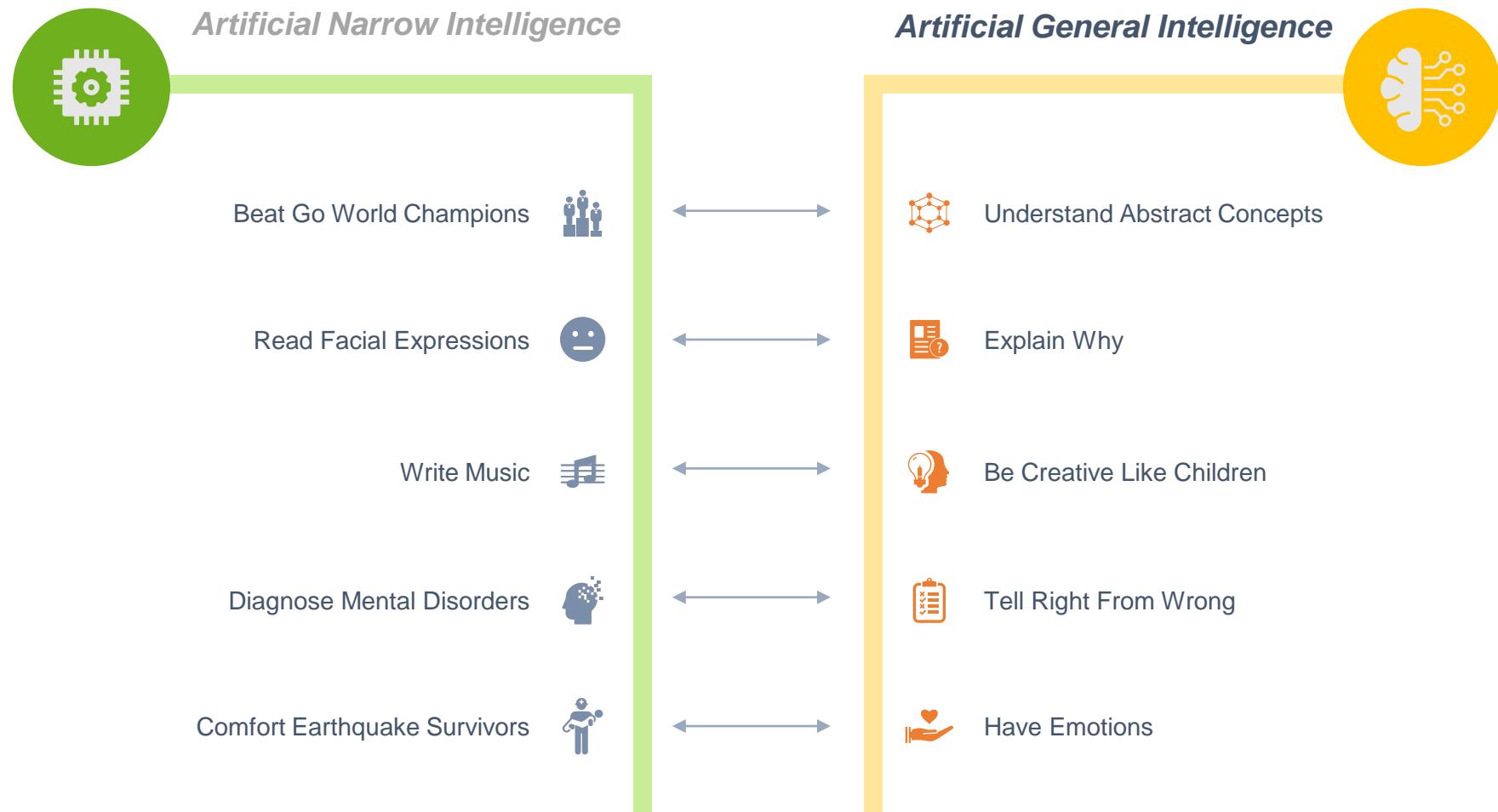


Branches of Artificial Intelligence

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 RMIT Polytechnic 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

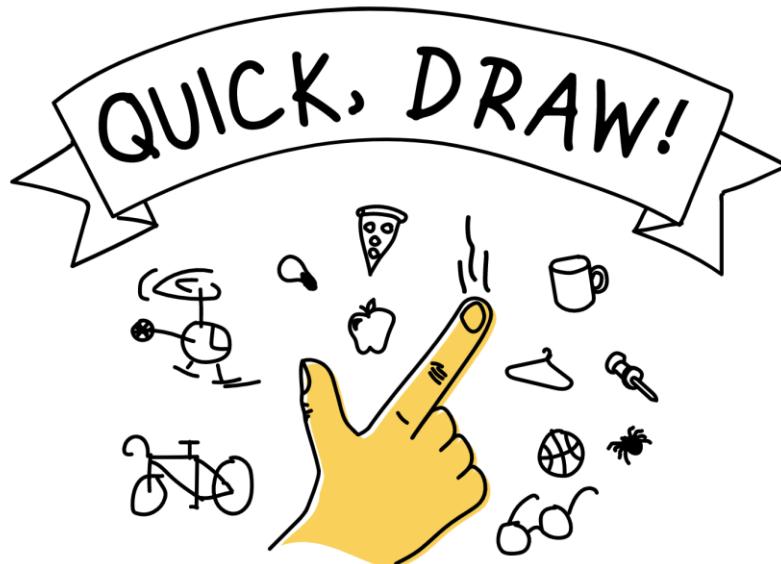
Hyperautomation

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.

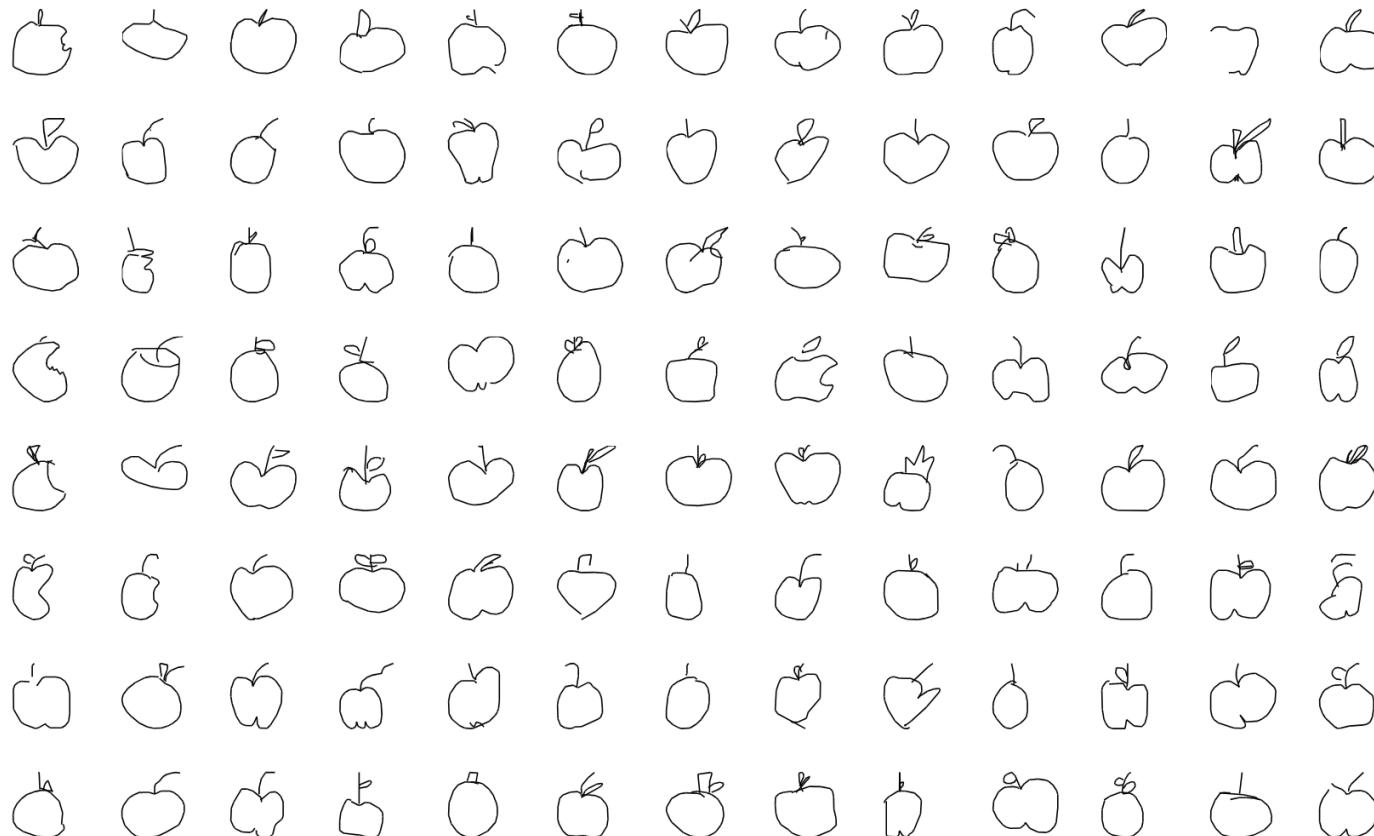
Let's Draw!





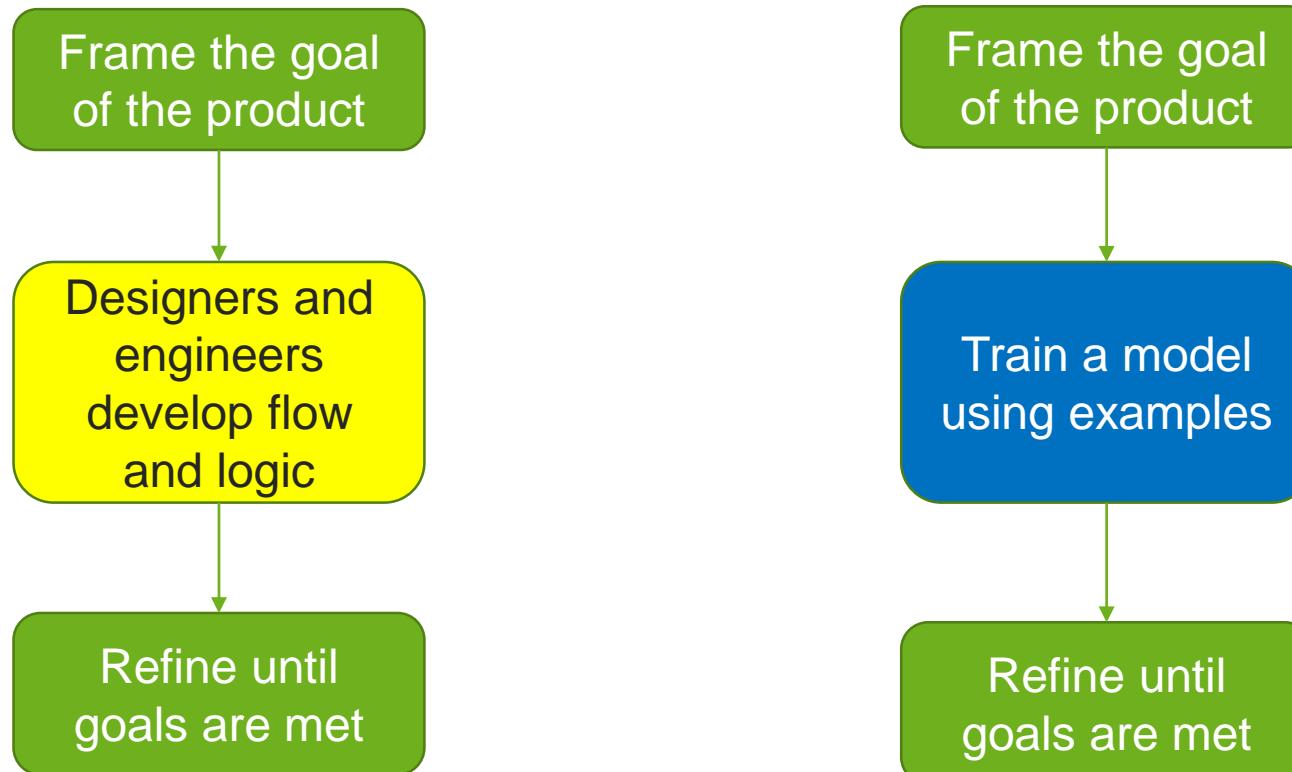
How does ML work in QuickDraw?

- <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?

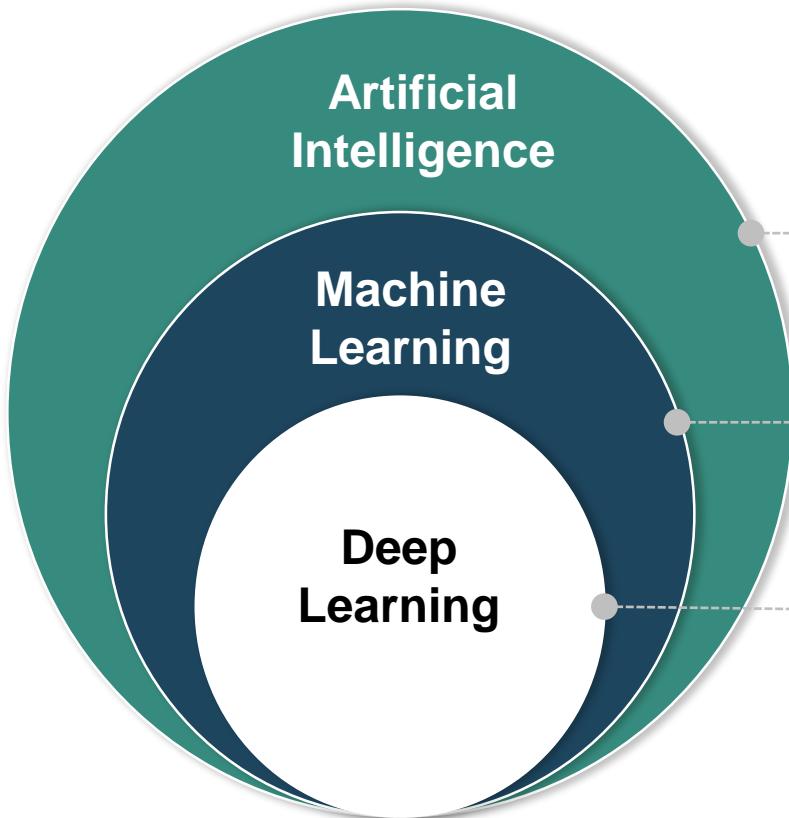
Search Engine

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.

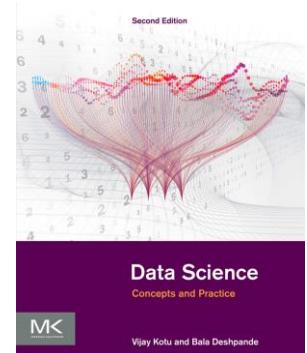
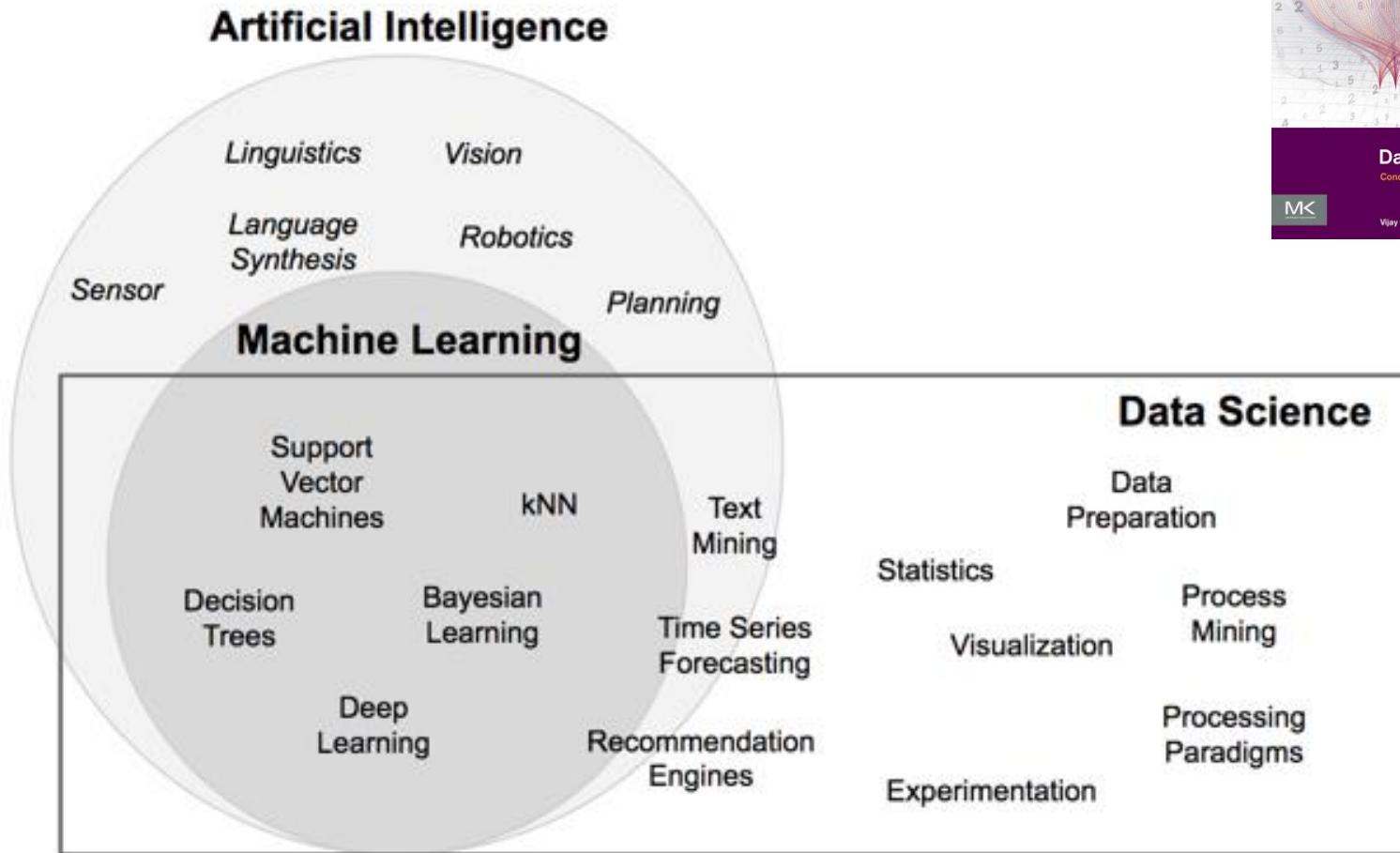


Deep Learning

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

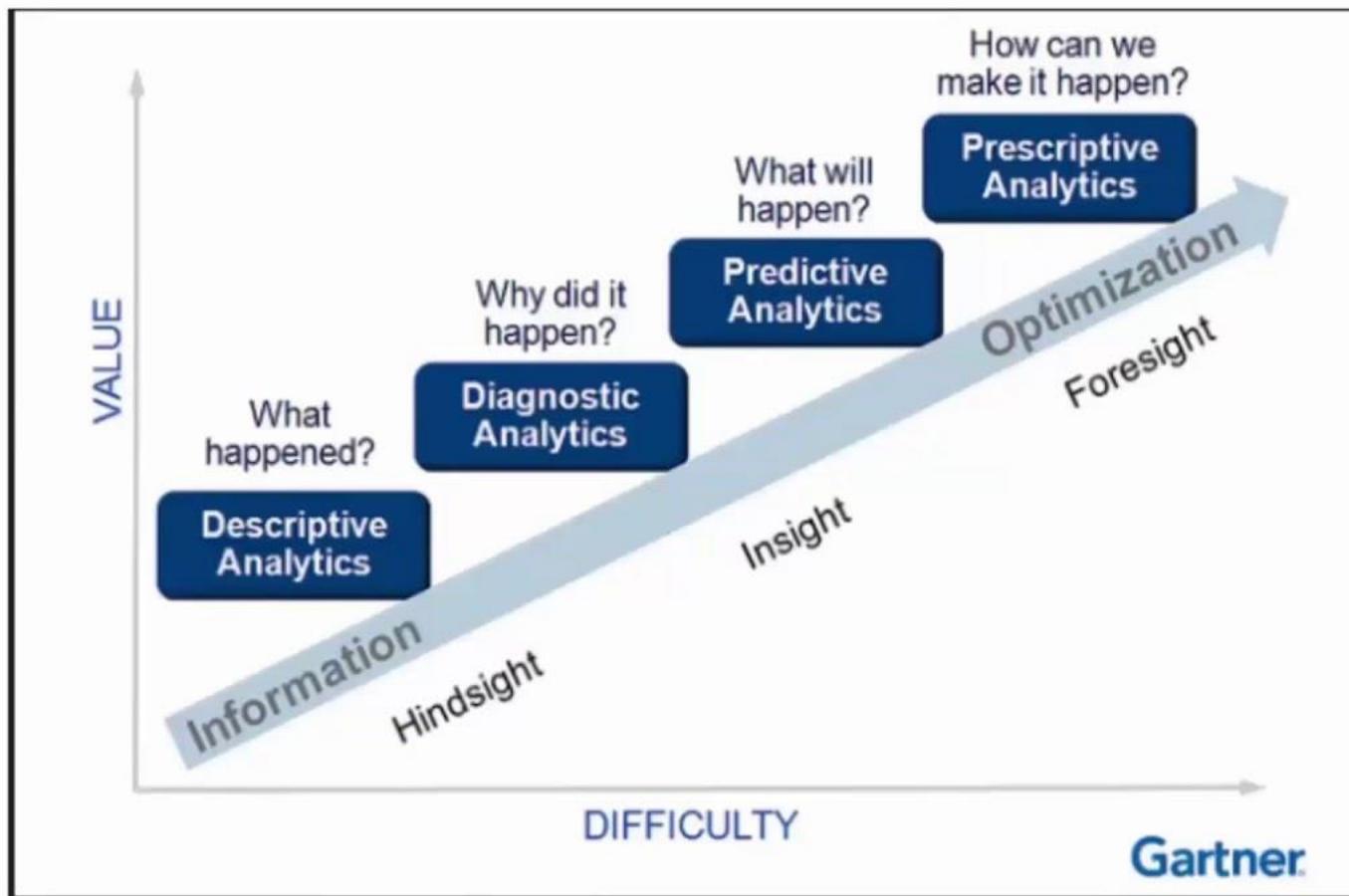


AI vs ML vs DS





Gartner Analytic Continuum



5 questions data science answers

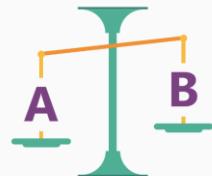


Is this weird?
(Anomaly detection)



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?

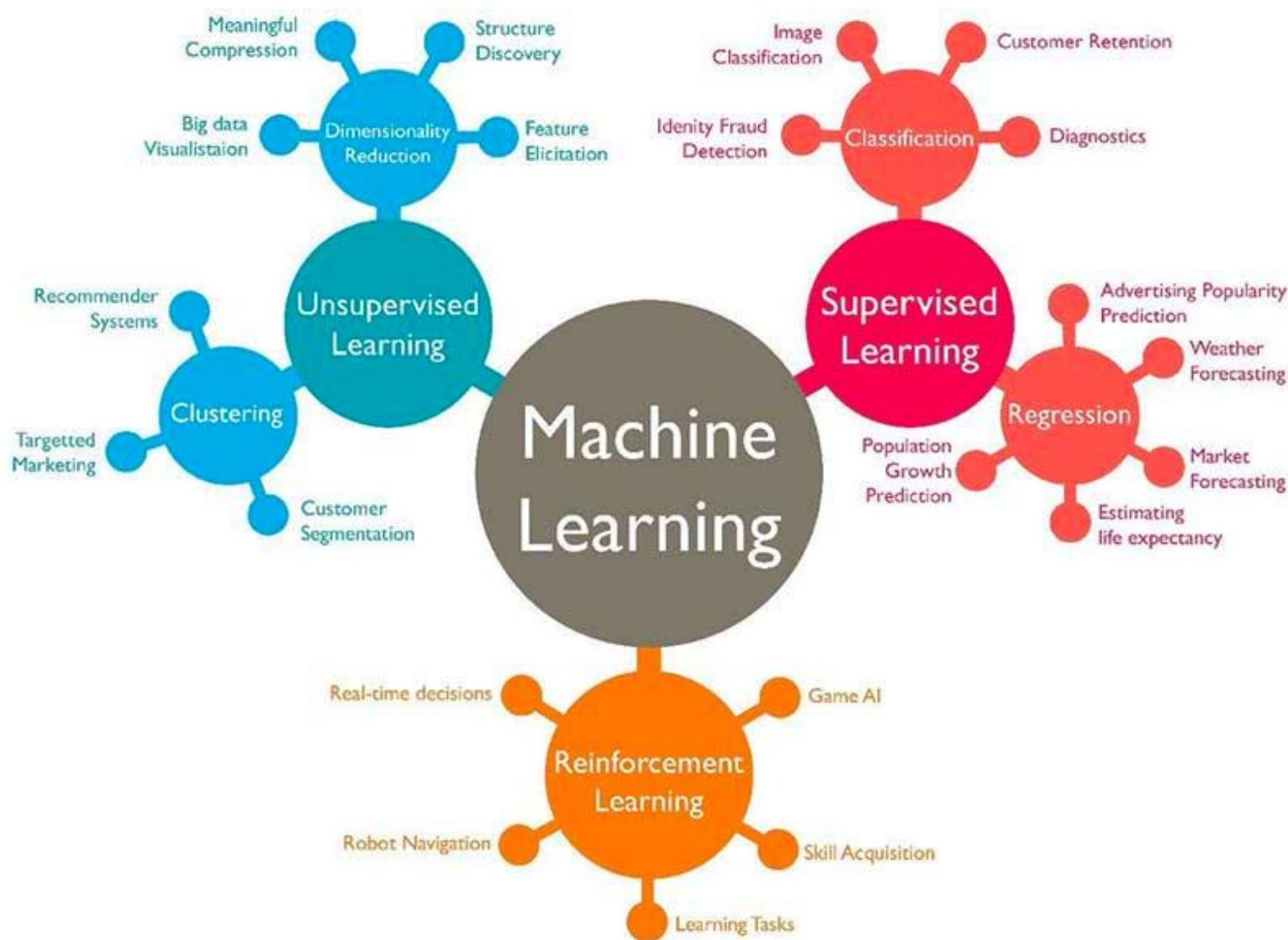
What should I do?
(Reinforce Learning)



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



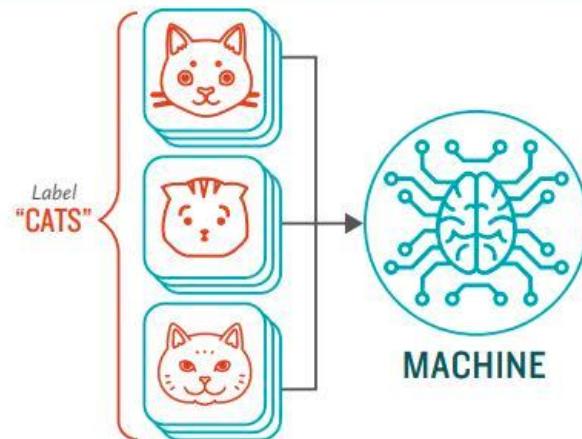


Supervised Learning

How **Supervised** Machine Learning Works

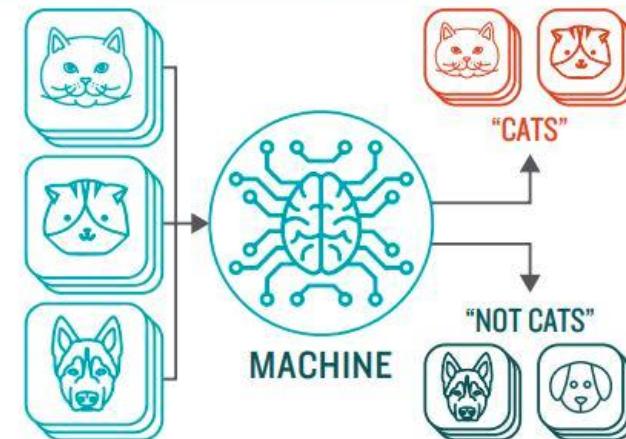
STEP 1

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

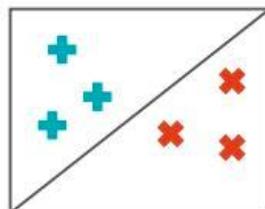


STEP 2

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

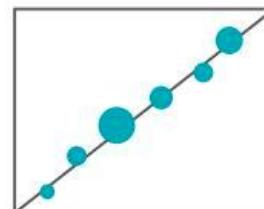


TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLASSIFICATION

Sorting items into categories



REGRESSION

Identifying real values (dollars, weight, etc.)

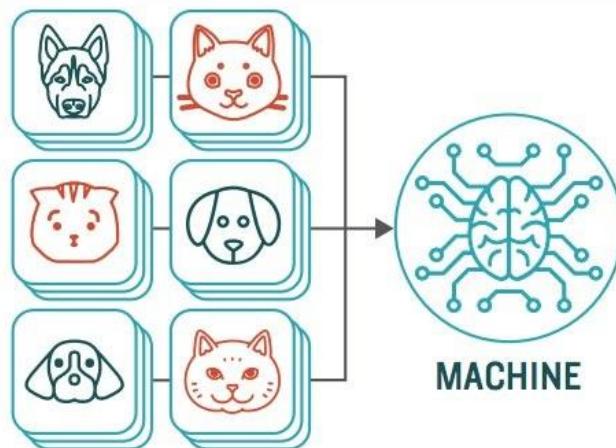


Unsupervised Learning

How **Unsupervised** Machine Learning Works

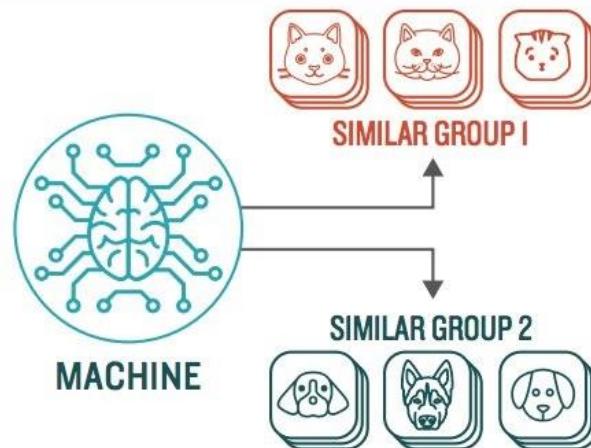
STEP 1

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

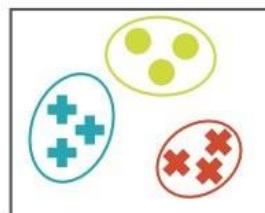


STEP 2

Observe and learn from the patterns the machine identifies



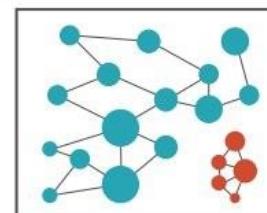
TYPES OF PROBLEMS TO WHICH IT'S SUITED



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

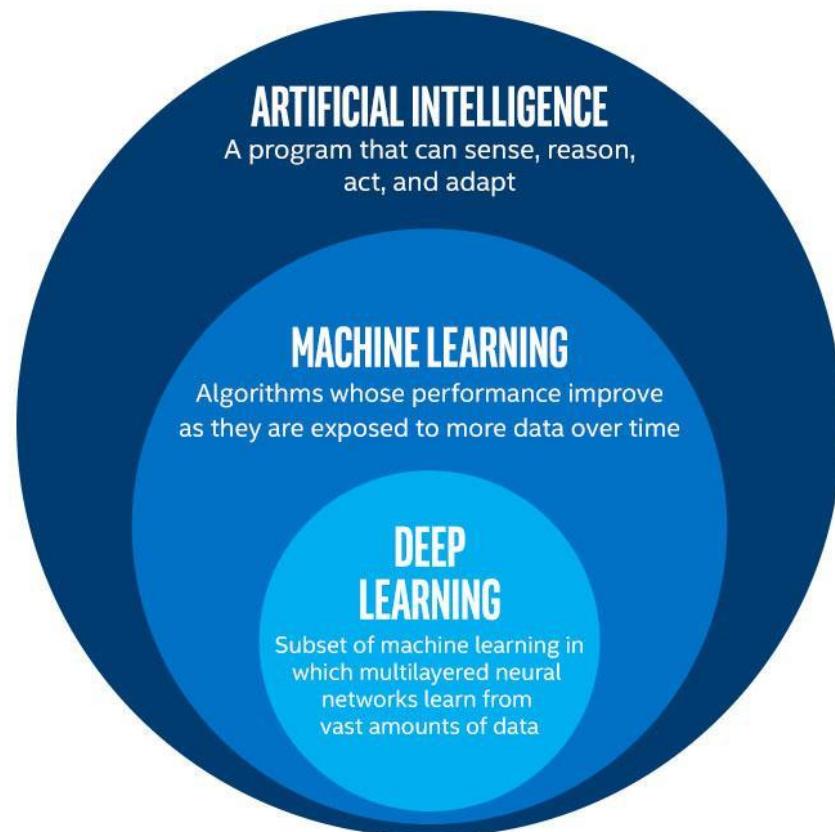


What is deep learning?

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.

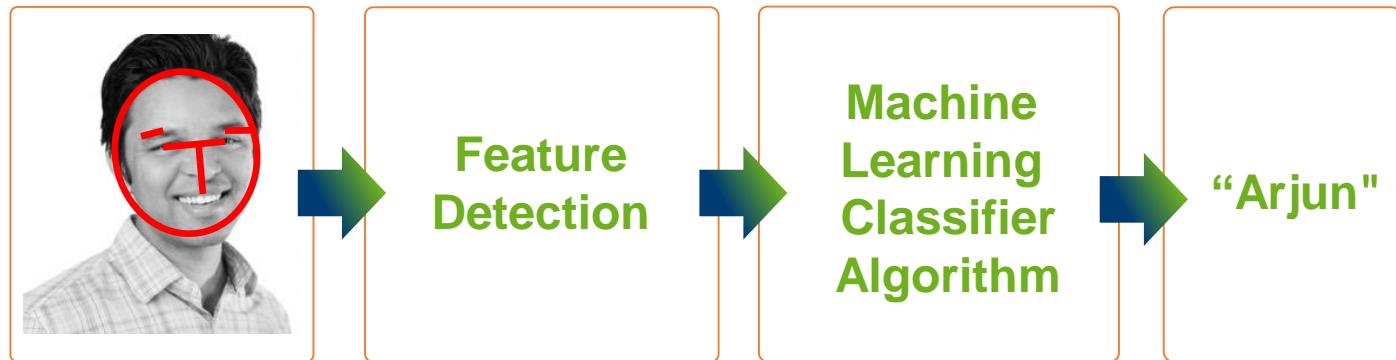




Deep Learning Example

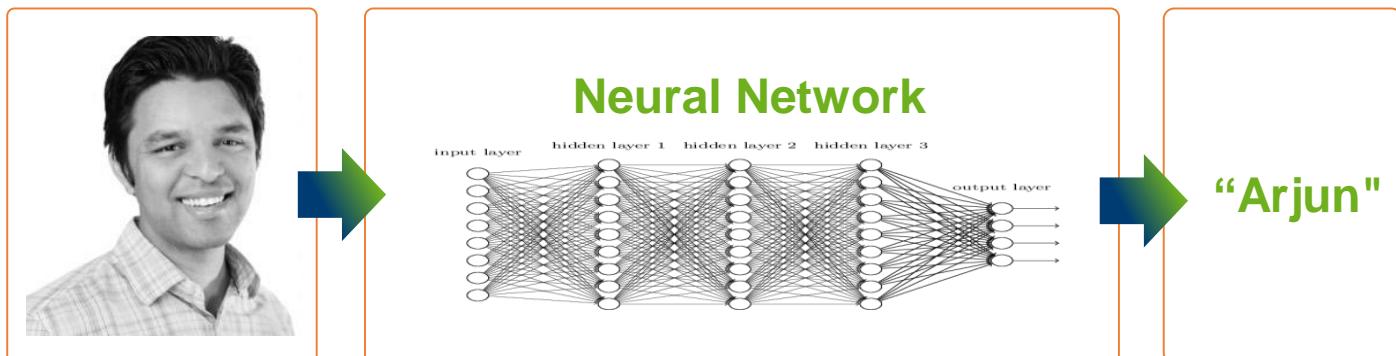
Classic Machine Learning

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



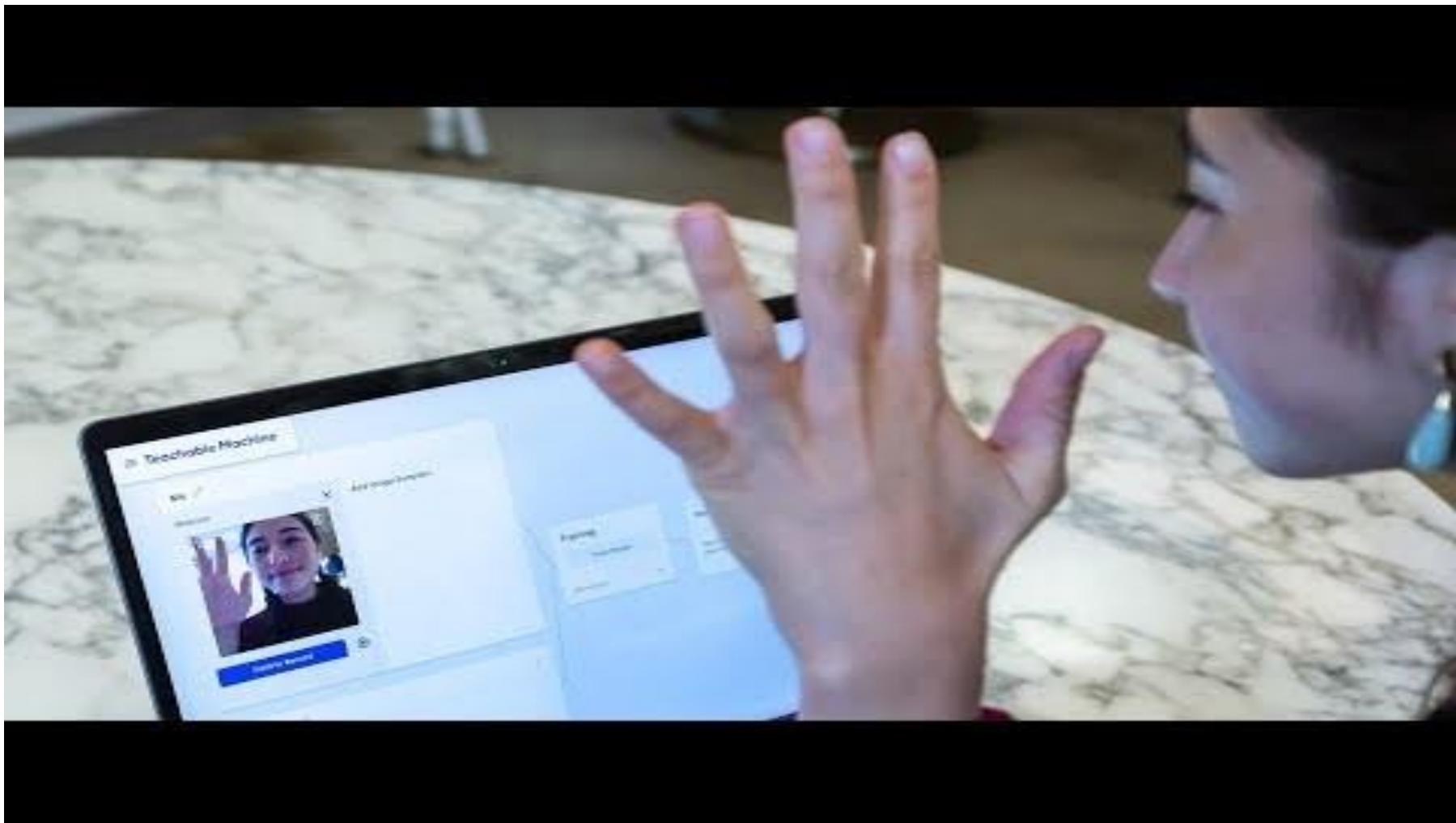
Deep Learning

Steps 1 and 2 are combined into 1 step.





Teachable Machine



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



Reinforcement Learning



Photo: ST



Reinforcement Learning

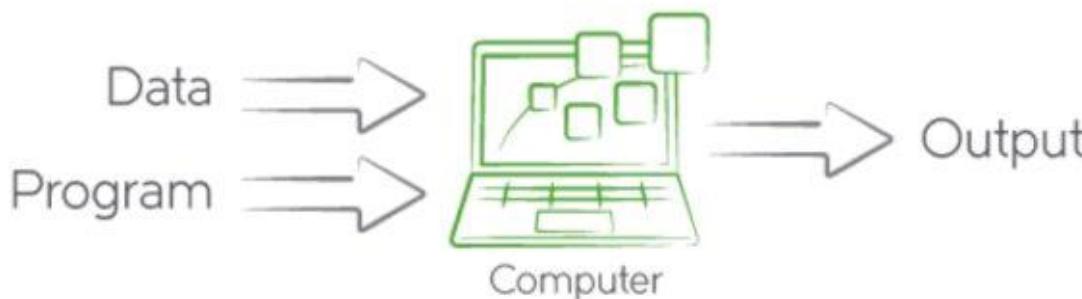




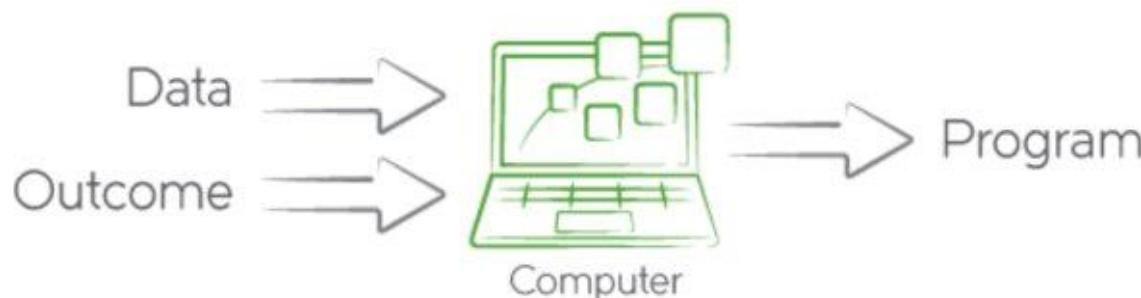


Traditional Programming vs Machine Learning

Traditional Programming

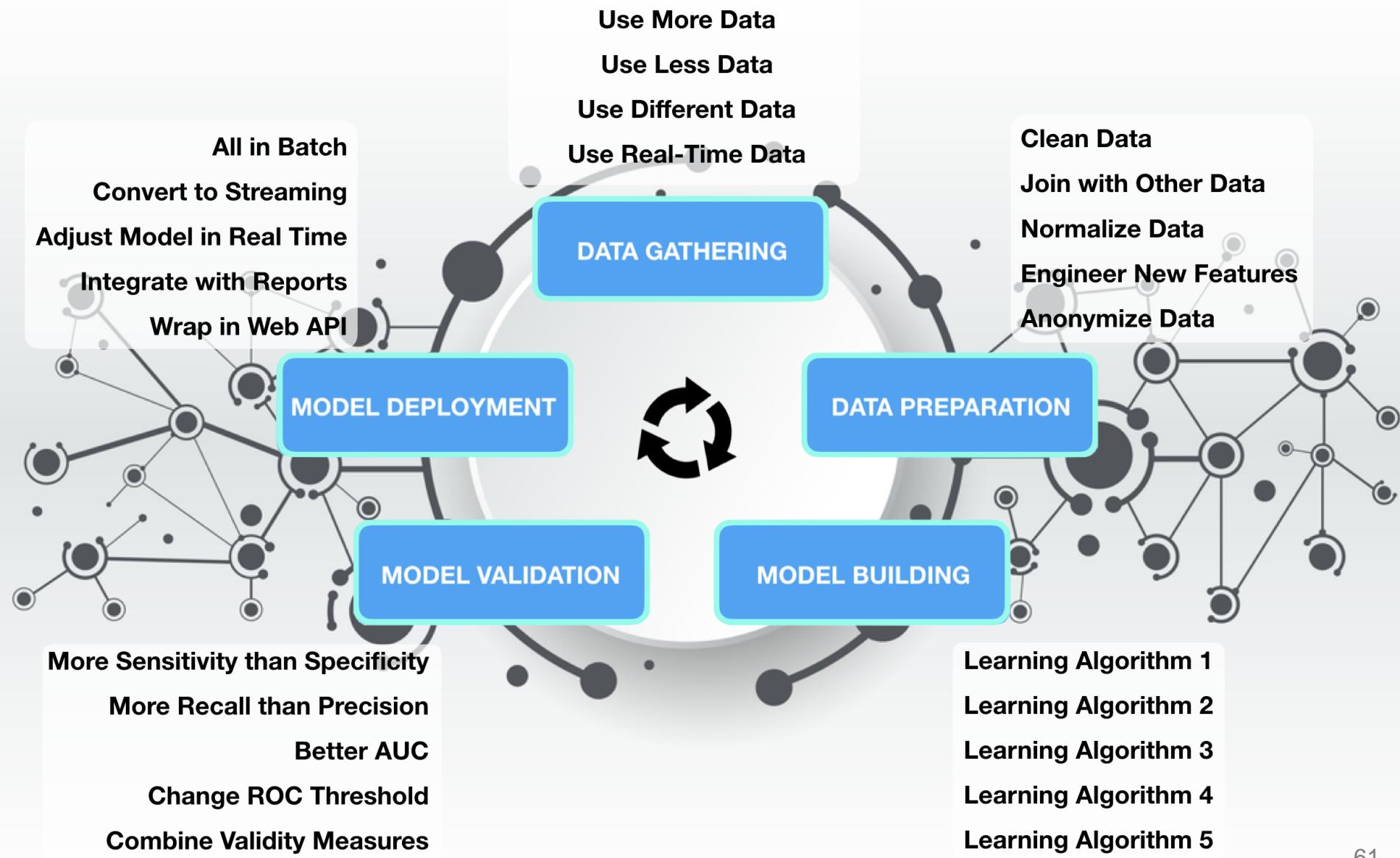


Machine Learning





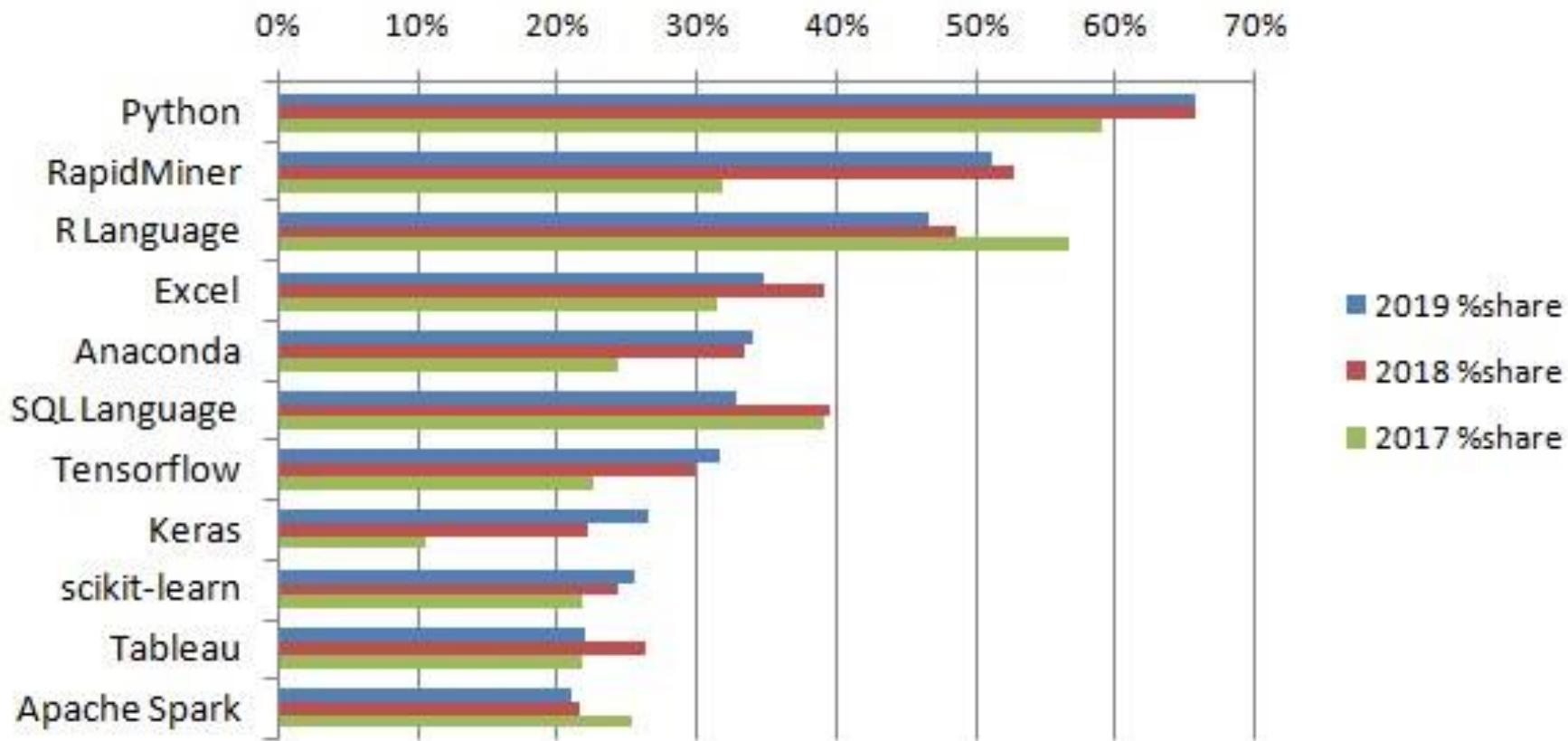
AI/ML Workflow





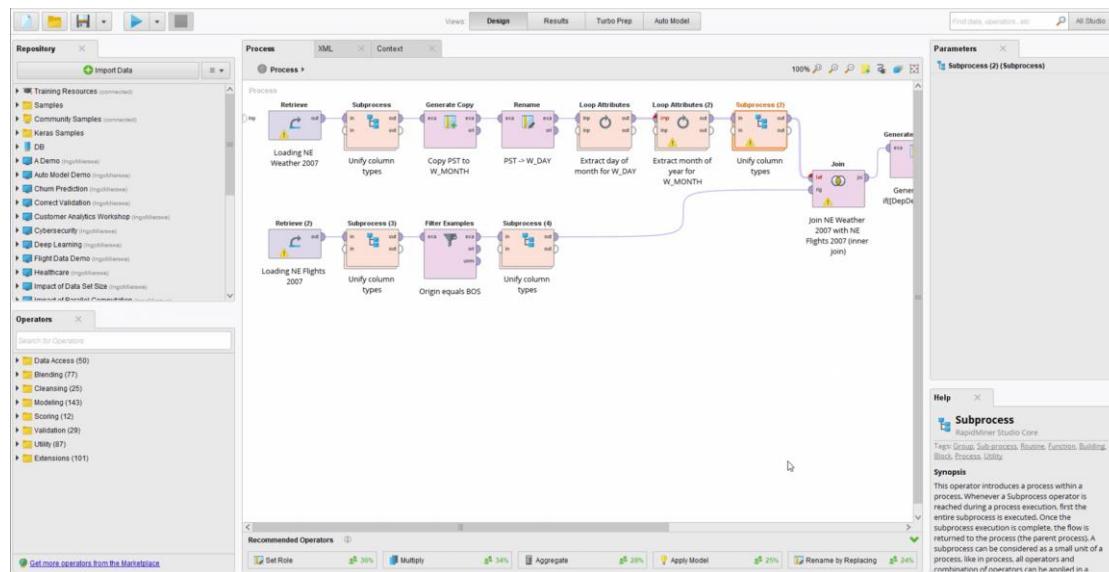
What are the popular tools?

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

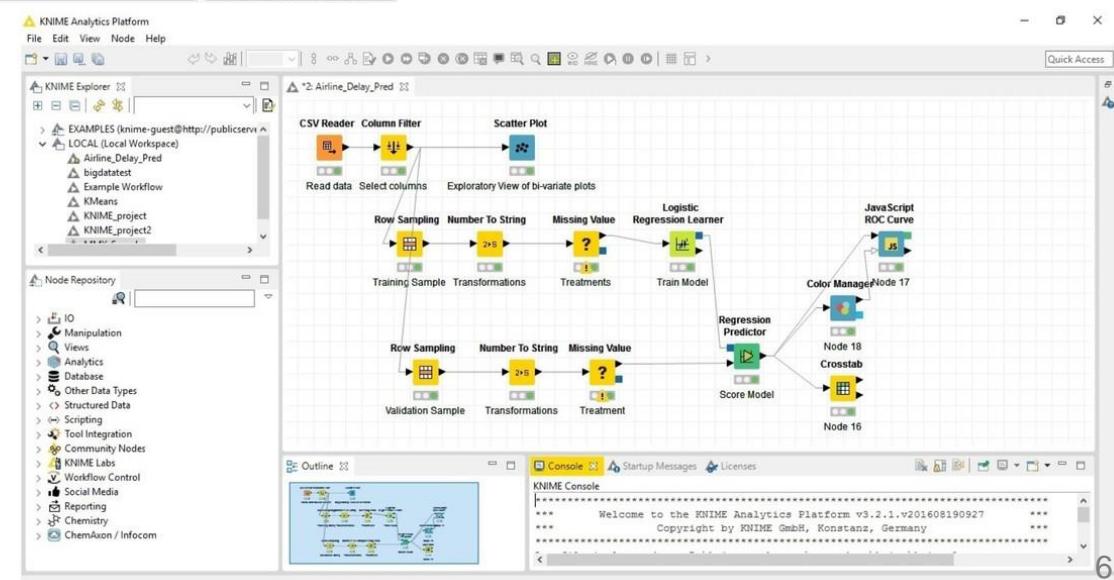




Graphical Tools (ML/DS)



RapidMiner

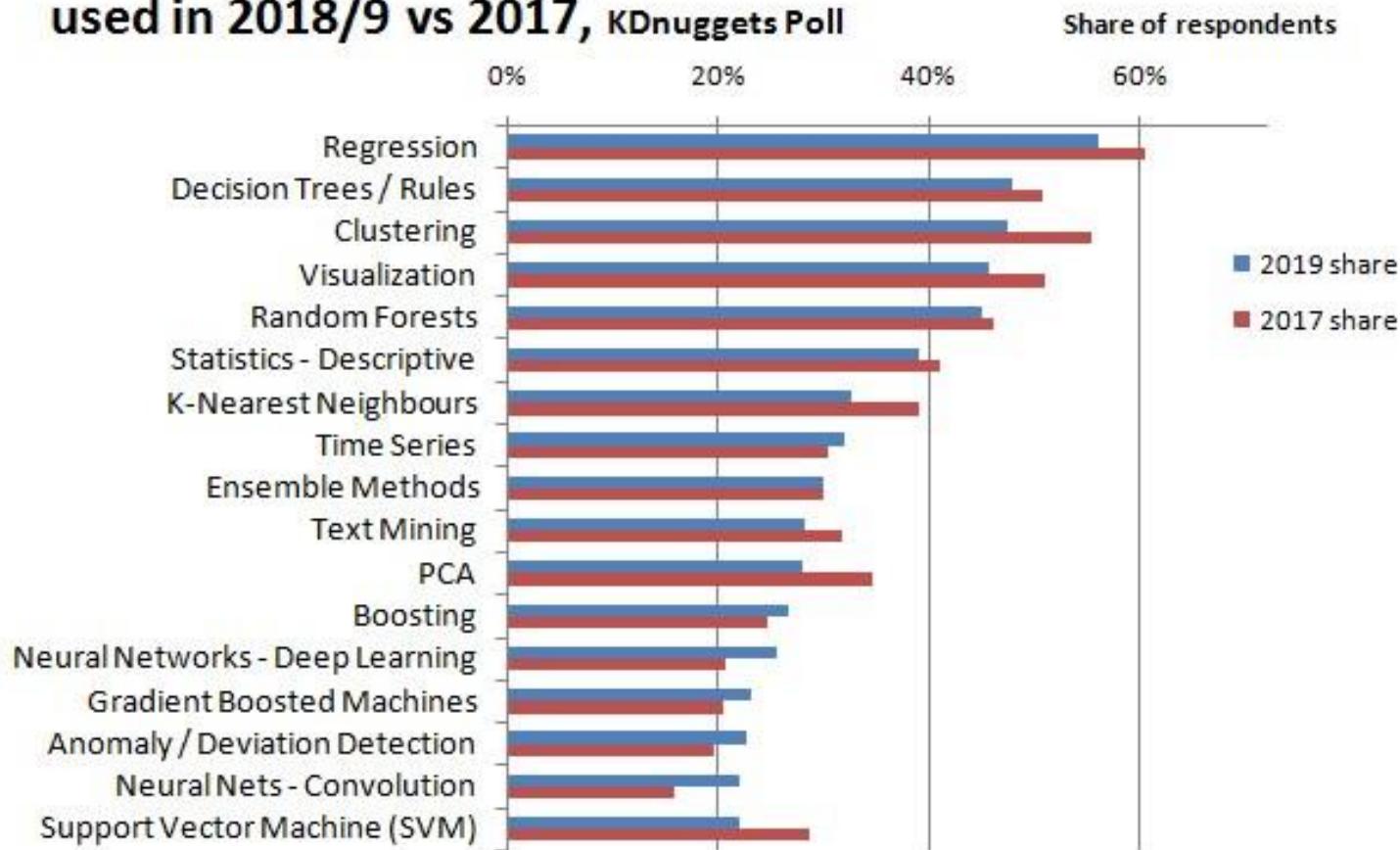


KNIME



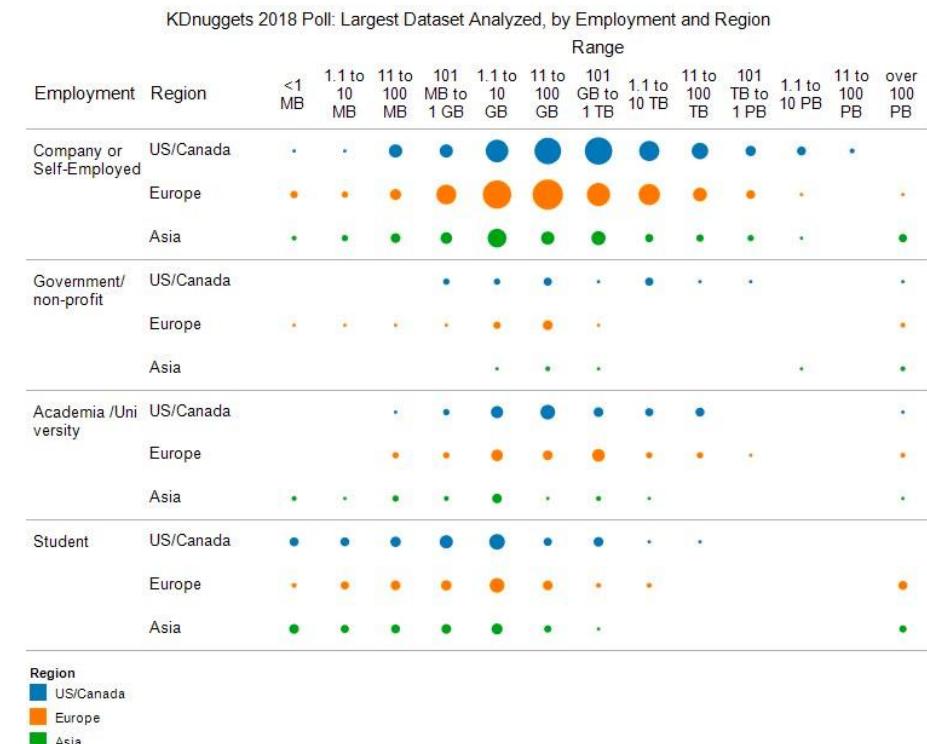
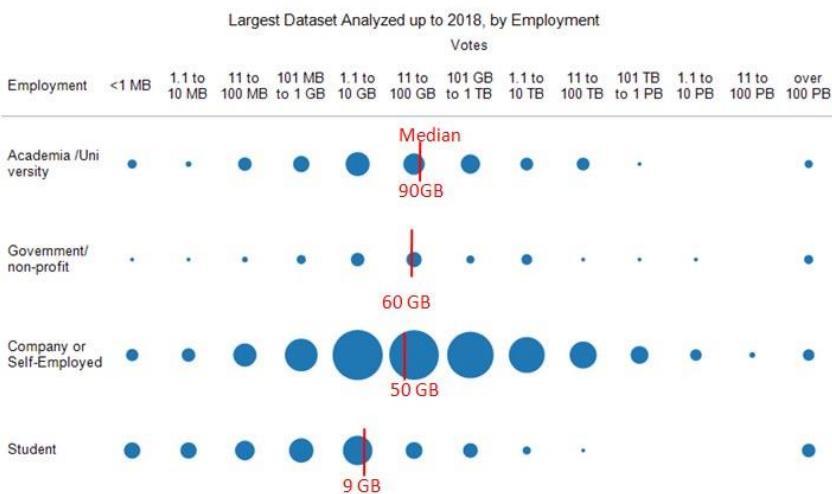
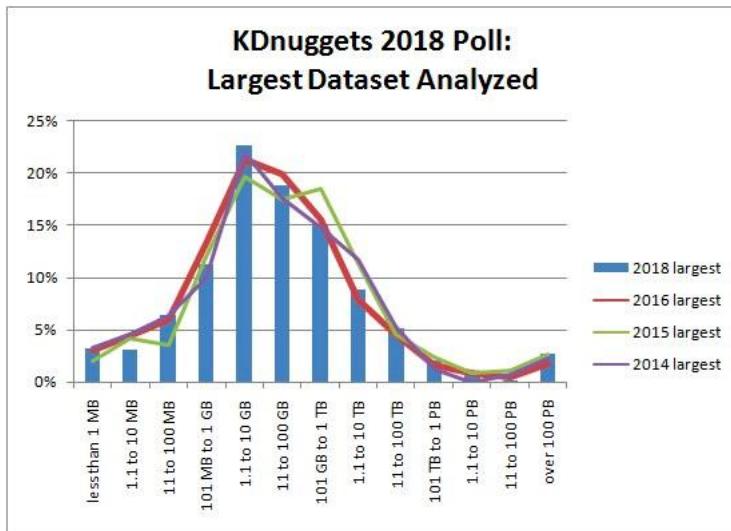
Top Methods/algorithms

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





Largest Datasets Analysed





Platform - BigML

What is....



Quick 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 search

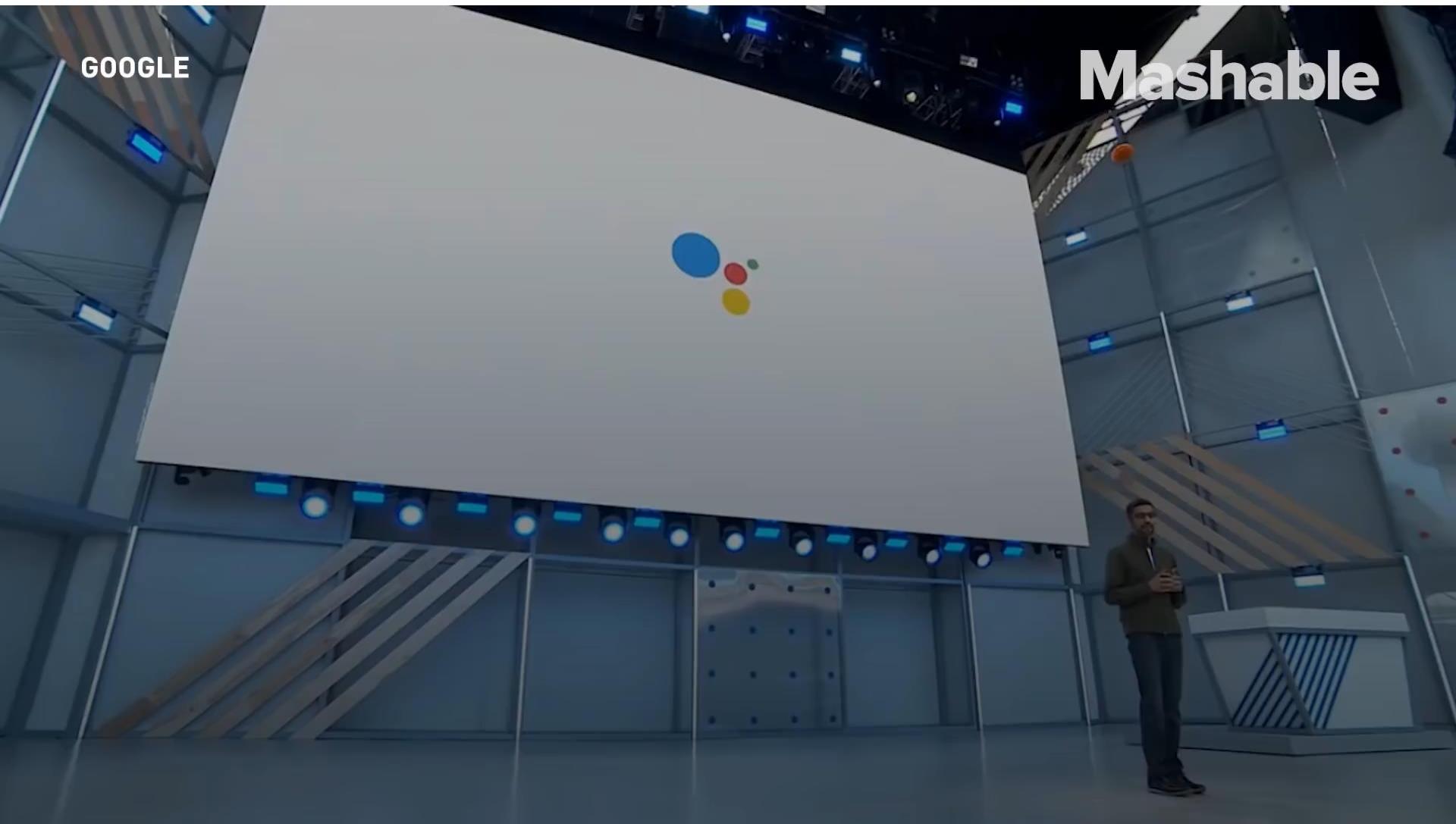


<https://ibm.co/36SOnTN>

Where is AI applied?



AI assistant make real phone call



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

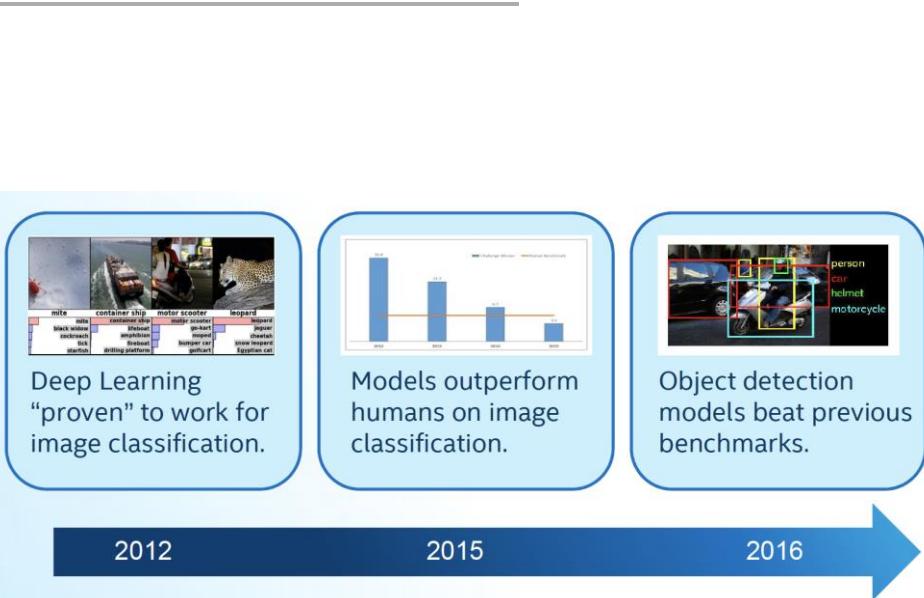


We carry around powerful natural language processing algorithms in our phones/computers.

Object detection



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



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





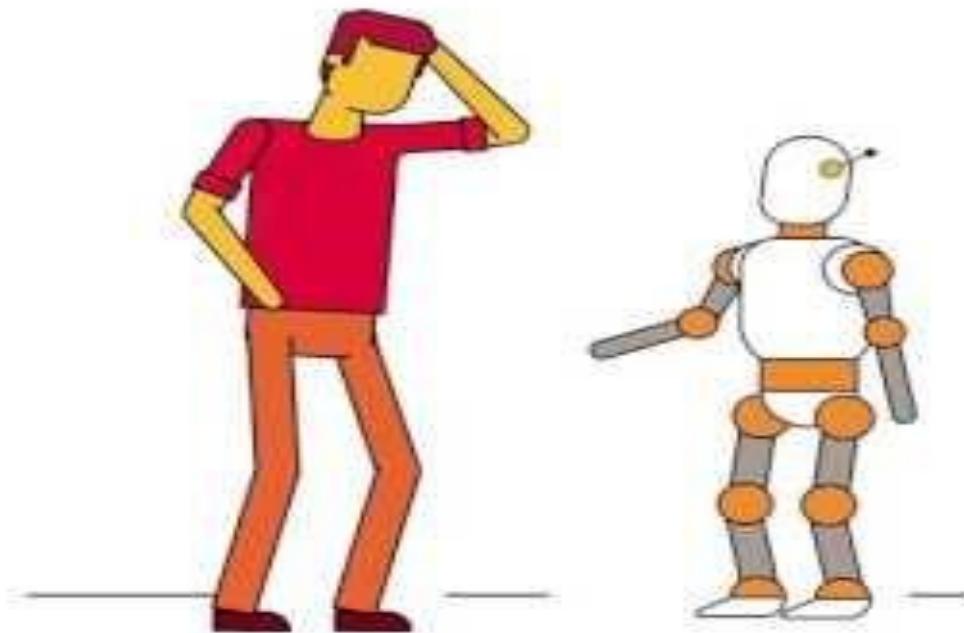
Travel

- 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





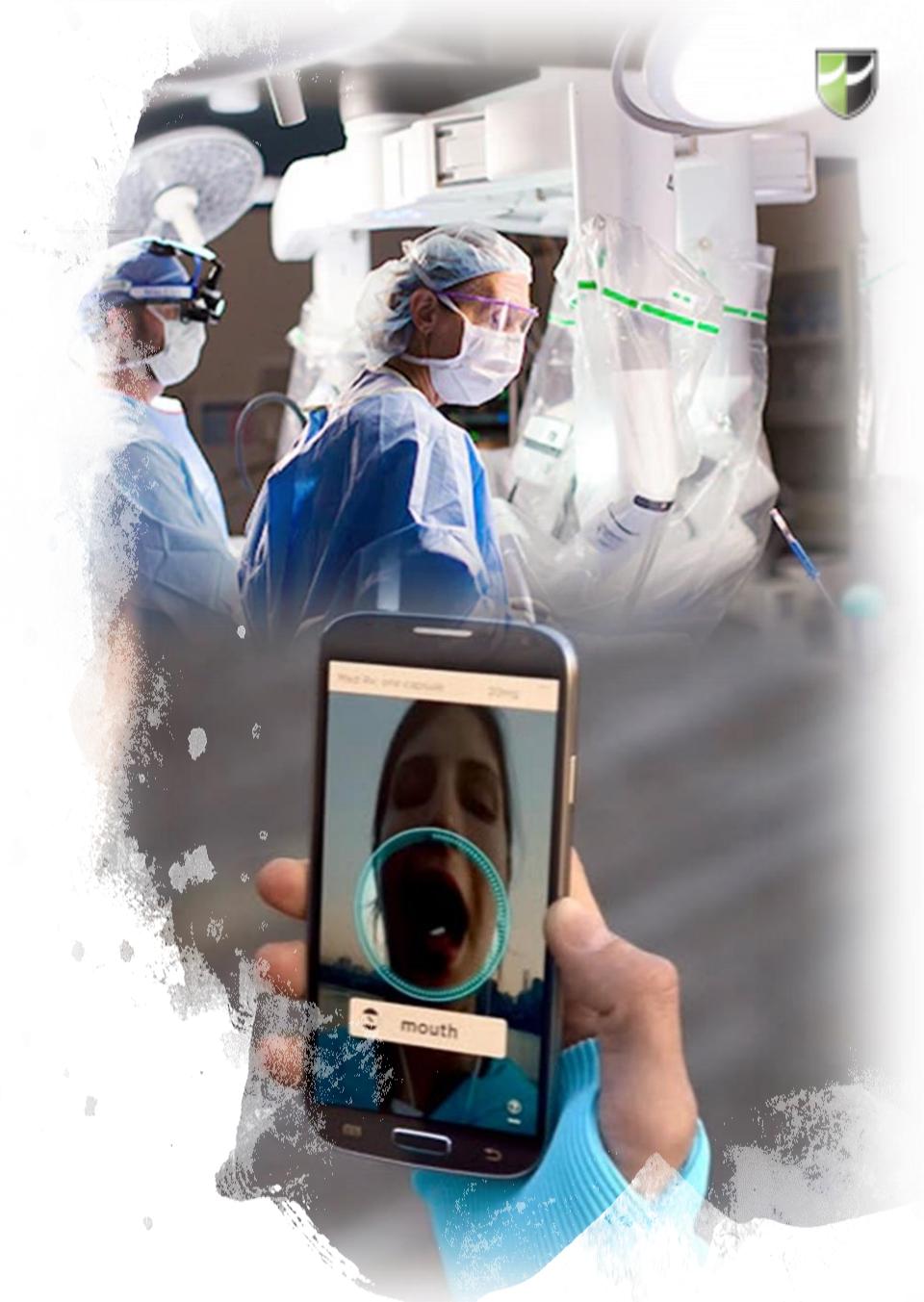
AI in Healthcare





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

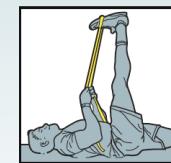
AI algorithms optimize hospital operations, staffing schedules, and inventory by using medical and environmental factors to forecast patient behavior and disease probabilities



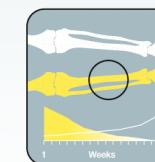
AI tools analyze patients' medical histories and environmental factors to identify people at risk of an illness and steer them to preventive care programs



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



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



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



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)



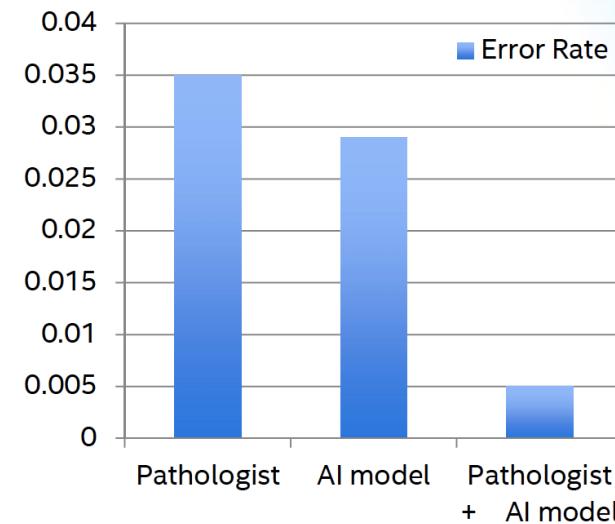
Now with AI : Doctors can provide diagnoses more efficiently and accurately, with the availability of:

- 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

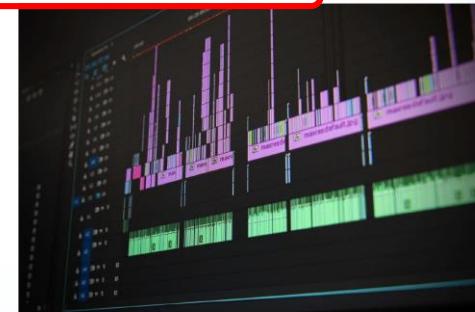
Traditionally : Doctors would diagnose a condition and recommend a treatment based on what historically worked for most people.

- 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.

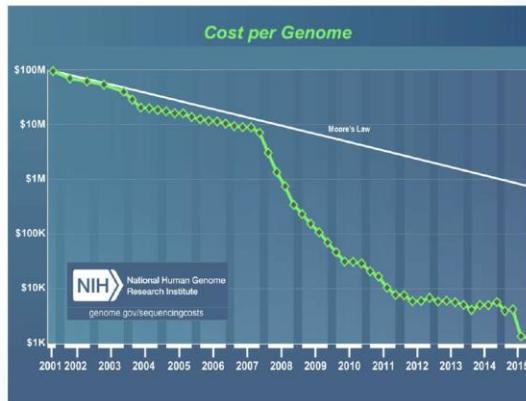




Healthcare – Genome Sequencing

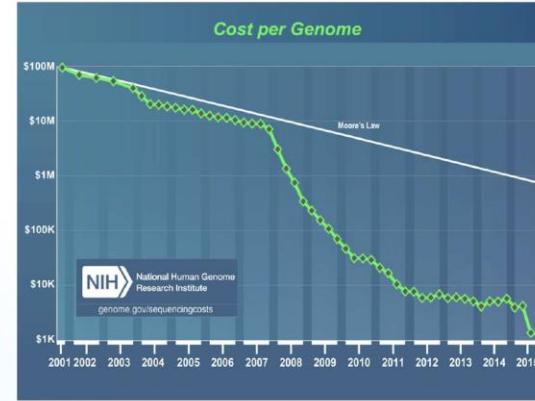
In 2001: Full human sequencing cost \$100 million.

- 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





Autonomous Car

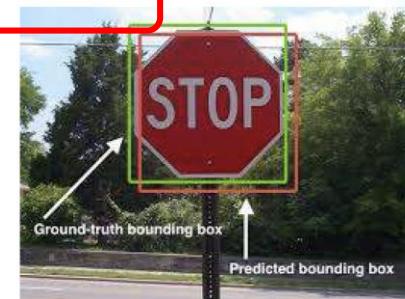
Traditionally: Despite having safer cars, the number of deadly car accidents have been on the rise the last few years.

- 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



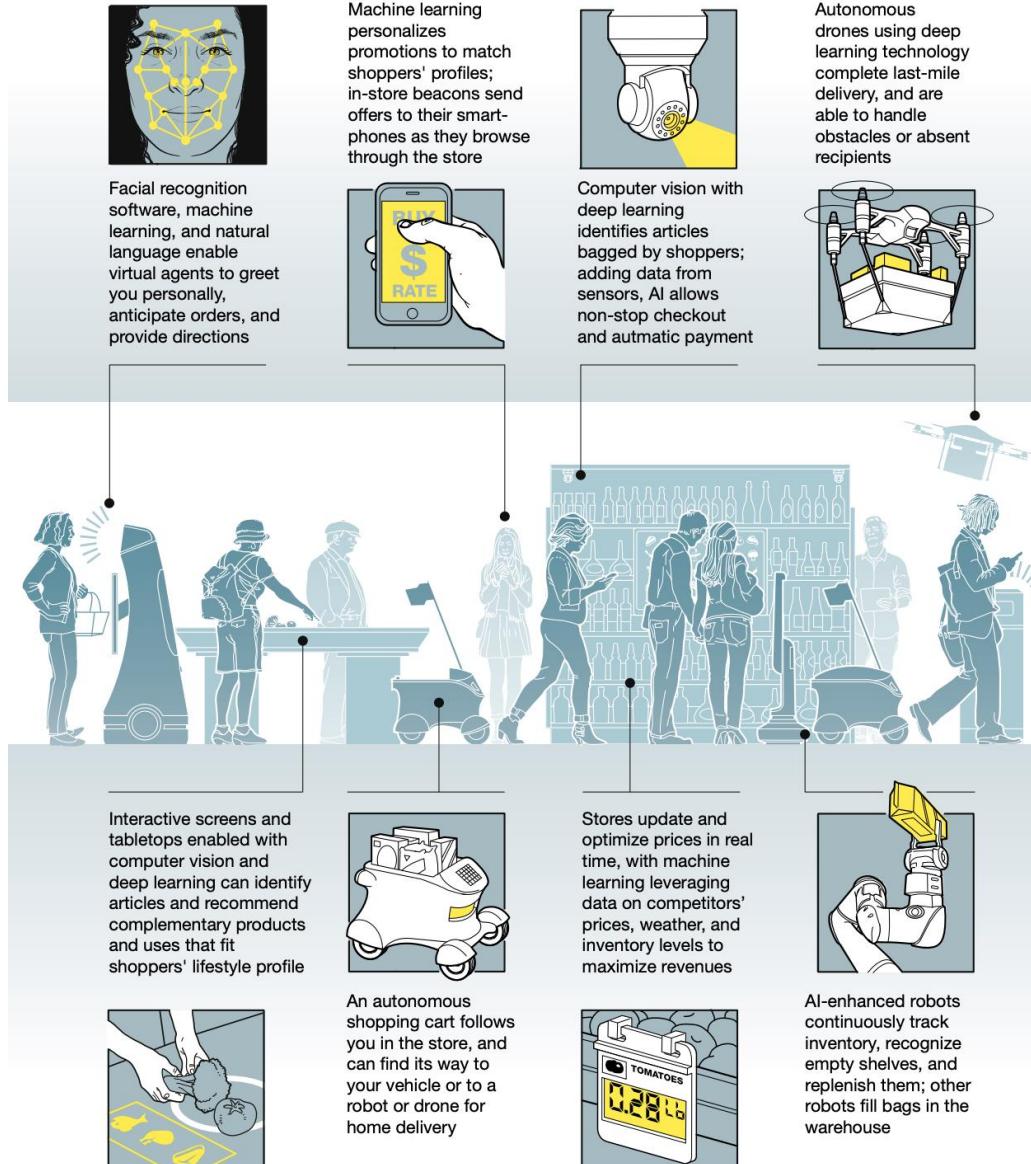
AI in Retail



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

HOW COLD DO YOU EXPECT IT TO BE? (°F)

THE NORTH FACE

FLUIDXPS by IBM Watson



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



The background of the slide shows a field of young green plants, likely soybeans, growing in rows. The plants are supported by thin vertical stakes. The sky above is clear and blue.

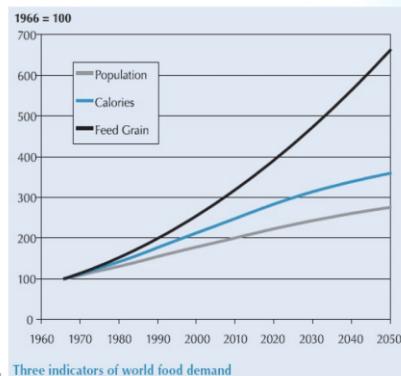
R BLUERIVER



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.

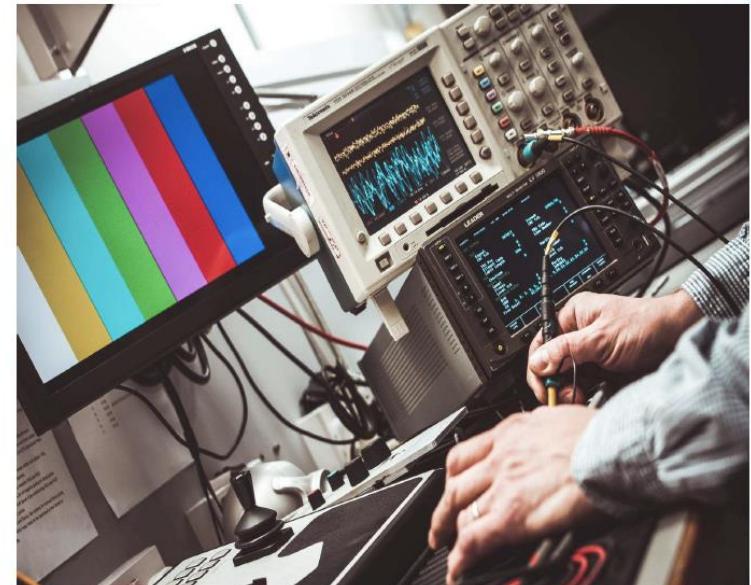




AI for Music Generation

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.

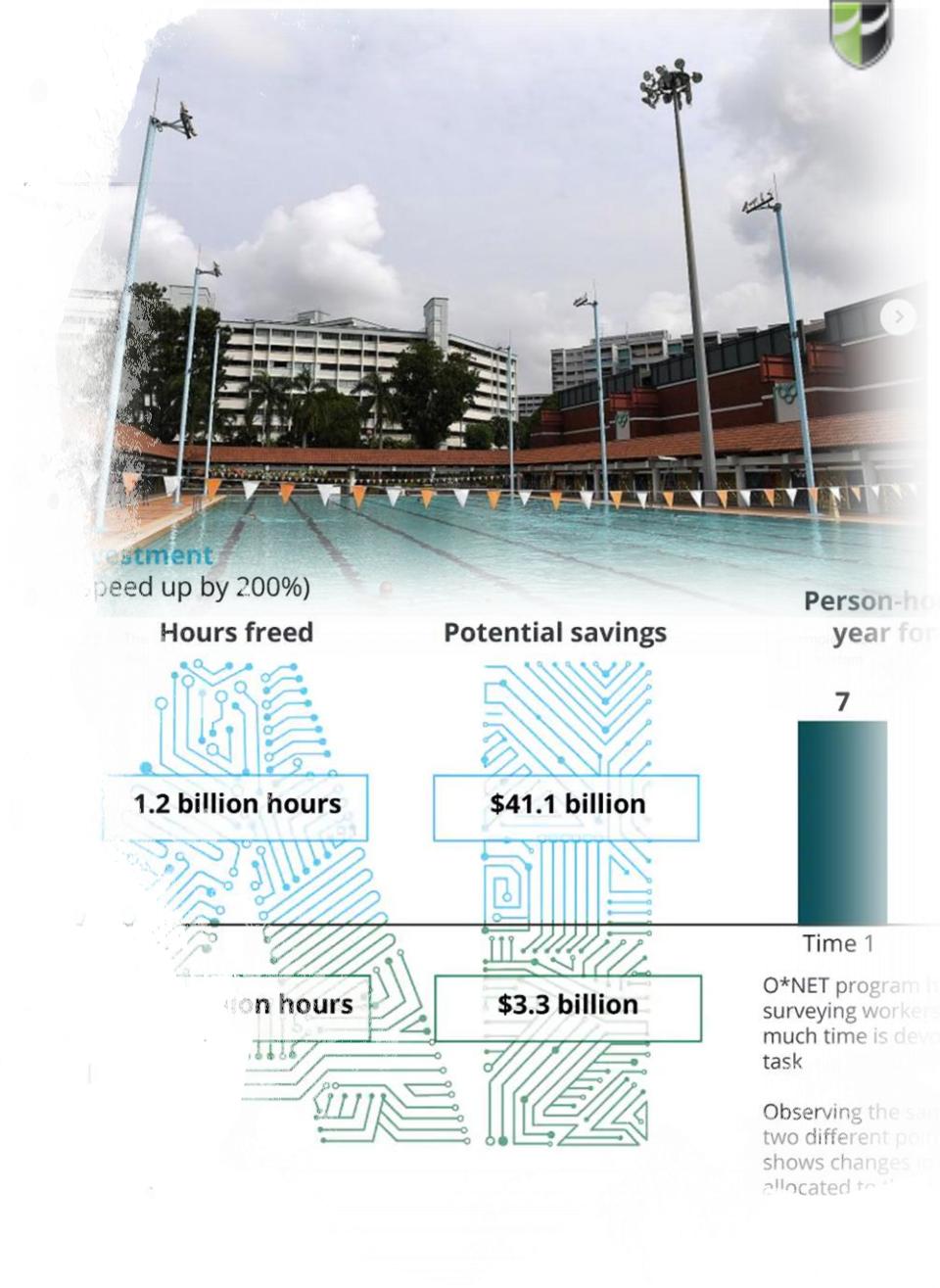


The instrumentation was composed with artificial intelligence, lyrics and vocal melodies written by Taryn. Let us know what you think in the comments!



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

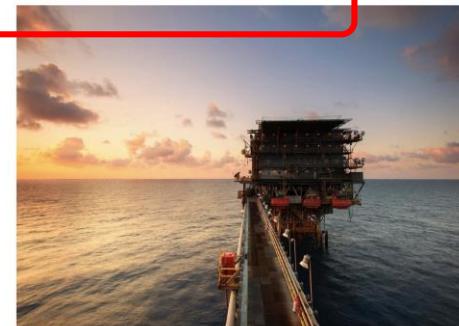
Traditionally: Shrinking oil reserves force companies to operate in remote and possibly hostile areas.

- 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.



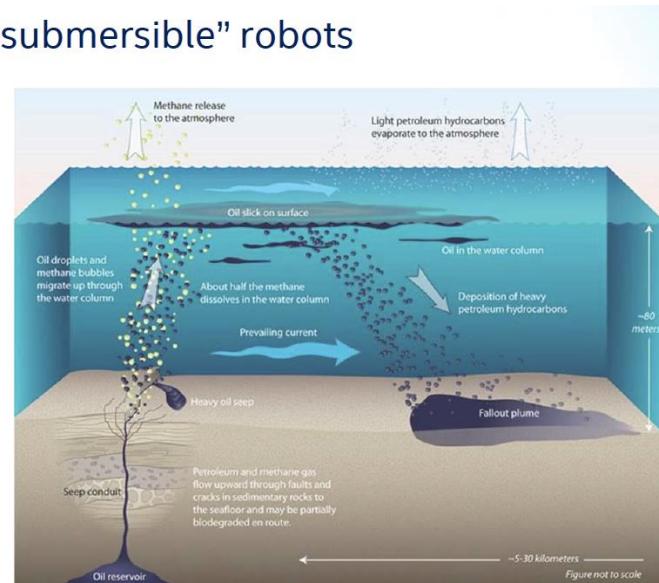
Now with AI: AI uses economic, political and weather data to forecast optimum production locations.

- 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.

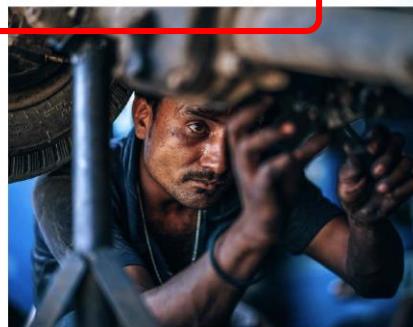




Preventive Maintenance

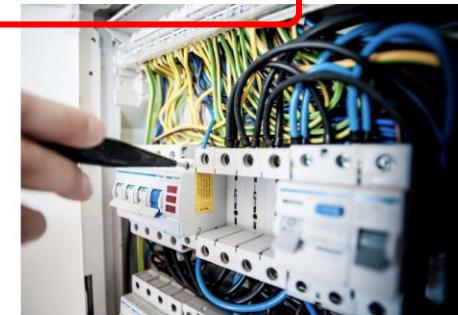
Traditionally: Relied on historical data to provide basis for preventative maintenance schedule.

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



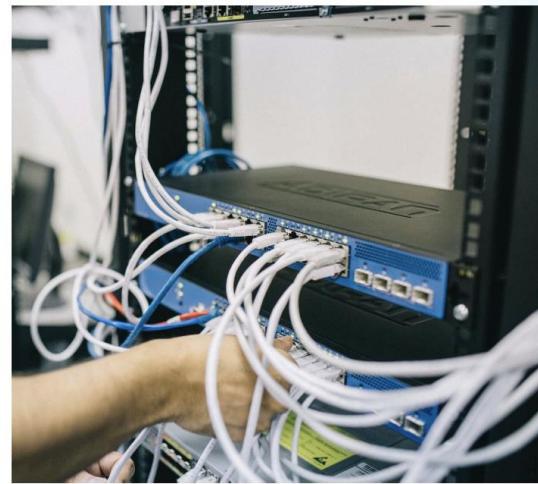
Now with AI: Internet of Things (IoT) sensors help to optimize maintenance scheduling.

- 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.

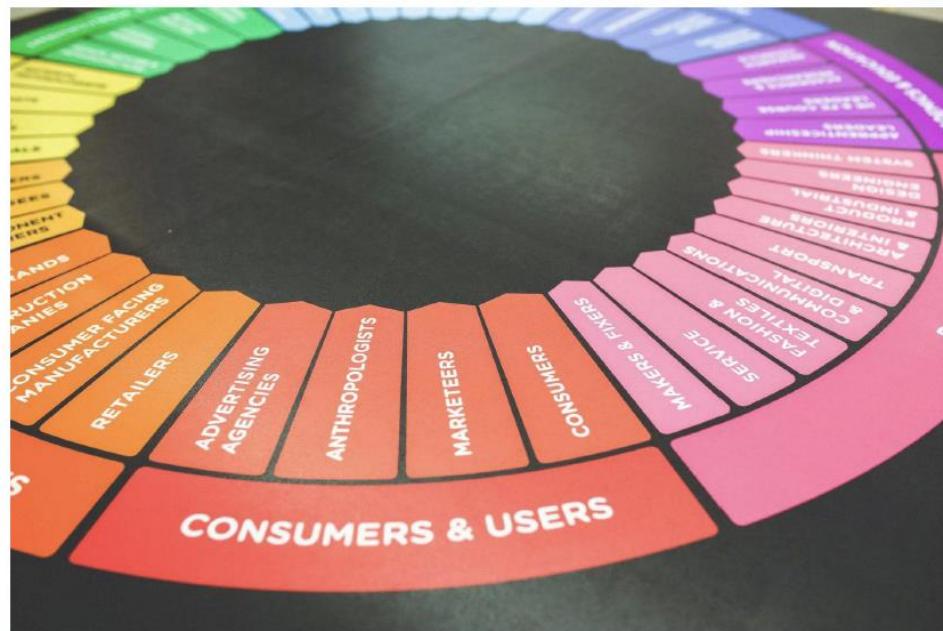




AI and Customer Service

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/>



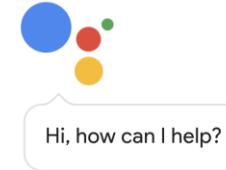
Voice Kit

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.



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

f t m



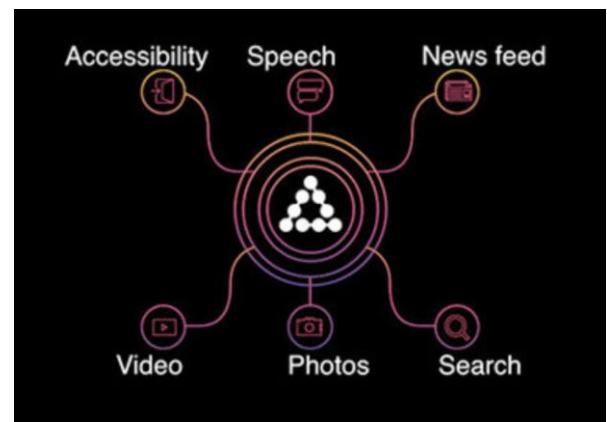


AI Services

- 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

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.
- Integrate with 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)

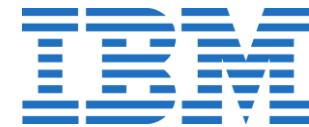


AI for Earth awards grants to projects that use artificial intelligence to address four critical areas that are vital for building a sustainable future.

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



AI Services



- Cognos Analytic - <https://www.ibm.com/sg-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.

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](#).

I hate these new features. On #ThisPhone after the update.
I hate #ThisPhone Company products, you'd have to torture me to get me to use #ThisPhone.
The emoji in #ThisPhone are stupid.
#ThisPhone is a useless, stupid waste of money.
#ThisPhone is the worst phone I've ever had - ever 😞
#ThisPhone another ripoff, lost all respect SHAME.
I'm worried my #ThisPhone 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

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

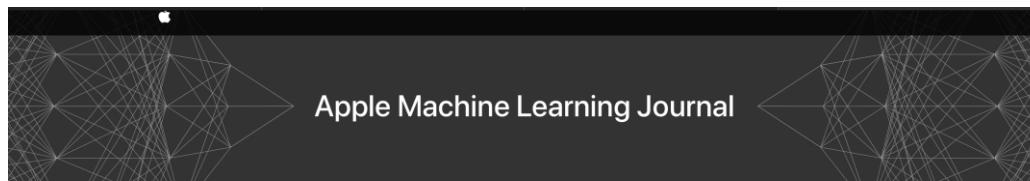
October 18, 2017

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

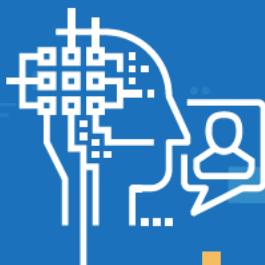
Topic | Singles' Day (11.11)

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.

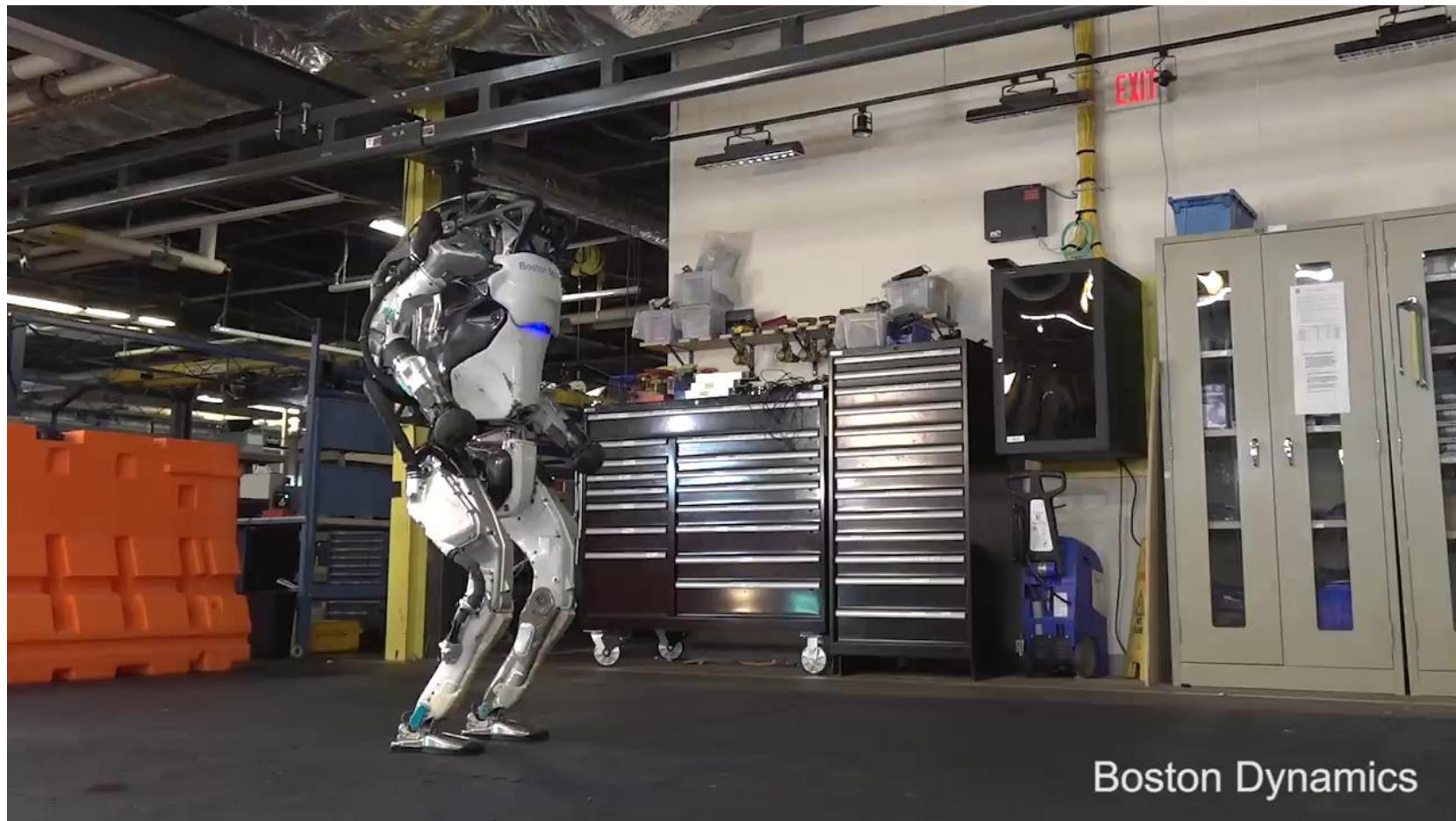


Function specific AI services

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.codota.com/enterprise https://kite.com/



Robotics



So what's next after this lesson?



Where to go from here?

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

The screenshot shows the DataCamp website's search results page for "python". At the top, there's a purple banner with the text "Subscribe now. Save 50% on DataCamp and skill up." and a timer indicating the offer ends in 04 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**: Master 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 scoping and error handling. 3 hours. Instructor: HUGO BOWNE-ANDERSON.
- Deep Learning in Python**: Learn the fundamentals of neural networks and how to build deep learning models using Keras 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 import, build, and manipulate DataFrames. 4 hours.

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

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

The screenshot shows the edX website homepage. At the top, there's 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 smiling and holding a smartphone, with the text "Accelerate your future. Learn anytime, anywhere." and a "Find courses" button. A search bar below the banner has the placeholder "What do you want to learn?". At the bottom of the page, there's 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 various partner institutions are displayed at the very bottom.



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

Specialist Diploma in Applied Artificial Intelligence

Total Hours = 270 hours
Time to Complete = 12 months

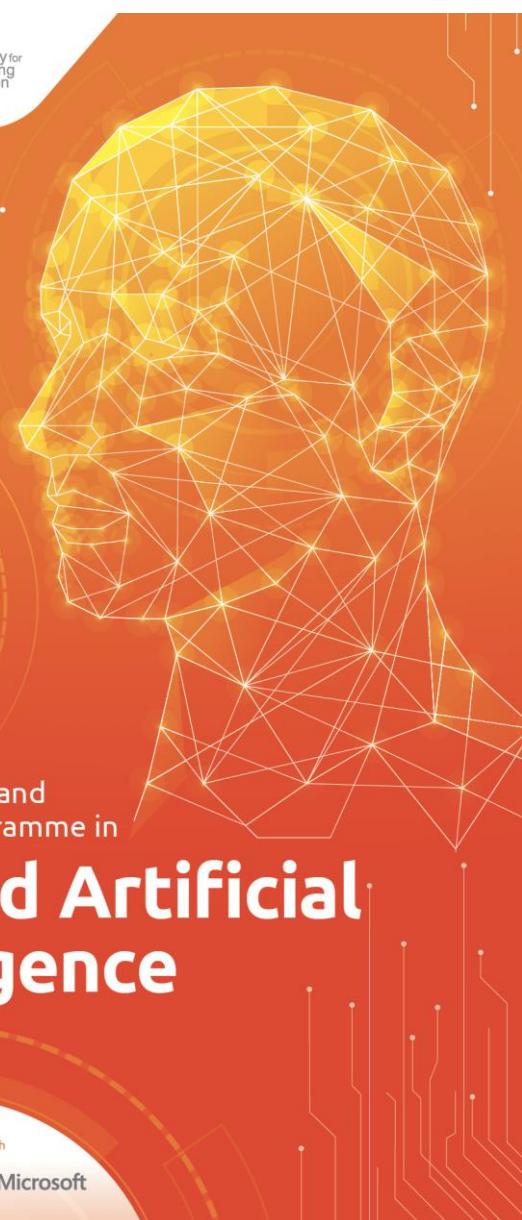
PDC in Fundamentals of Artificial Intelligence (120 hours)	PDC in Applications of Artificial Intelligence (150 hours)
Math for Machine Learning (30 hours)	Pattern Recognition and Anomaly Detection (30 hours)
Introduction to Programming (30 hours)	Recommender Systems (30 hours)
Introduction to Data Management 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](#)

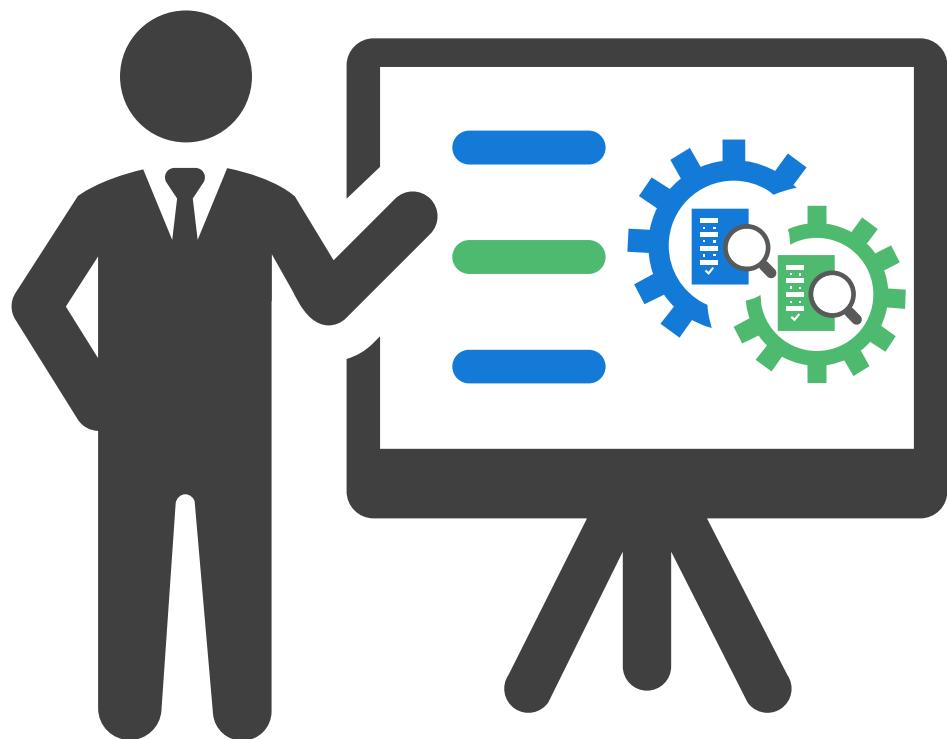
+ [Artificial Intelligence for Everyone - A Practical Experience \(1 day Beginner\)](#)

+ [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:

137

Survey Time!

Please help to complete the survey that has been sent via SMS to your registered mobile number. ^_^

(TRAQOM)



Thank you