

# Introduction to Code-Free Machine Learning

## [eAttendance]

# (SF) An Introduction to Code-Free Machine Learning (24 Sept 2020)

Good Morning!

- 1) Download the presentation slides and activities worksheet at [http://bit.ly/cfml\\_sep20](http://bit.ly/cfml_sep20)
- 2) We will start at 9am sharp

Sit back and relax for now ☺



# Warm up!

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**Step 1: Go to the following url**

[https://bit.ly/kw\\_poll](https://bit.ly/kw_poll)



**Step 2: facilitator will walk you through the following 2 questions**

- 1) Write down what you know about code-free and machine learning**
  
- 2) What do you hope to gain from this workshop.**



5 mins



# Programme

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Section 1:	What is Machine Learning Machine Learning Workflow
Section 2:	Activity 1 – First Machine Learning with Azure
Section 3:	Activity 2 – 7 Various aspect of Machine Learning
	Lunch Break
Section 4:	Transfer Learning Computer Vision: Activity 8 – Car Damage Assessment Classification
Section 5:	Natural Language Processing Activity 9 – Book Genre Classifier
Section 6:	Activity 10 – Sentiment Analyser
Section 7:	Linking them together: Code-Free application Development Robotic Process Automation



# Introduction of trainer

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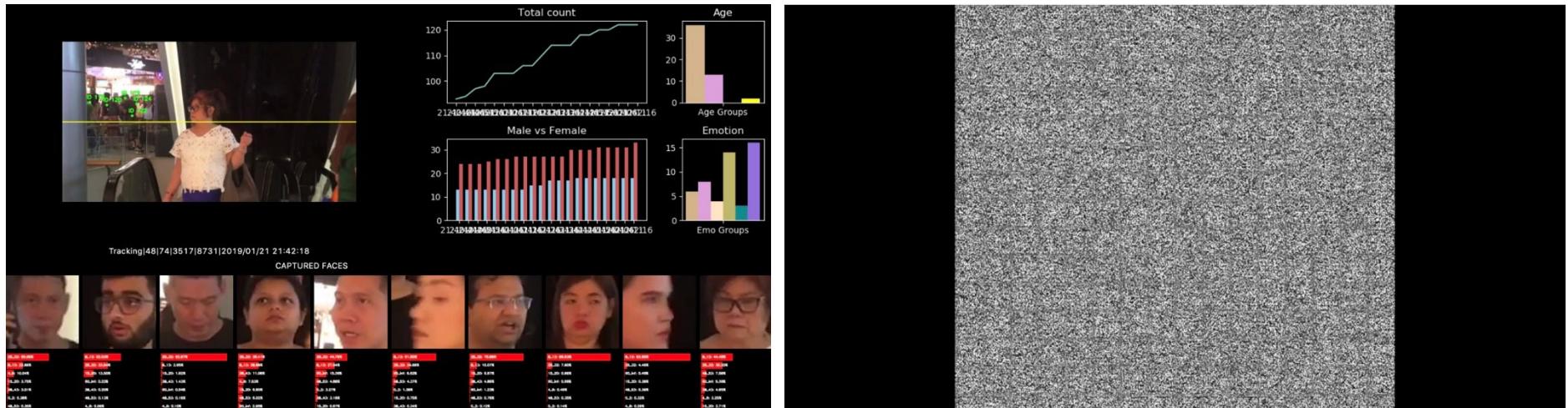
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# Projects



**Silver Cross Medical**

**SILVER CROSS CLINIC**  
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NAME: [REDACTED]  
VISIT DATE: 02-08-2019

IDENTIFICATION: T003210G  
19020801  
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491159

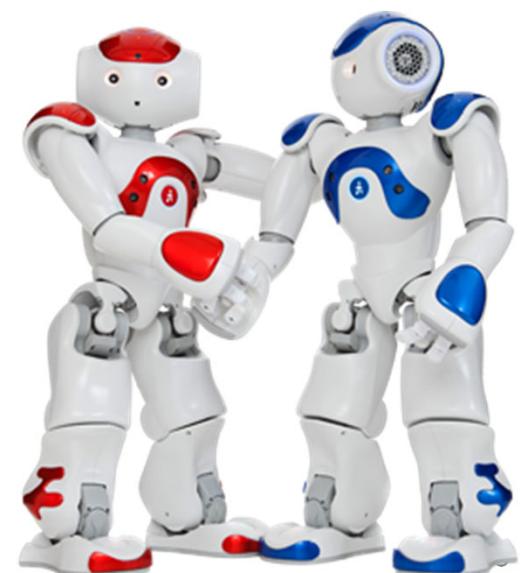
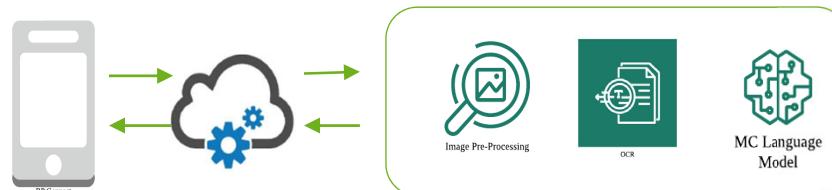
This is to certify that the above mentioned has been given:  
UNFIT FOR SCHOOL for 1 day(s) from 02-08-2019 to 02-08-2019  
REMARKS:

Dr Low Sau Wah (M61492)  
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Printed By: Clinic Assistant 1 SCW (02-08-2019)

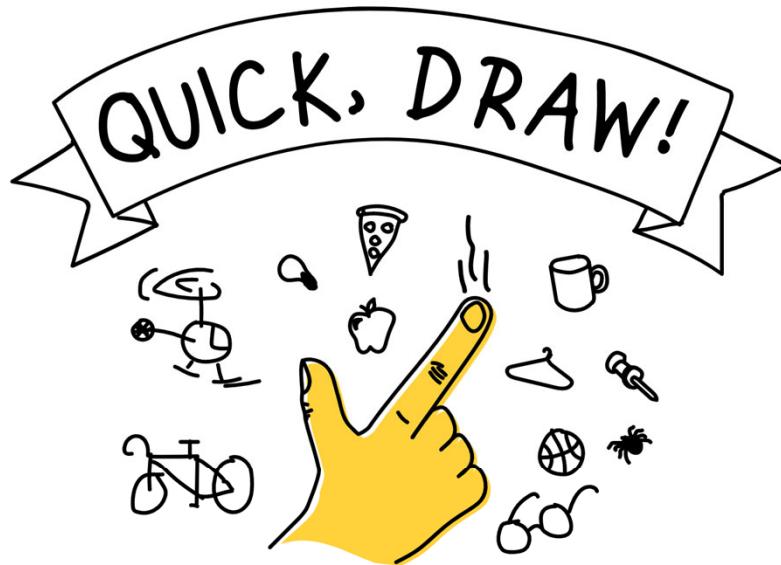
Not Valid For Absence From Court Attendance





# 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!

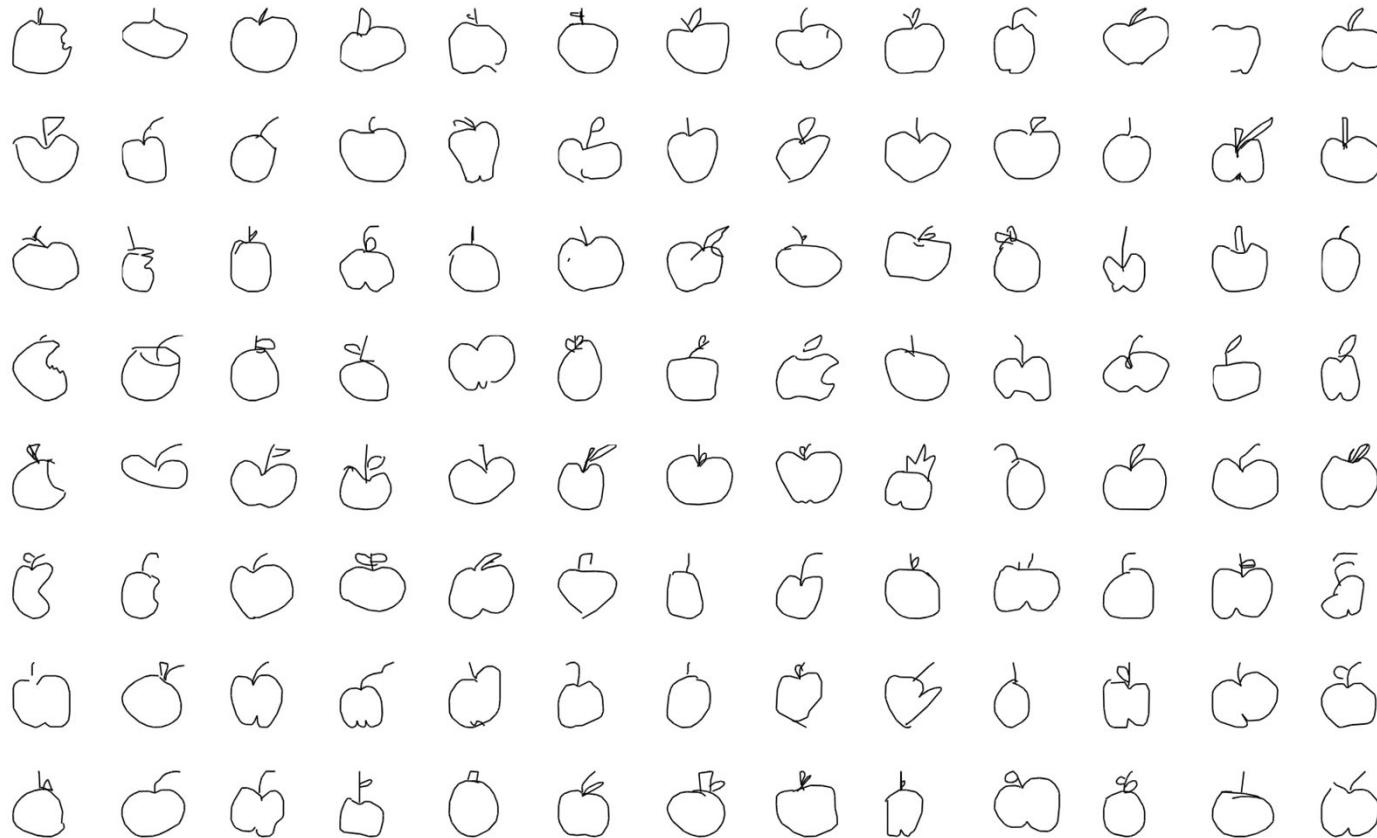




# How does ML work in QuickDraw?

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





# Bias Bias Bias

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## When It Comes to Gorillas, Google Photos Remains Blind

Google promised a fix after its photo-categorization software labeled black people as gorillas in 2015. More than two years later, it hasn't found one.



In WIRED's tests, Google Photos did identify some primates, but no gorillas like this one were to be found. RICK MADONIK/TORONTO STAR/GETTY IMAGES

<https://www.wired.com/story/when-it-comes-to-gorillas-google-photos-remains-blind/>



# How to learn ML?

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Teaching the  
whole game

Always  
teaching  
through  
examples

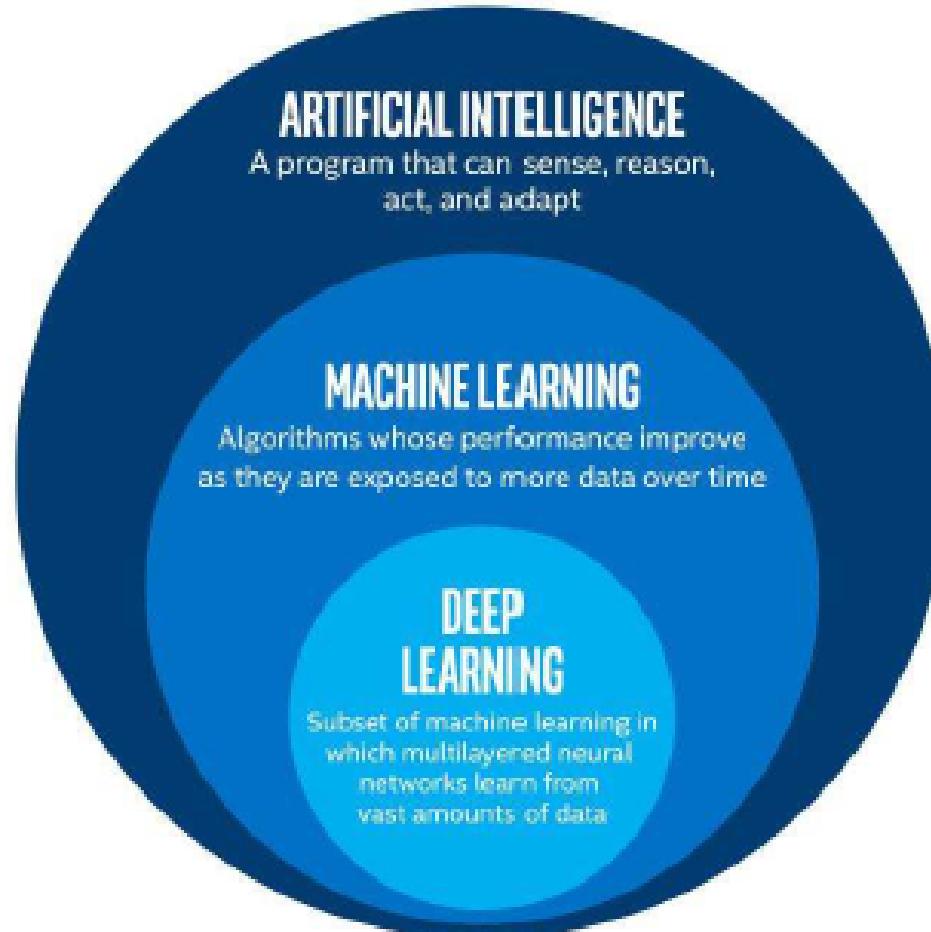
Simplifying as  
much as  
possible

Removing  
barriers



# Machine Learning

- These programs learn from repeatedly seeing data, rather than being explicitly programmed by humans





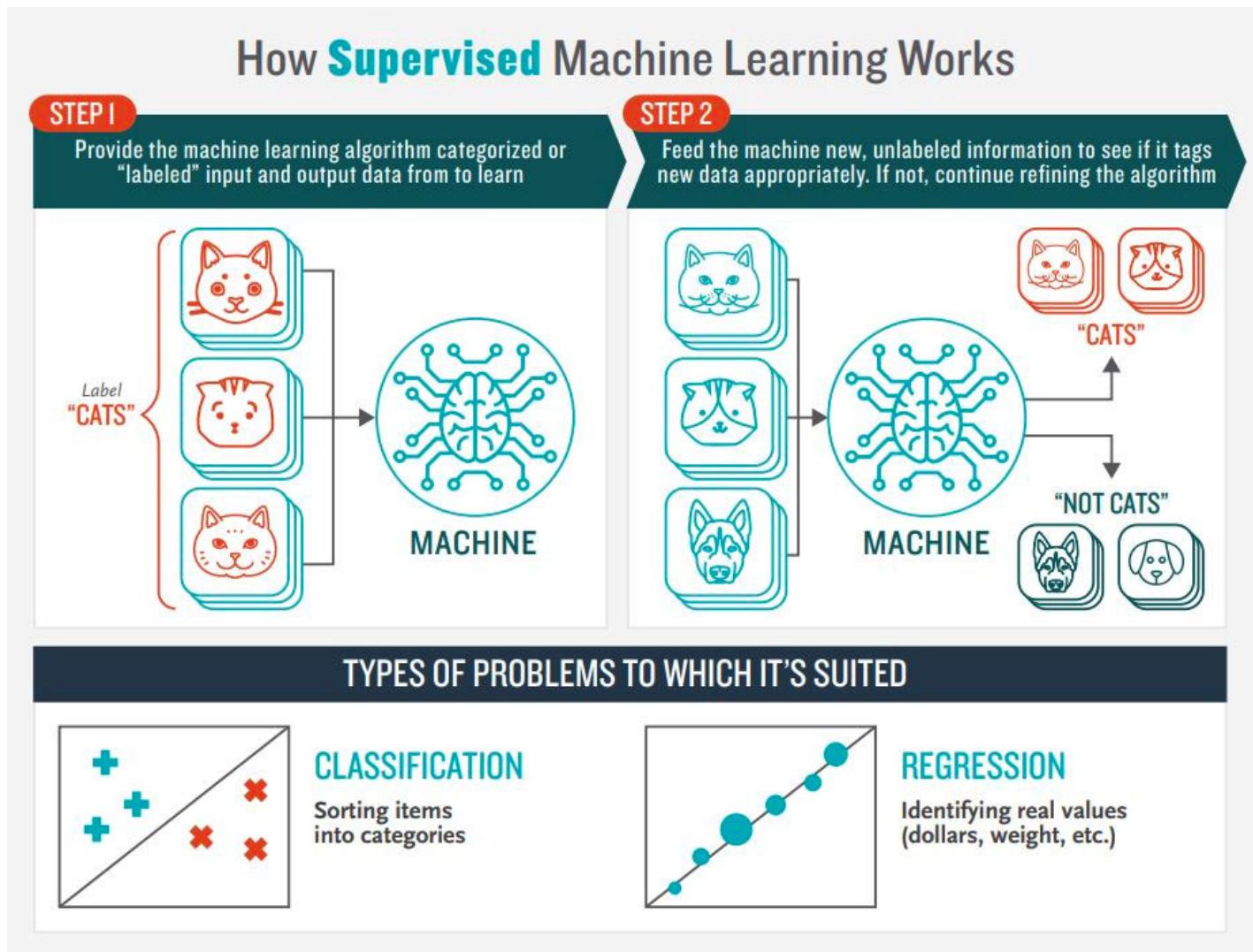
# Machine Learning

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- **Two main types of learning**
  - Supervised Learning
    - Data points have known outcome
    - Goal is to make predictions - Classify and Regression
  - Unsupervised Learning
    - Data points have unknown outcome
    - Goal is to find structure within the data – Clustering
- **Other types of learning**
  - Reinforcement Learning
  - Genetic Algorithm

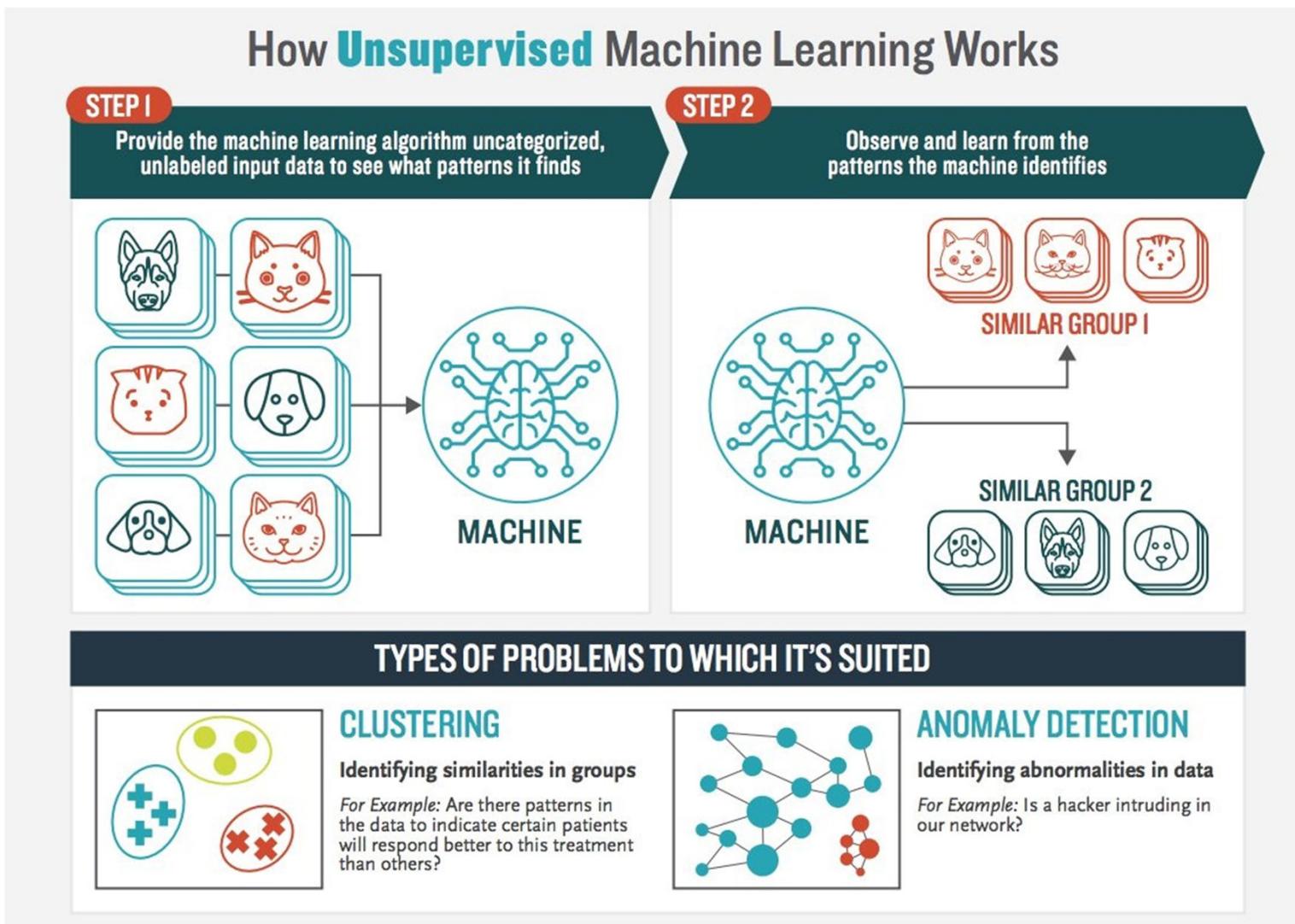


# Supervised Learning





# Unsupervised Learning





# Machine Learning

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- Applications in our daily lives

Spam Filtering

Web Search

Postal Mail Routing

Fraud Detection

Movie  
Recommendations

Vehicle Driver  
Assistance

Web Advertisements

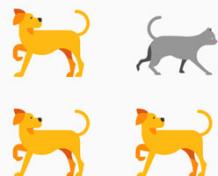
Social Networks

Speech Recognition



# 5 questions data science answers

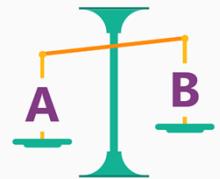
**Is this weird?  
(Anomaly detection)**



Is this pressure  
gauge reading  
normal?

Is this message  
from the internet  
typical?

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



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)  
(Continuous)**



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?



# 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

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- 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*

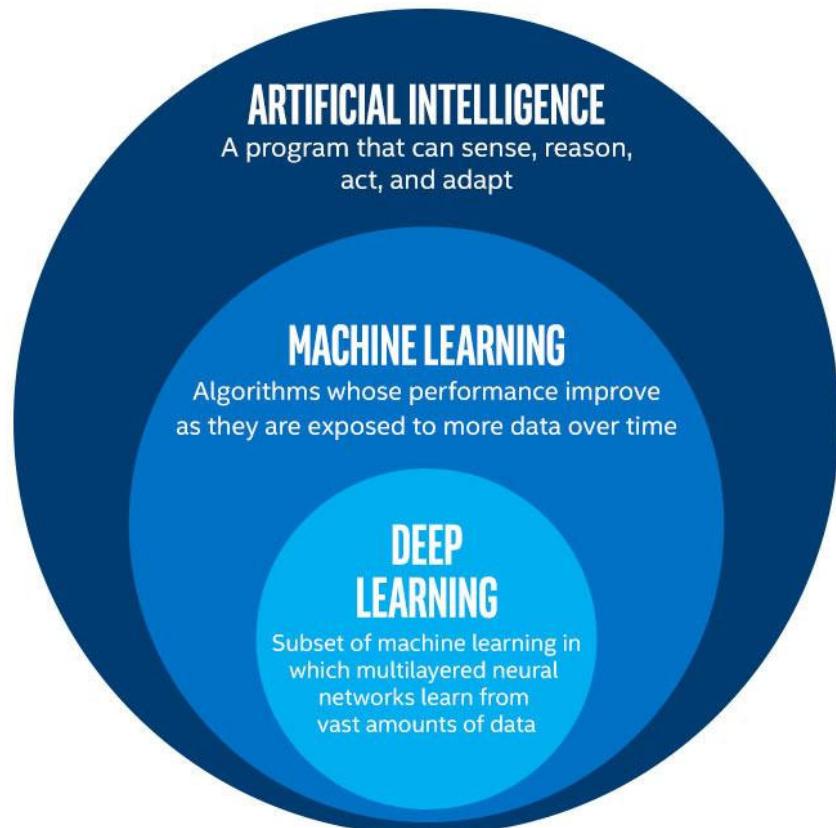


# What is deep learning?

## 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

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- Deep learning is a class of machine learning algorithms that:
  - use a cascade of multiple layers of nonlinear processing units for feature extraction and transformation. Each successive layer uses the output from the previous layer as input.
  - learn in supervised (e.g., classification) and/or unsupervised (e.g., pattern analysis) manners.
  - learn multiple levels of representations that correspond to different levels of abstraction; the levels form a hierarchy of concepts.

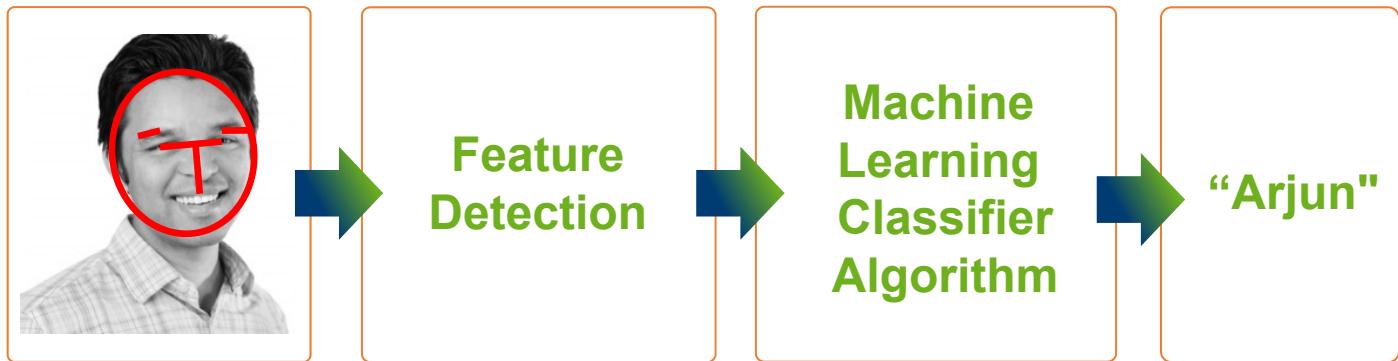
Ref: [https://en.wikipedia.org/wiki/Deep\\_learning#Deep\\_learning\\_revolution](https://en.wikipedia.org/wiki/Deep_learning#Deep_learning_revolution)



# Deep Learning Example

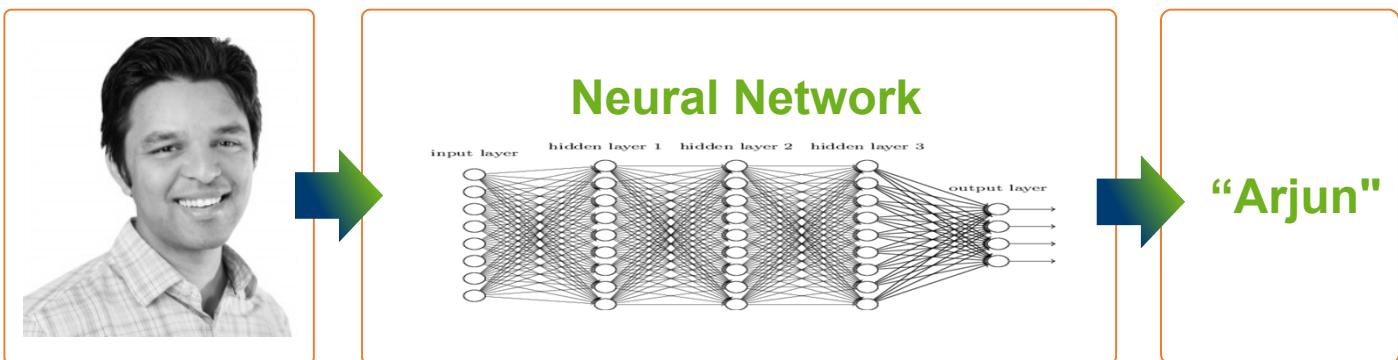
## Classic Machine Learning

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



## Deep Learning

Steps 1 and 2 are combined into 1 step.





# Deep Learning in Action

[bit.ly/google\\_teachable](https://bit.ly/google_teachable)

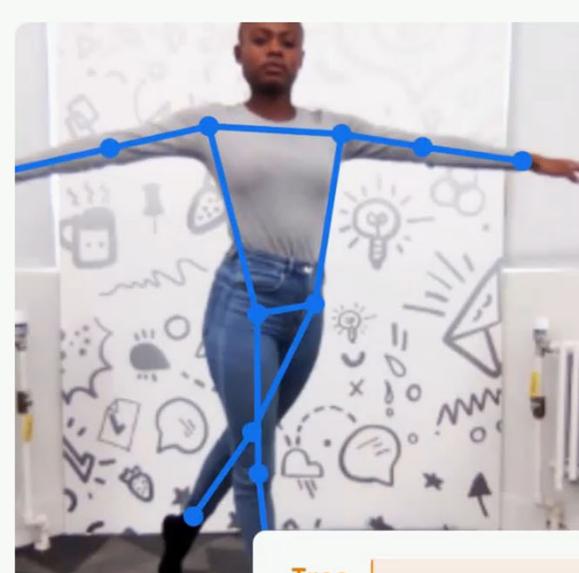
## Teachable Machine



Train a computer to recognize your own images, sounds, & poses.

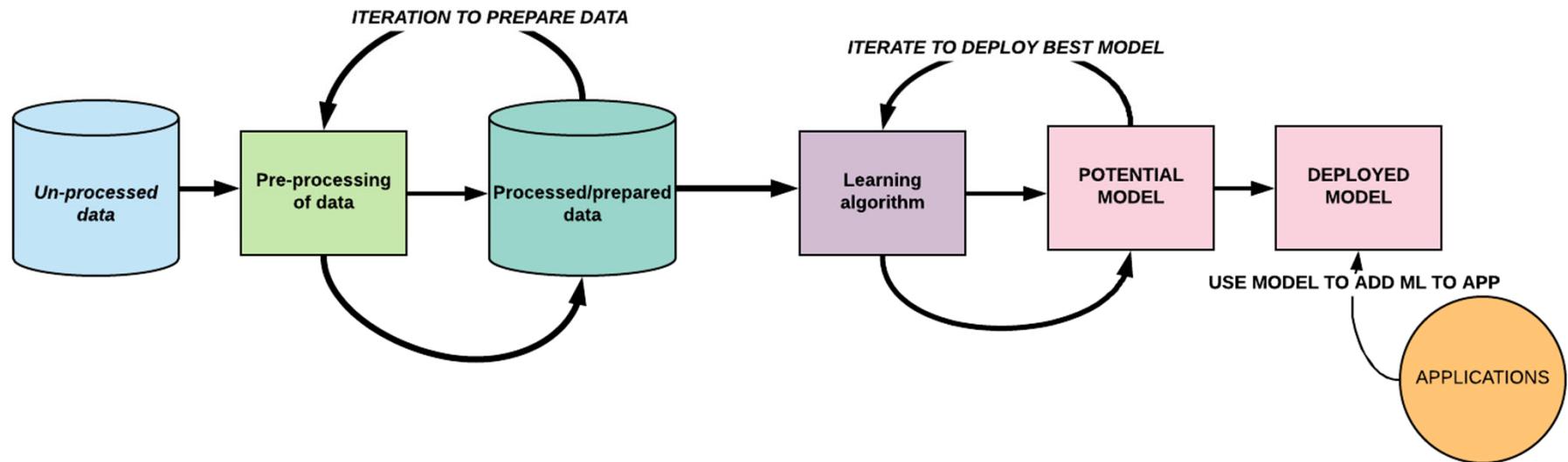
A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.

[Get Started](#)





# Machine Learning workflow

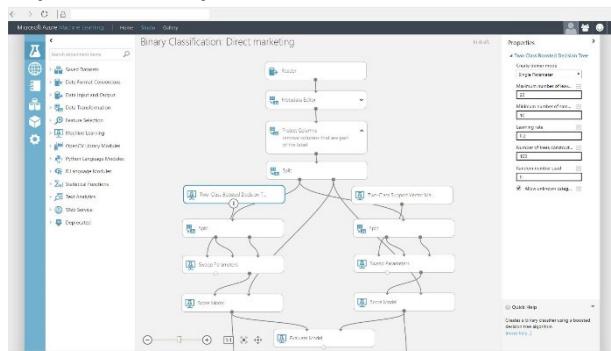


Ref: <https://cloudacademy.com/blog/what-is-azure-machine-learning/>

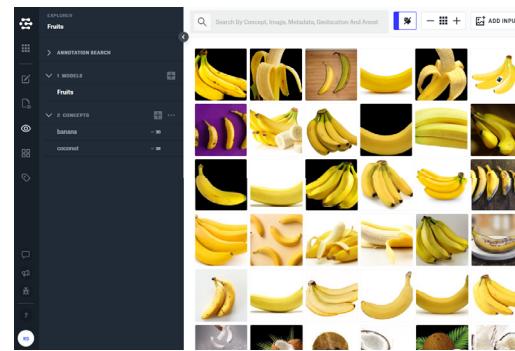


# Code-Free Machine Learning tools

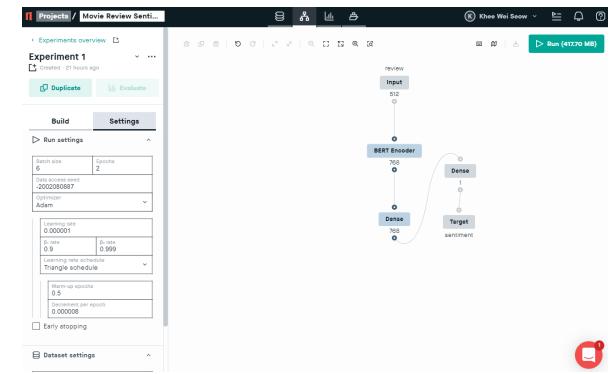
Microsoft Azure  
Machine Learning Studio  
(Classic)



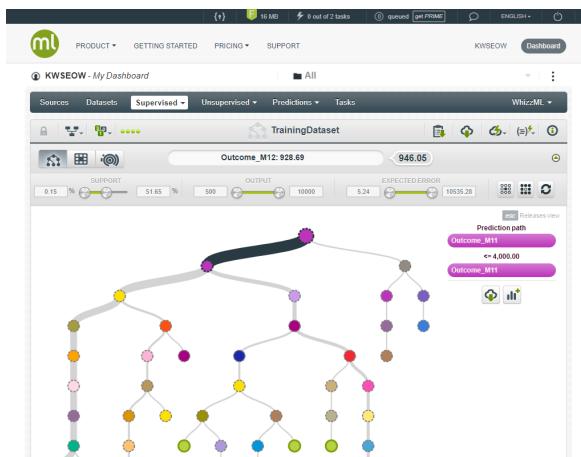
Clarifai



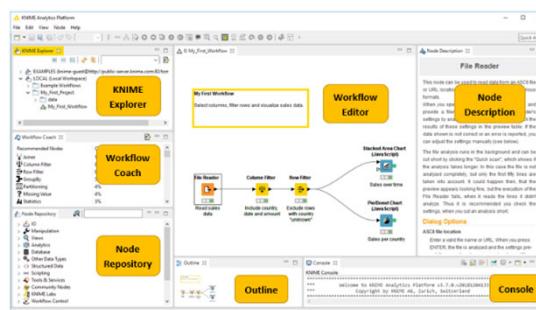
Peltarion



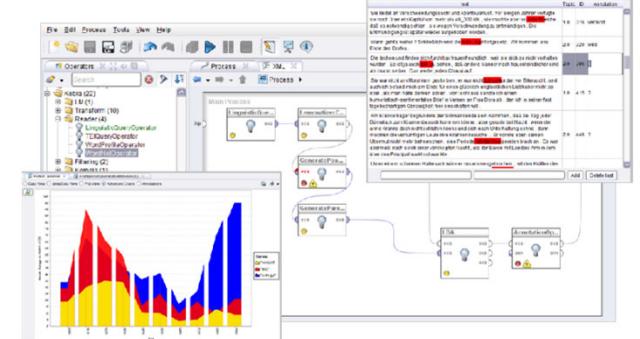
bigml



KNIME



Rapidminer





# Activity 1 – First Machine Learning with Azure

- Automobile Price Prediction



**Step 1:**  
Watch and listen to the instructor's demonstration



15 mins

	symboling	normalize	make	fuel-type	aspiration	num-of-dc	body-style	drive-whee	engine-loc	wheel-bas	length	width	height	curb-wei	engine-typ	num-of-cy	engine-siz	fuel-syst	bore	stroke
3 ?			alfa-romeo	gas	std	two	convertibl	rwd	front	88.6	168.8	64.1	48.8	2548	dohc	four	130	mpfi	3.47	2.68
3 ?			alfa-romeo	gas	std	two	convertibl	rwd	front	88.6	168.8	64.1	48.8	2548	dohc	four	130	mpfi	3.47	2.68
1 ?			alfa-romeo	gas	std	two	hatchback	rwd	front	94.5	171.2	65.5	52.4	2823	ohcv	six	152	mpfi	2.68	3.47
2	164	audi	gas	std	four	sedan	fwd	front	99.8	176.6	65.2	54.3	2337	ohc	four	109	mpfi	3.19	3.4	
2	164	audi	gas	std	four	sedan	4wd	front	99.4	176.6	65.4	54.3	2824	ohc	five	136	mpfi	3.19	3.4	
2 ?			audi	gas	std	two	sedan	fwd	front	99.8	177.3	65.3	53.1	2507	ohc	five	136	mpfi	3.19	3.4
1	158	audi	gas	std	four	sedan	fwd	front	105.8	192.7	71.4	55.7	2844	ohc	five	136	mpfi	3.19	3.4	
1 ?			audi	gas	std	four	wagon	fwd	front	105.8	192.7	71.4	55.7	2954	ohc	five	136	mpfi	3.19	3.4
1	158	audi	gas	turbo	four	sedan	fwd	front	105.8	192.7	71.4	55.9	3086	ohc	five	131	mpfi	3.13	3.4	
0 ?			audi	gas	turbo	two	hatchback	4wd	front	99.5	178.2	67.9	52	3053	ohc	five	131	mpfi	3.13	3.4
2	192	bmw	gas	std	two	sedan	rwd	front	101.2	176.8	64.8	54.3	2395	ohc	four	108	mpfi	3.5	2.8	
0 ?			bmw	gas	std	four	sedan	rwd	front	101.2	175.8	64.8	54.3	2395	ohc	four	108	mpfi	3.5	2.8
0	188	bmw	gas	std	two	sedan	rwd	front	101.2	176.8	64.8	54.3	2710	ohc	six	164	mpfi	3.31	3.19	
0	188	bmw	gas	std	two	sedan	rwd	front	101.2	176.8	64.9	54.3	2720	ohc	six	164	mpfi	3.31	3.19	
1 ?			bmw	gas	std	four	sedan	rwd	front	103.5	189	65.9	55.7	3051	ohc	six	164	mpfi	3.31	3.19
0 ?			bmw	gas	std	four	sedan	rwd	front	103.5	189	65.9	55.7	3230	ohc	six	209	mpfi	3.62	3.39
0 ?			bmw	gas	std	two	sedan	rwd	front	103.5	193.8	67.9	53.7	3380	ohc	six	209	mpfi	3.62	3.39
0 ?			bmw	gas	std	four	sedan	rwd	front	110	197	70.9	56.3	3505	ohc	six	209	mpfi	3.62	3.39
2	121	chevrolet	gas	std	two	hatchback	fwd	front	88.4	141.1	60.3	53.2	1488	i	three	61	2bbi	2.91	3.03	
1	98	chevrolet	gas	std	two	hatchback	fwd	front	94.5	155.9	63.6	52	1874	ohc	four	90	2bbi	3.03	3.11	
0	81	chevrolet	gas	std	four	sedan	fwd	front	94.5	158.8	63.6	52	1909	ohc	four	90	2bbi	3.03	3.11	
1	118	dodge	gas	std	two	hatchback	fwd	front	93.7	157.3	63.8	50.8	1876	ohc	four	90	2bbi	2.97	3.23	
1	118	dodge	gas	turbo	two	hatchback	fwd	front	93.7	157.3	63.8	50.8	2128	four	90	mpfi	3.03	3.39		
1	148	dodge	gas	std	four	hatchback	fwd	front	93.7	157.3	63.8	50.6	1967	ohc	four	90	2bbi	2.97	3.23	
1	148	dodge	gas	std	four	sedan	rwd	front	93.7	157.3	63.8	50.6	1967	ohc	four	90	2bbi	2.97	3.23	
1	148	dodge	gas	std	four	sedan	rwd	front	93.7	157.3	63.8	50.6	1969	ohc	four	90	2bbi	2.97	3.23	
1	148	dodge	gas	turbo	??	sedan	fwd	front	93.7	157.3	63.8	50.6	2191	ohc	four	98	mpfi	3.03	3.39	
-1	110	dodge	gas	std	two	wagon	fwd	front	103.3	174.6	64.6	59.8	2356	ohc	four	122	2bbi	3.34	3.46	
3	145	dodge	gas	turbo	two	hatchback	fwd	front	95.9	172.6	66.3	50.2	2811	ohc	four	156	mpfi	3.6	3.9	
2	137	honda	gas	std	two	hatchback	fwd	front	86.6	144.6	63.9	50.8	1713	ohc	four	92	1bbi	2.91	3.41	
2	137	honda	gas	std	two	hatchback	fwd	front	86.6	144.6	63.9	50.8	1819	ohc	four	92	1bbi	2.91	3.41	
1	101	honda	gas	std	two	hatchback	fwd	front	93.7	150	64	52.6	1837	ohc	four	79	1bbi	2.91	3.07	
1	101	honda	gas	std	two	hatchback	fwd	front	93.7	150	64	52.6	1940	ohc	four	92	1bbi	2.91	3.41	
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0	78	honda	gas	std	two	wagon	fwd	front	96.5	157.1	63.9	58.3	2024	ohc	four	92	1bbi	2.92	3.41	
0	106	honda	gas	std	two	hatchback	fwd	front	96.5	167.5	65.2	53.3	2236	ohc	four	110	1bbi	3.15	3.58	
0	85	honda	gas	std	four	sedan	rwd	front	96.5	175.4	65.2	54.1	2304	ohc	four	110	1bbi	3.15	3.58	
0	85	honda	gas	std	four	sedan	rwd	front	96.5	175.4	65.2	54.1	2372	ohc	four	110	1bbi	3.15	3.58	
1	107	honda	gas	std	two	hatchback	rwd	front	96.5	169.1	66	51	2291	ohc	four	110	2bbi	3.15	3.58	
0 ?			isuzu	gas	std	four	sedan	rwd	front	94.3	170.7	61.8	53.5	2337	ohc	four	111	1bbi	3.31	3.23
1 ?			isuzu	gas	std	two	sedan	rwd	front	94.5	155.9	63.6	52	1874	ohc	four	90	2bbi	3.03	3.11
0 ?			isuzu	gas	std	four	sedan	rwd	front	94.5	155.9	63.6	52	1909	ohc	four	90	2bbi	3.03	3.11
2 ?			isuzu	gas	std	two	hatchback	rwd	front	96	172.6	65.2	51.4	2734	ohc	four	119	mpfi	3.43	3.23
0	145	jaguar	gas	std	four	sedan	rwd	front	113	199.6	69.6	52.8	4066	dohc	six	258	mpfi	3.63	4.17	
0 ?			jaguar	gas	std	four	sedan	rwd	front	113	199.6	69.6	52.8	4066	dohc	six	258	mpfi	3.63	4.17
1	104	mazda	gas	std	two	hatchback	fwd	front	93.1	159.1	64.2	54.1	1890	ohc	four	91	2bbi	3.03	3.15	
1	104	mazda	gas	std	two	hatchback	fwd	front	93.1	159.1	64.2	54.1	1900	ohc	four	91	2bbi	3.03	3.15	
1	113	mazda	gas	std	four	sedan	rwd	front	93.1	166.8	64.2	54.1	1945	ohc	four	91	2bbi	3.03	3.15	
1	113	mazda	gas	std	four	sedan	rwd	front	93.1	166.8	64.2	54.1	1950	ohc	four	91	2bbi	3.03	3.15	
3	150	mazda	gas	std	two	hatchback	rwd	front	95.3	169	65.7	49.6	2380	rotor	two	70	1bbi	?	?	
3	150	mazda	gas	std	two	hatchback	rwd	front	95.3	169	65.7	49.6	2385	rotor	two	70	1bbi	?	?	
3	150	mazda	gas	std	two	hatchback	rwd	front	95.3	169	65.7	49.6	2500	rotor	two	80	mpfi	?	?	
1	129	mazda	gas	std	two	hatchback	fwd	front	98.8	177.8	66.5	53.7	2385	ohc	four	121	2bbi	3.39	3.39	
0	115	mazda	gas	std	four	sedan	rwd	front	98.8	177.8	66.5	55.5	2410	ohc	four	122	2bbi	3.39	3.39	
1	129	mazda	gas	std	two	hatchback	fwd	front	98.8	177.8	66.5	55.5	2410	ohc	four	122	2bbi	3.39	3.39	
0	115	mazda	gas	std	four	sedan	rwd	front	98.8	177.8	66.5	55.5	2443	ohc	four	122	1idi	3.39	3.39	

## Step 2:

- Do on your own

Individual Activity

35 mins





# 15 Mins Break



[bit.ly/top10\\_2020](https://bit.ly/top10_2020)





# Activity 2 - 7

- 
- Activity 2 - Deploying your experiment as a Web Service
  - Activity 3 - Importing data
  - Activity 4 - Cleaning and Structuring Data
  - Activity 5 - Using Binary Classification Algorithm
  - Activity 6 – Evaluating a Regression Model with Cross Validation
  - Activity 7 – Optimising your model (Hyperparameter Tuning)

**Step 1:**

Watch and listen to the instructor's demonstration

**Step 2:**

Work through the activities

**Individual Activity**



80 mins



LUNCH BREAK



# 60 mins Lunch Break

Some interesting videos

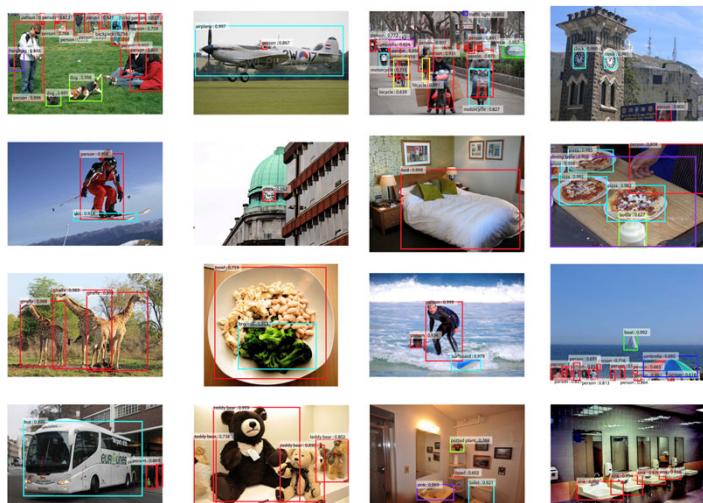
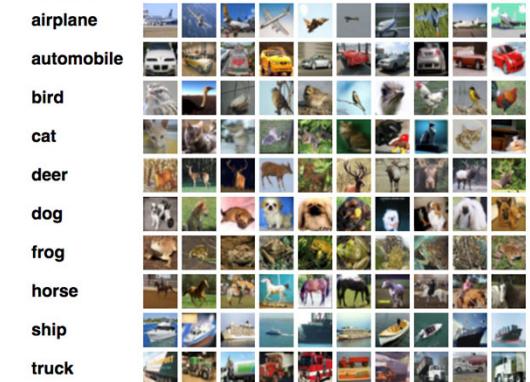
<https://www.youtube.com/watch?v=bmNaLC6vkU>

[https://www.youtube.com/watch?v=Nnf8P5A\\_saE](https://www.youtube.com/watch?v=Nnf8P5A_saE)



# Applications of Computer Vision

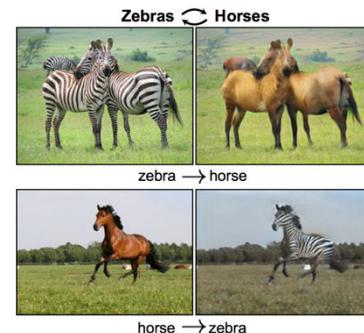
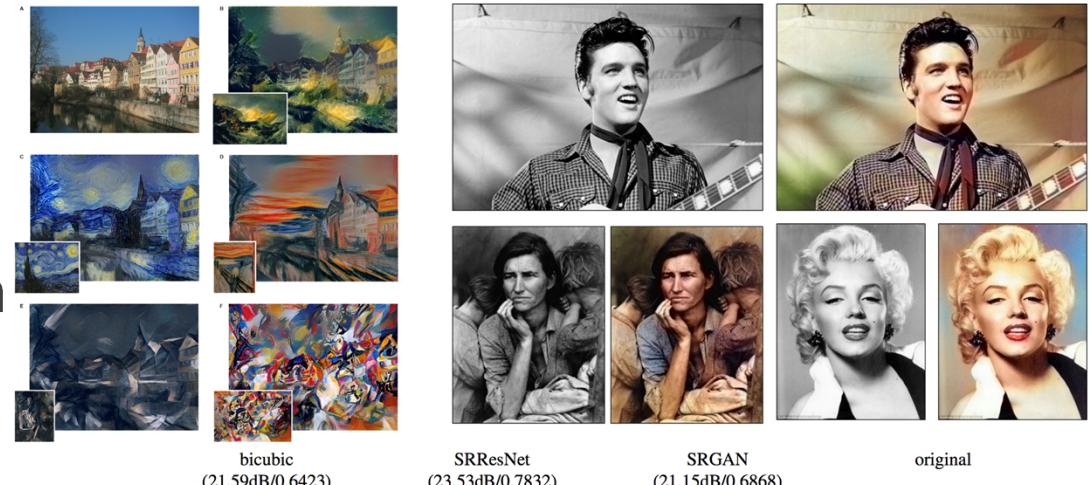
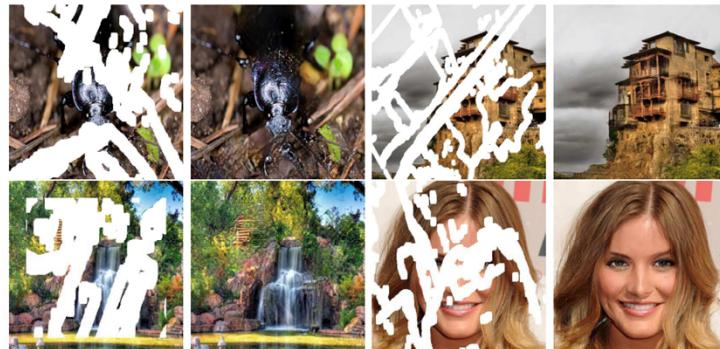
- Image Classification
- Image Classification With Localization
- Object Detection
- Object Segmentation





# Applications of Computer Vision

- Image Style Transfer
- Image Colorization
- Image Reconstruction
- Image Super-Resolution
- Image Synthesis
- Other Problems





# Transfer Learning

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Humans have an inherent ability to transfer knowledge across tasks.

What we acquire as knowledge while learning about one task, we utilize in the same way to solve related tasks.

The more related the tasks, the easier it is for us to transfer, or cross-utilize our knowledge.

Some simple examples would be,

- \* Know how to ride a motorbike → Learn how to ride a car
- \* Know how to play classic piano → Learn how to play jazz piano

- Models are difficult to train from scratch

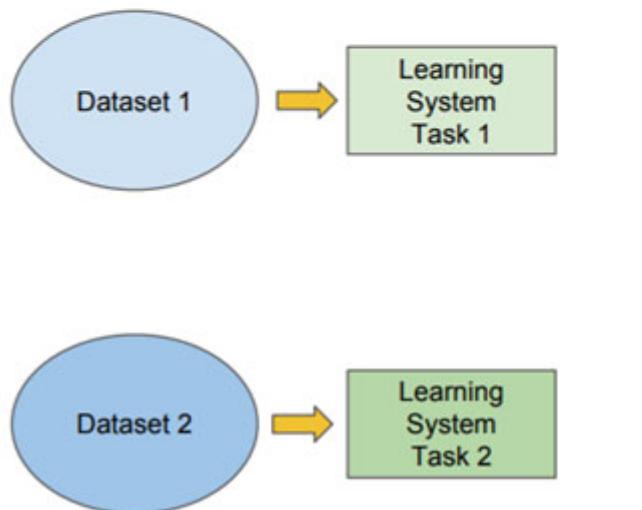
- Huge datasets (like ImageNet)
- Long number of training iterations
- Very heavy computing machinery
- Time experimenting to get hyper-parameters just right



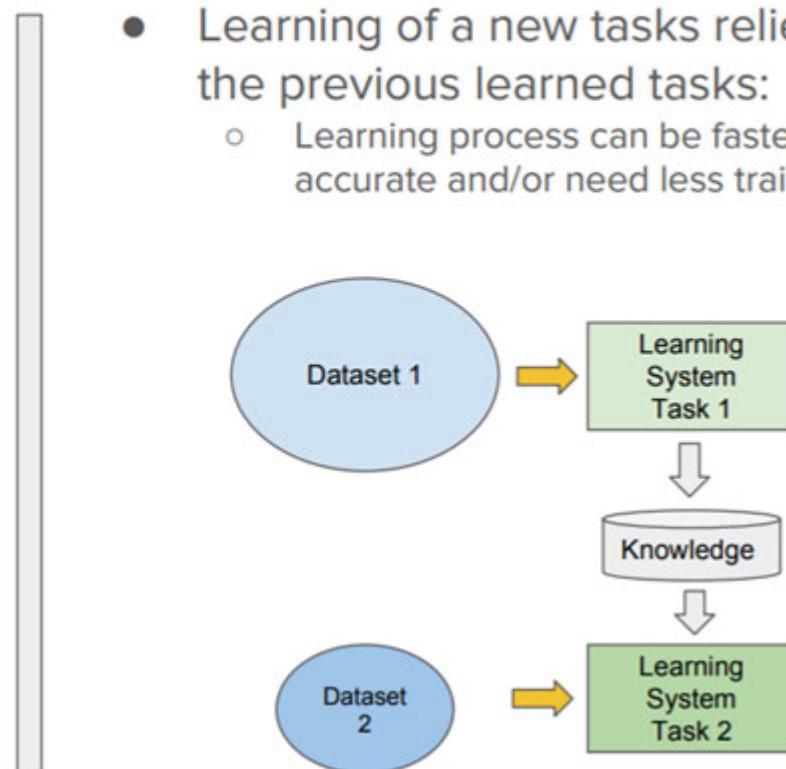
# Transfer Learning

## Traditional ML vs Transfer Learning

- Isolated, single task learning:
  - Knowledge is not retained or accumulated. Learning is performed w.o. considering past learned knowledge in other tasks



- Learning of a new tasks relies on the previous learned tasks:
  - Learning process can be faster, more accurate and/or need less training data





# Activity 8 – Car Damage Classifier

Broken headlamp	Broken tail lamp	Glass shatter	Door scratch

Door dent	Bumper dent	Bumper scratch	Unknown

**Step 1:**  
Watch and listen to the  
instructor's demonstration



15 mins

**Step 2:**  
- Do on your own

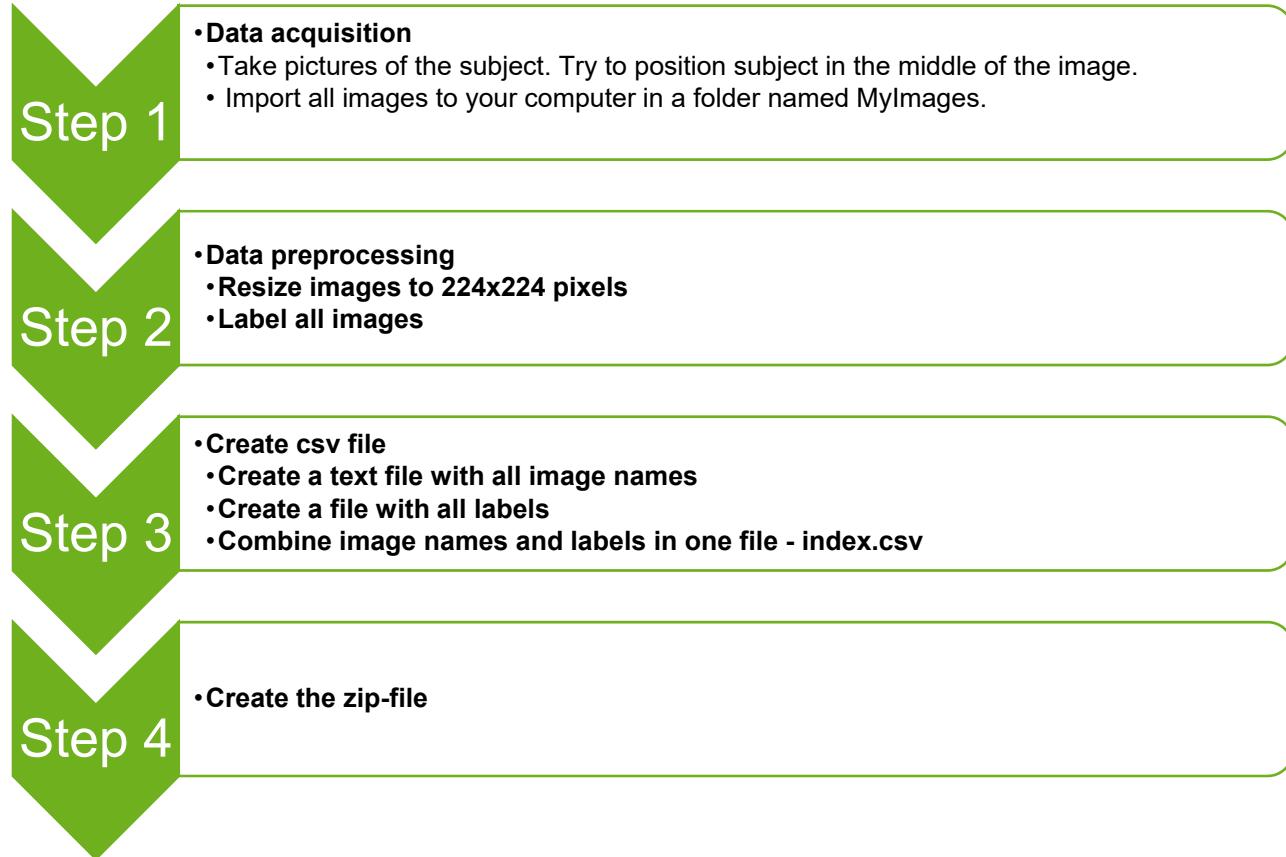
**Individual Activity**



30 mins



# Creating a new dataset





# Natural Language Processing

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- Search Autocorrect and Autocomplete
- Language Translator
- **Social Media Monitoring**
- Chatbots
- **Survey Analysis**
- Targeted Advertising
- Hiring and Recruitment
- Voice Assistants
- Grammar Checkers
- Email Filtering





# Activity 9 - Book Genre Classifier



## CMU Book Summary Dataset

The CMU Book Summary Dataset supports ongoing work described in:

David Bamman and Noah Smith (2013), "New Alignment Methods for Discriminative Book Summarization," [[ArXiv](#)]  
[booksummaries.tar.gz](#) [17M]

This dataset contains plot summaries for 16,559 books extracted from Wikipedia, along with aligned metadata from Freebase, including book author, title, and genre.

All data is released under a [Creative Commons Attribution-ShareAlike License](#). For questions or comments, please contact David Bamman ([dbamman@cs.cmu.edu](mailto:dbamman@cs.cmu.edu)).

### Example

The following example illustrates the data and metadata available for Don DeLillo's *White Noise*.

### Book metadata

Wikipedia ID	1166383
Freebase ID	/m/04cvx9
Book title	White Noise
Book author	Don DeLillo
Publication date	1985-01-21
Genres	Novel, Postmodernism, Speculative fiction, Fiction

**Step 1:**  
Watch and listen to the  
instructor's demonstration



15 mins

**Step 2:**  
- Do on your own

**Individual Activity**

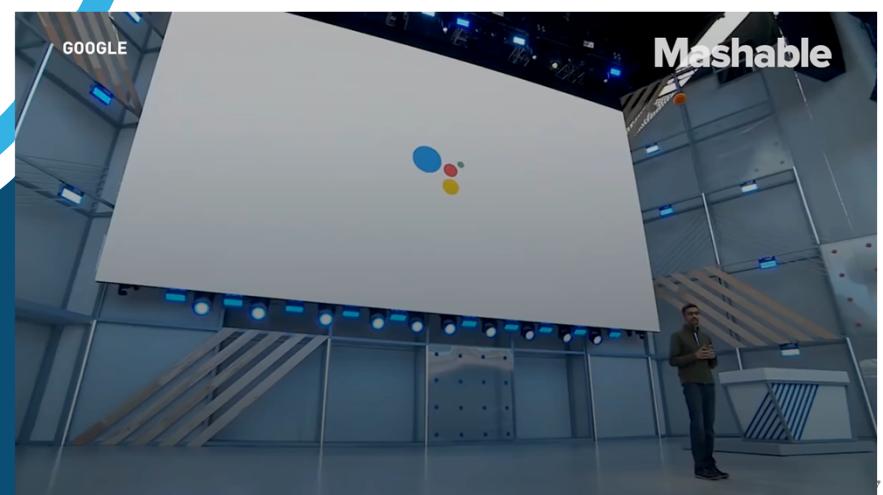


30 mins



# 15 Mins Break

[bit.ly/google\\_duplex2019](http://bit.ly/google_duplex2019)





# Activity 10 - Creating a Sentiment Analyser



## About this dataset

This dataset contains textual movie reviews from IMDB users, together with the rating (simplified as positive or negative) that the user gave to the movie.

## Inspiration

Use this dataset to predict a simple positive or negative category from paragraph-sized text data.

### Step 1:

Watch and listen to the instructor's demonstration



15 mins

### Step 2:

- Do on your own



30 mins

**Individual Activity**



# Linking Them Together

## App Development

### Top 9 No-Code Web App Development Tools that May Compete with Bubble

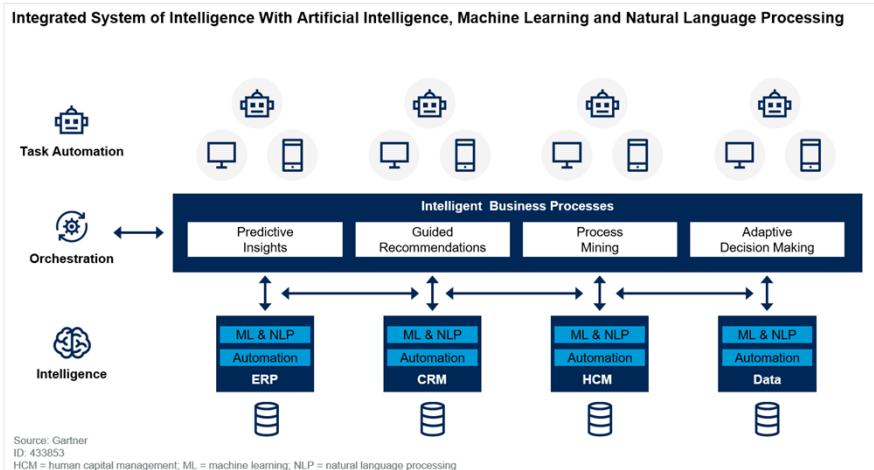
We're here to prove that "building the best product" is possible not only with Bubble.

Discover the 5 most powerful Bubble alternatives in the comparison table below to decide which one fits you best. Find more detailed information about the other Bubble.io alternatives after the table.

The screenshot shows the Bubble UI Builder interface. On the left, the sidebar includes sections for Workflow, Data, Plugins, Settings, and Logs. The main area displays the "Boilerplate" template, which features a "GET STARTED" button. Below it, the "UI Elements" library is shown, containing various building blocks like Text, Icon, Link, Image, Shape, Video, Alert, and Map.

<https://uibakery.io/bubble-alternatives>

## RPA



Adobe Acrobat Document

<https://www.youtube.com/watch?v=FV8IM9SIFQ8> 39



# Dataset and Data Prep

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- Datasets
  - <http://kwseow.github.io>
  - <https://datasetsearch.research.google.com/>
  - <https://www.kaggle.com/>
- Data prep
  - Excel
  - Tableau Prep
  - Power BI

OFFICIAL (CLOSED) \ NON-SENSITIVE



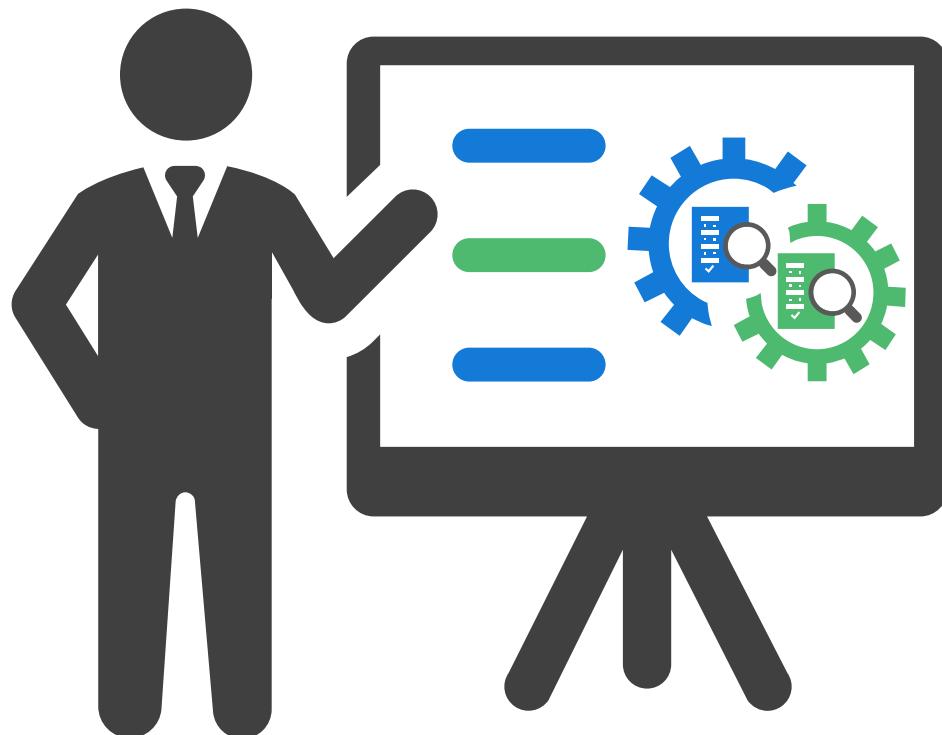
# Quiz

[https://bit.ly/kw\\_poll](https://bit.ly/kw_poll)





# Summary



Email  
[seow\\_khee\\_wei@rp.edu.sg](mailto:seow_khee_wei@rp.edu.sg)

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

Source code:

42



# Thank you