

Introduction to Code-Free Machine Learning

[eAttendance]

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



Good Morning!

- 1) Please take your attendance while we wait for the rest to come online. We should start at 9am sharp
- 2) Download the presentation slides and activities worksheet under the File tab in Teams

Sit back and relax for now 😊

[eAttendance]

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

<https://forms.office.com/Pages/ResponsePage.aspx?id=0LCI9vB5pECGRDX83unQ83BbnOHb0uxJILtb5DWLBUNTdWUzEzS1pTVjhaQ1Y2M0JXTzMxM0FRUy4u>

Click HERE for Live Attendance
Report



Warm up!

Step 1: Go to the following url

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

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



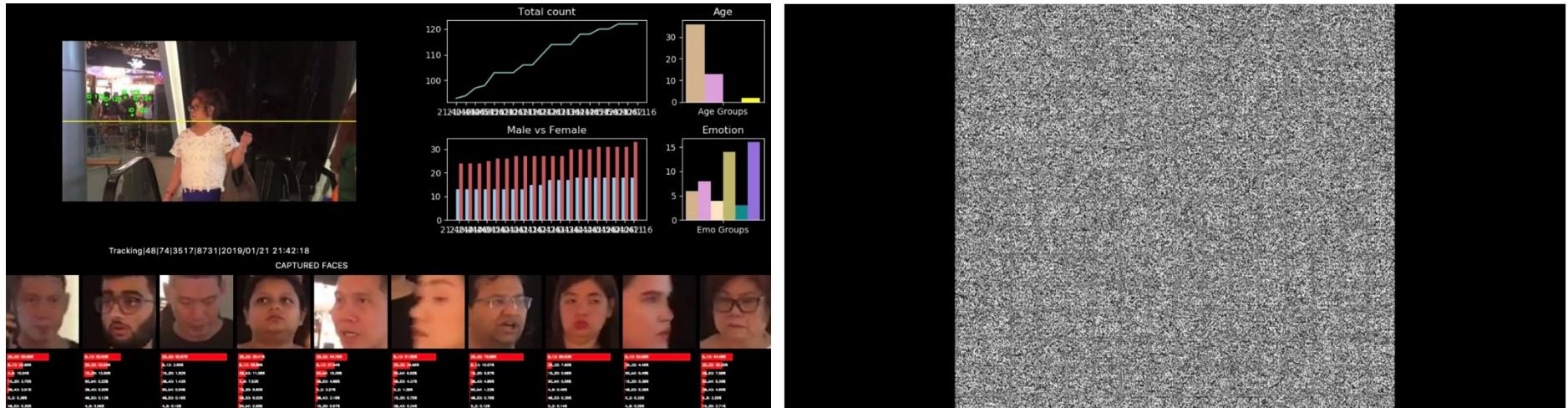
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Projects



SILVER CROSS CLINIC
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GET REGISTRATION NO: 1999050400
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TEL: 6363 3564 / FAX: 6363 3349

NAME: [REDACTED]
VISIT DATE: 02-08-2019

IDENTIFICATION: T003210G
190805-01
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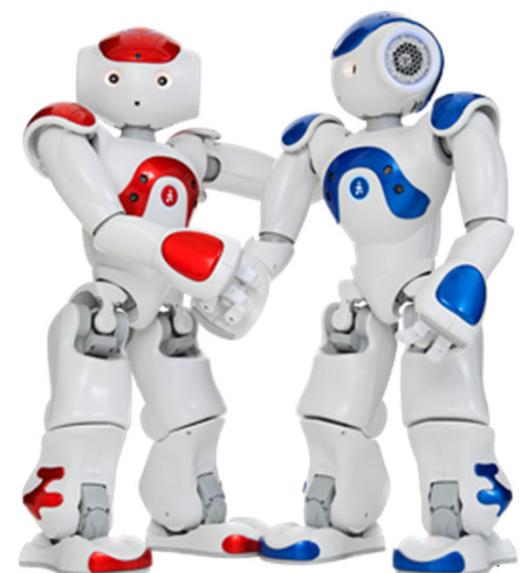
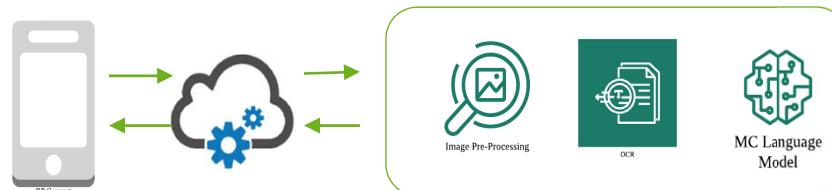
This is to certify that the above mentioned has been given:
UNFIT FOR SCHOOL for 1 day(s) from 02-08-2019 to 02-08-2019
REMARKS:

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

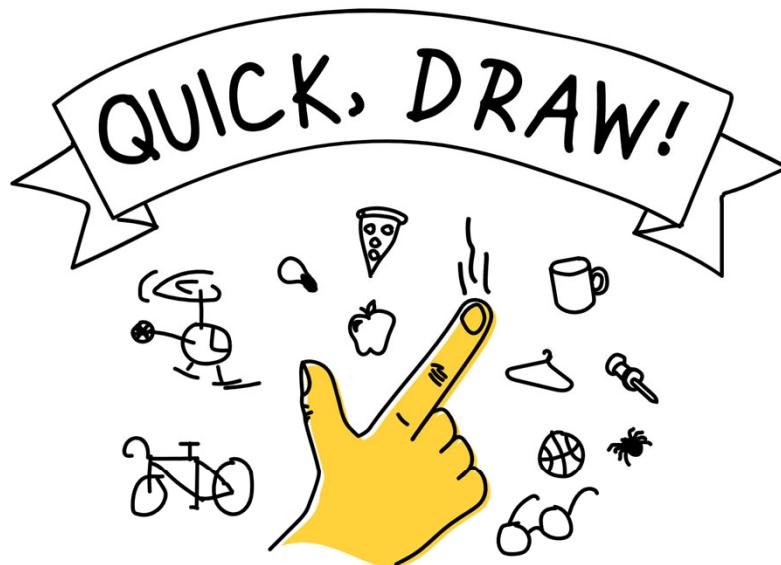
Not Valid For Absence From Court Attendance





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.

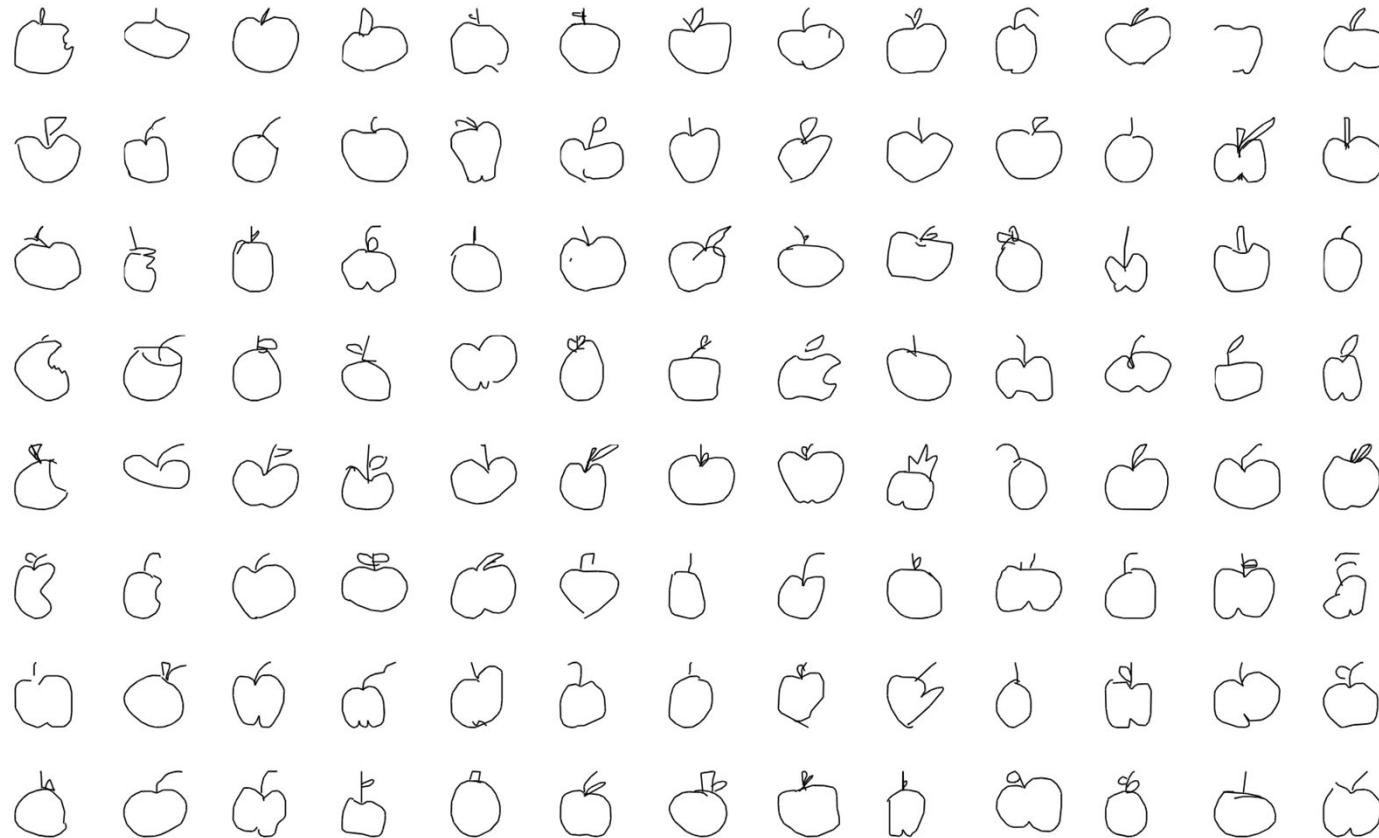
Let's Draw!





How does ML work in QuickDraw?

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





Bias Bias Bias

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?

Teaching the
whole game

Always
teaching
through
examples

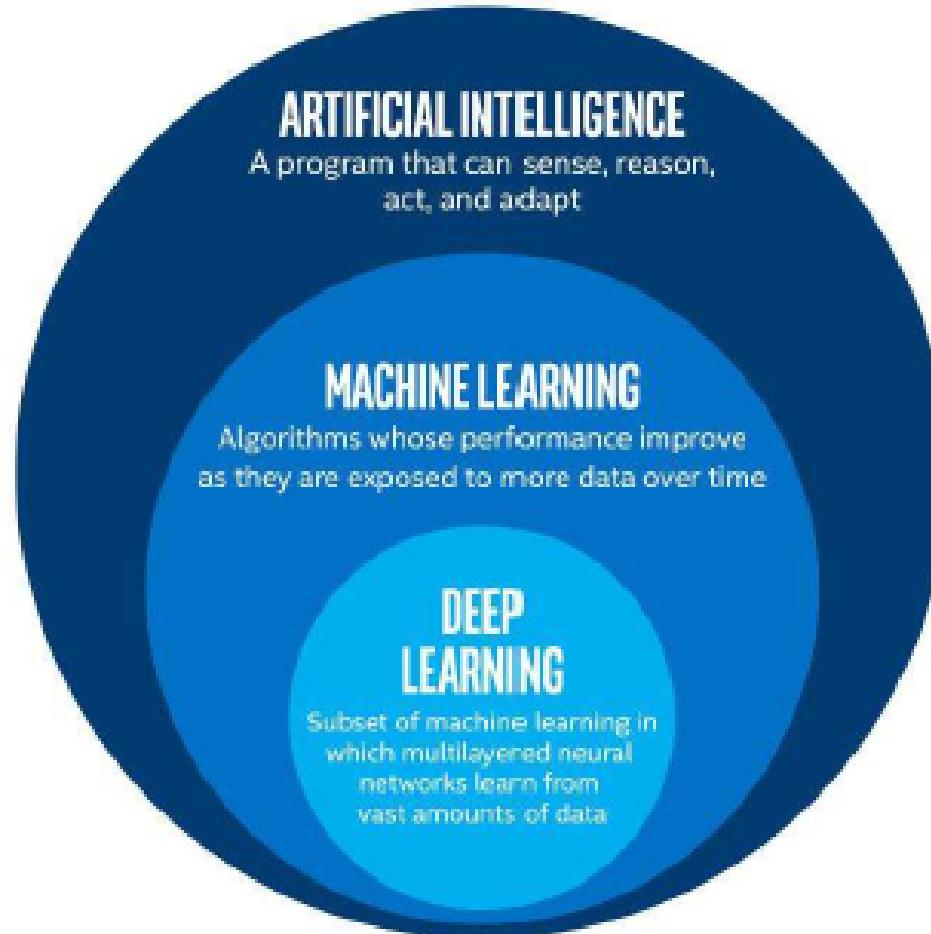
Simplifying as
much as
possible

Removing
barriers



Machine Learning

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



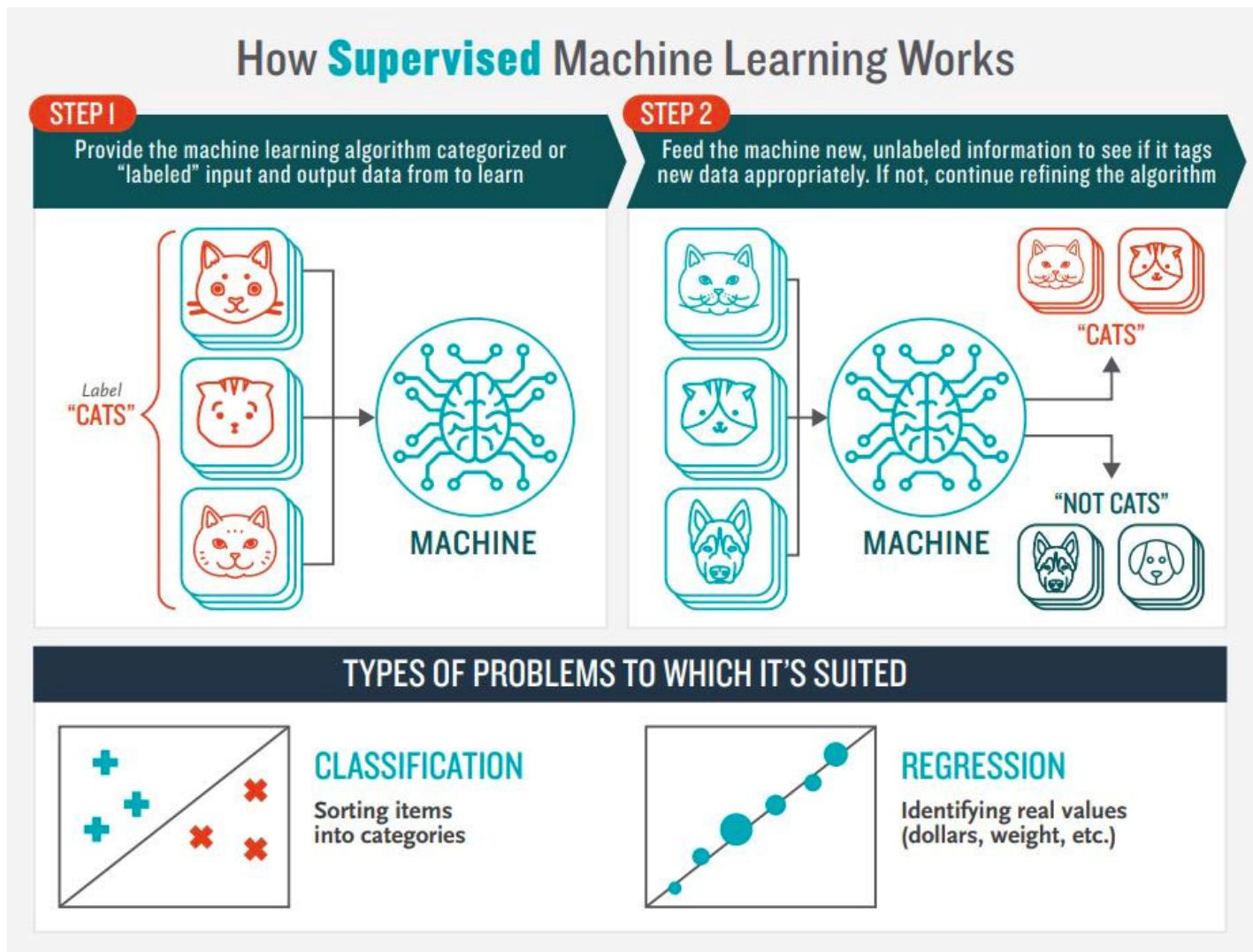


Machine Learning

- **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



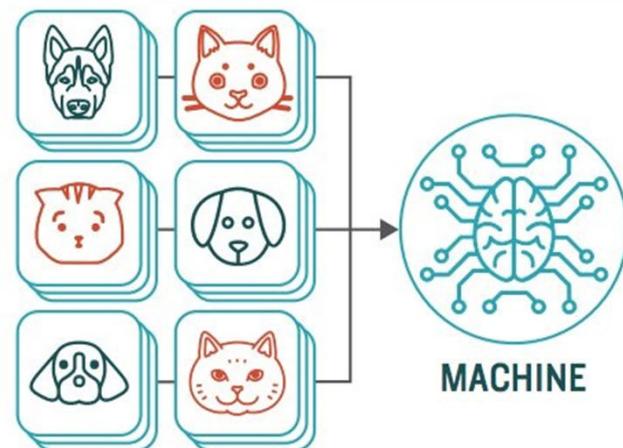


Unsupervised Learning

How Unsupervised Machine Learning Works

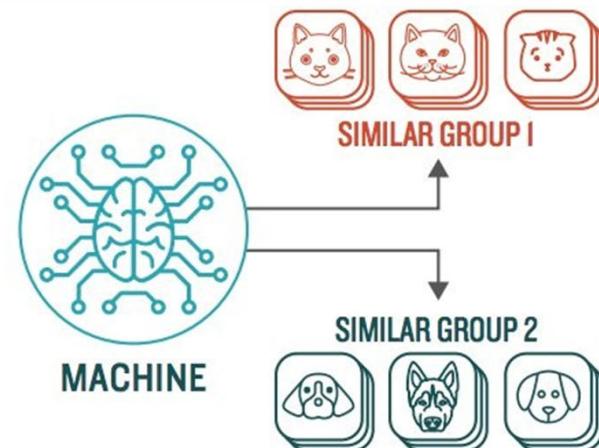
STEP 1

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

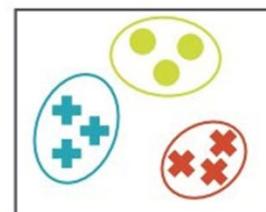


STEP 2

Observe and learn from the patterns the machine identifies



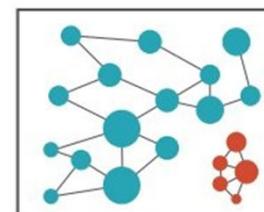
TYPES OF PROBLEMS TO WHICH IT'S SUITED



CLUSTERING

Identifying similarities in groups

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



ANOMALY DETECTION

Identifying abnormalities in data

For Example: Is a hacker intruding in our network?



Machine Learning

- Applications in our daily lives

Spam Filtering

Web Search

Postal Mail Routing

Fraud Detection

Movie
Recommendations

Vehicle Driver
Assistance

Web Advertisements

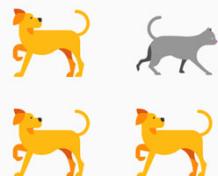
Social Networks

Speech Recognition



5 questions data science answers

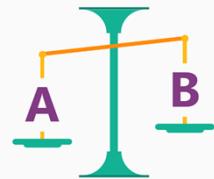
**Is this weird?
(Anomaly detection)**



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

- 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

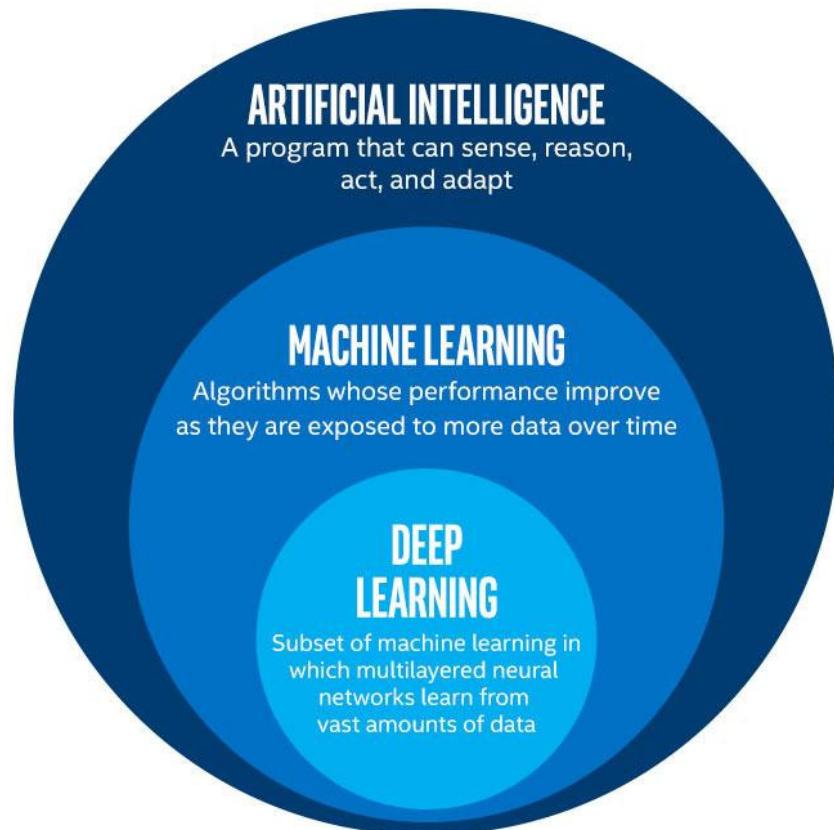


What is deep learning?

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

- 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



Deep Learning Example

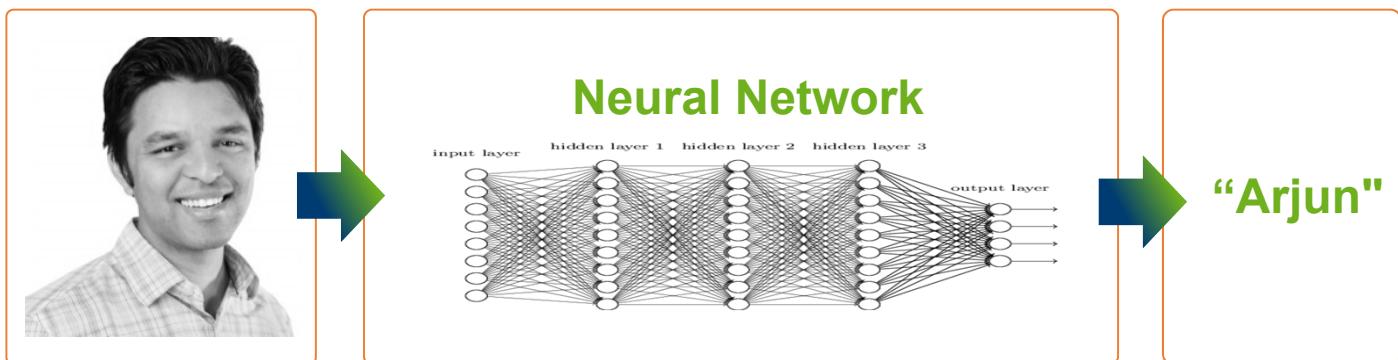
Classic Machine Learning

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

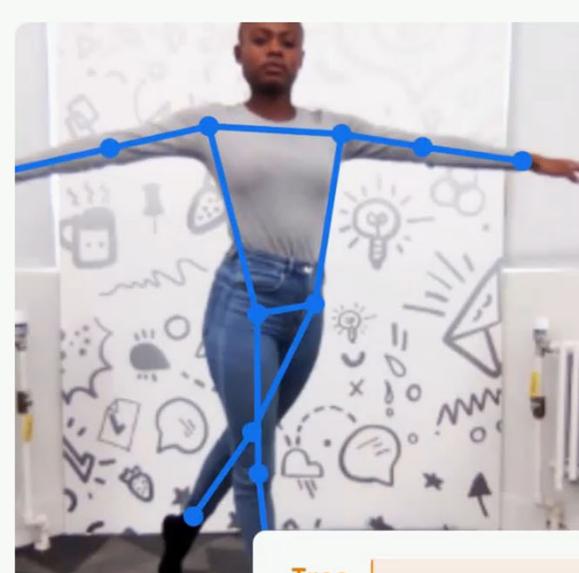
Teachable Machine



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

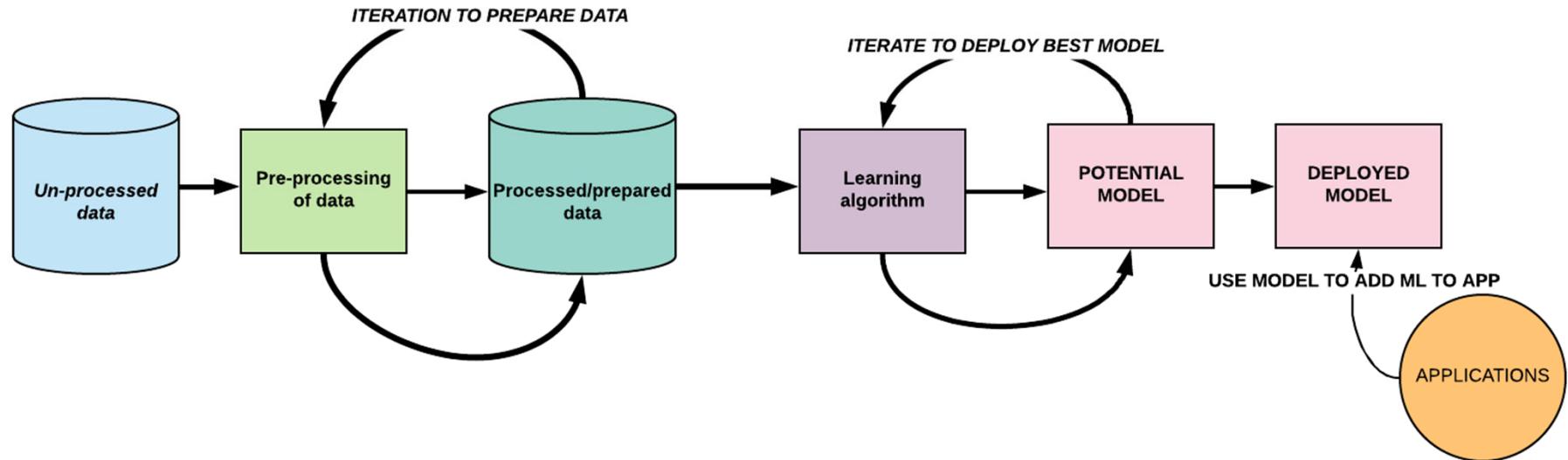
A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.

[Get Started](#)





Machine Learning workflow

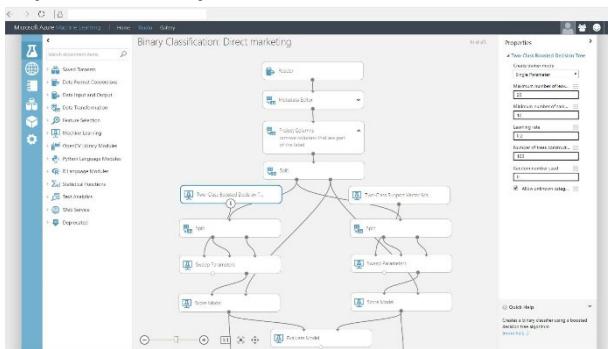


Ref: <https://cloudacademy.com/blog/what-is-azure-machine-learning/>

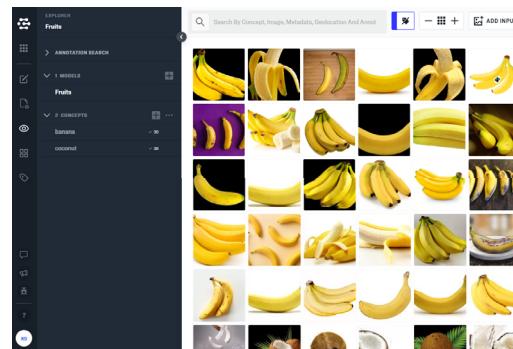


Code-Free Machine Learning tools

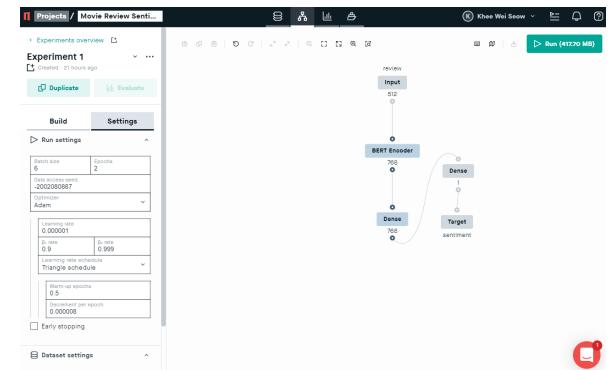
Microsoft Azure
Machine Learning Studio
(Classic)



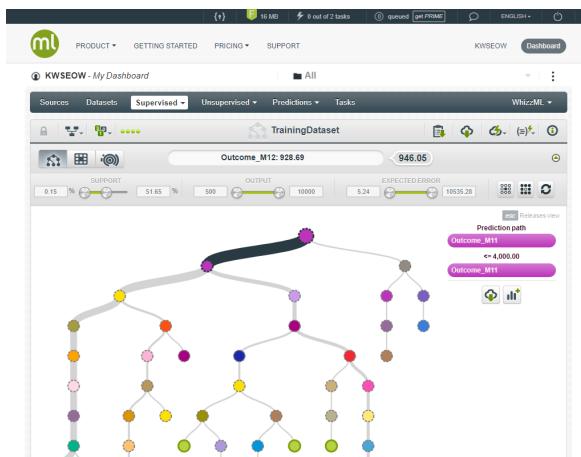
Clarifai



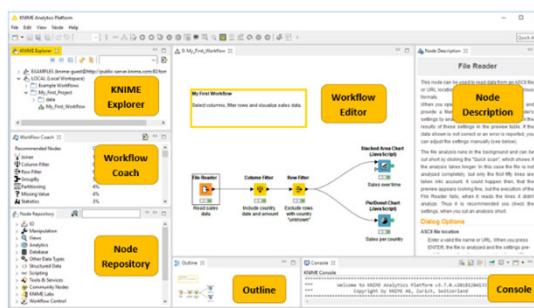
Peltarion



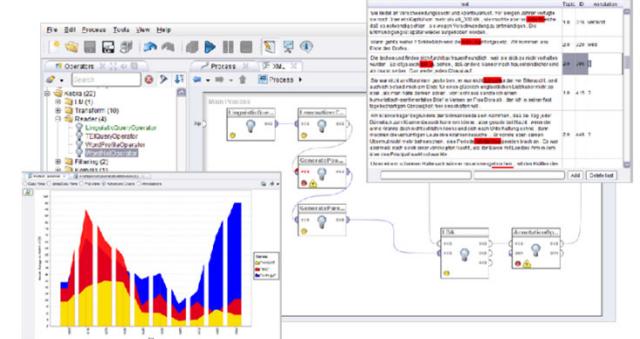
bigml



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	std	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	
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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	
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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	
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0	85	honda	gas	std	four	sedan	rwd	front	96.5	175.4	65.2	54.1	2401	ohc	four	110	mpfi	3.15	3.58	
1	107	honda	gas	std	two	sedan	fwd	front	96.5	169.1	66	51	2291	ohc	six	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	2bbi	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	
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0 ?		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	two	sedan	rwd	front	102	191.7	70.6	47.8	3950	ohcv	twelve	326	mpfi	3.54	2.76	
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	
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1	113	mazda	gas	std	four	sedan	fwd	front	93.1	166.8	64.2	54.1	1945	ohc	four	91	2bbi	3.03	3.15	
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3	150	mazda	gas	std	two	hatchback	rwd	front	95.3	169	65.7	49.6	2385	rotor	two	70	bbi	?	?	
3	150	mazda	gas	std	two	hatchback	rwd	front	95.3	169	65.7	49.6	2385	rotor	two	70	bbi	?	?	
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	fwd	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	fwd	front	98.8	177.8	66.5	55.5	2443	ohc	four	122	idi	3.39	3.39	

Step 2:

- Do on your own

Individual Activity

35 mins





15 Mins Break



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



10 mins

Step 2:

Work through the activities

Individual Activity



80 mins



LUNCH BREAK



60 mins Lunch Break

Some interesting videos

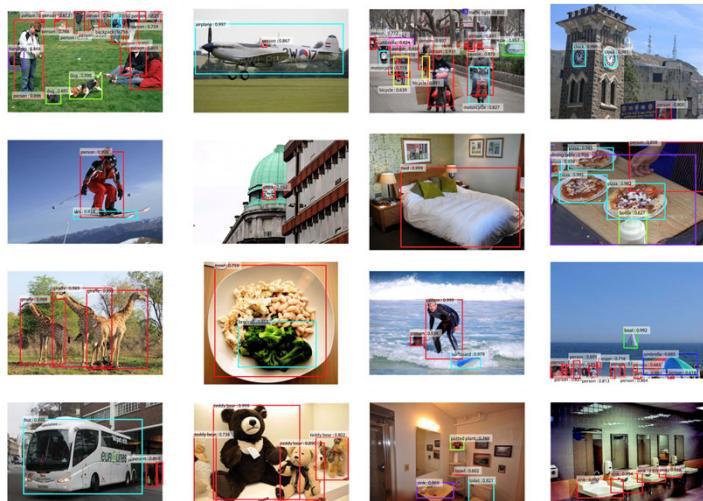
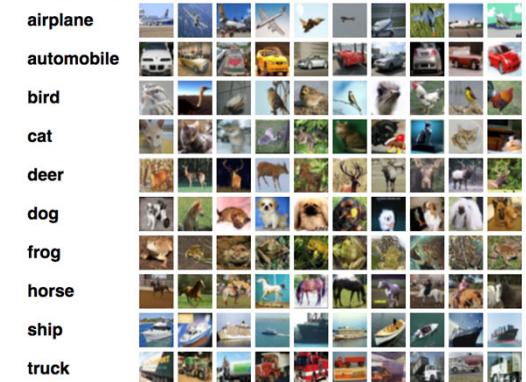
<https://www.youtube.com/watch?v=bmNaLC6vkU>

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



Applications of Computer Vision

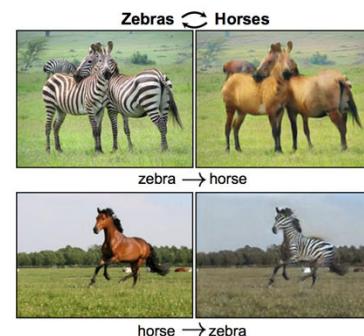
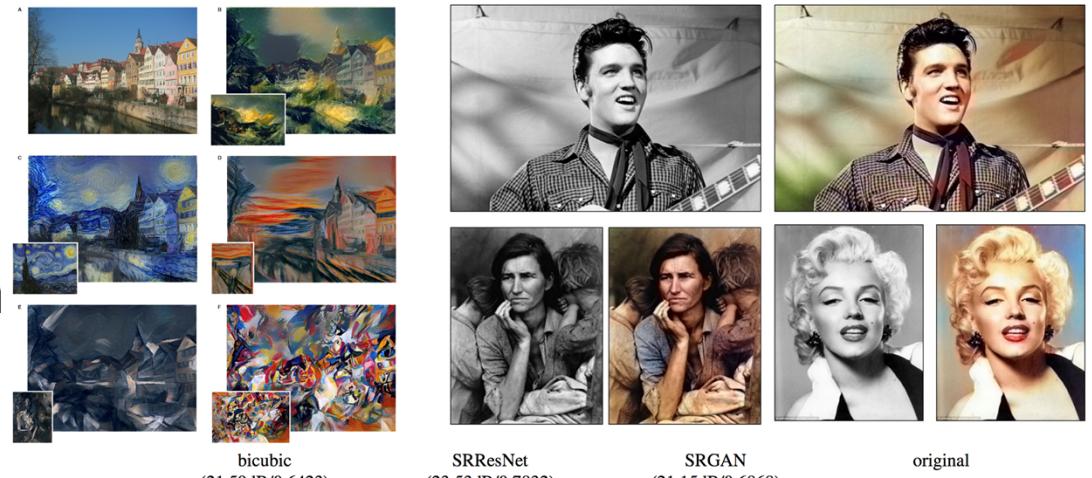
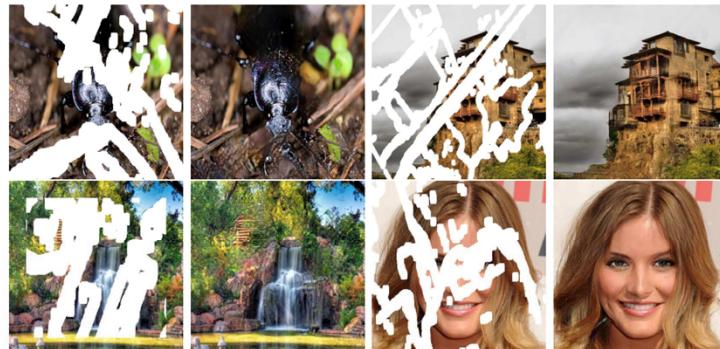
- Image Classification
- Image Classification With Localization
- Object Detection
- Object Segmentation





Applications of Computer Vision

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





Transfer Learning



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

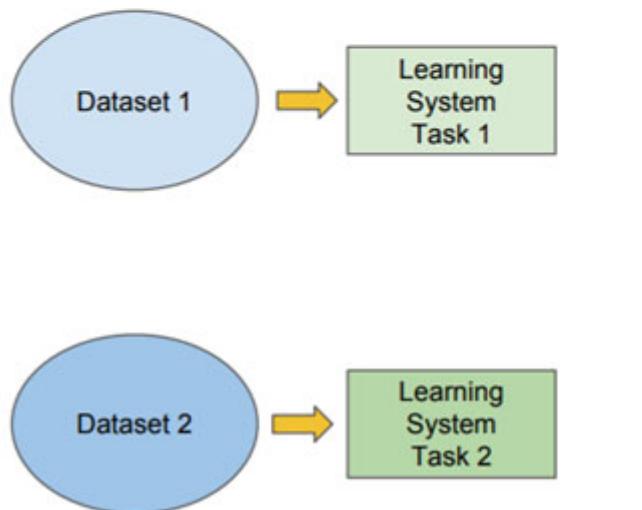
- Models are difficult to train from scratch
 - Huge datasets (like ImageNet)
 - Long number of training iterations
 - Very heavy computing machinery
 - Time experimenting to get hyper-parameters just right



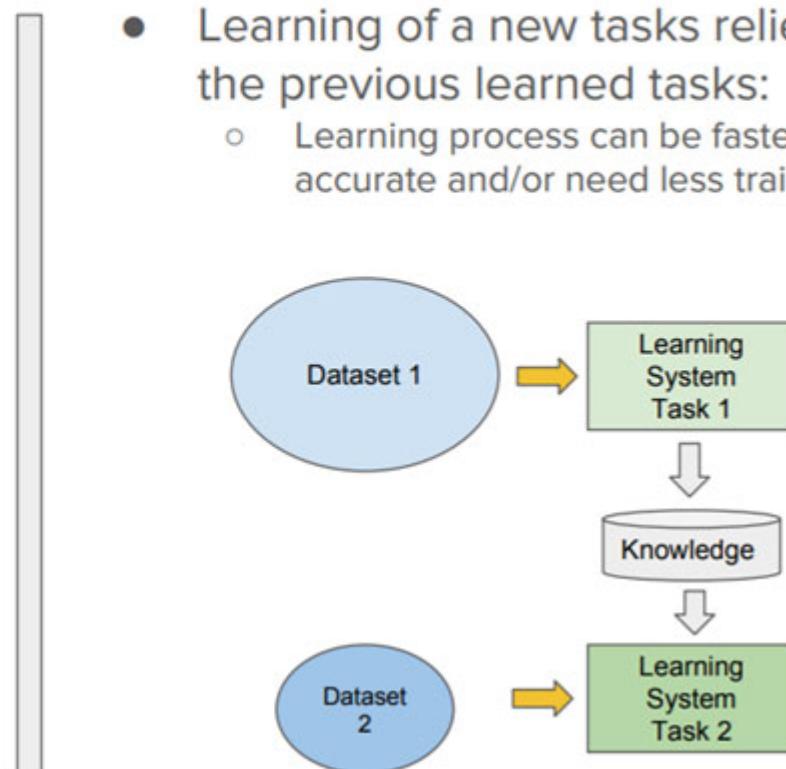
Transfer Learning

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

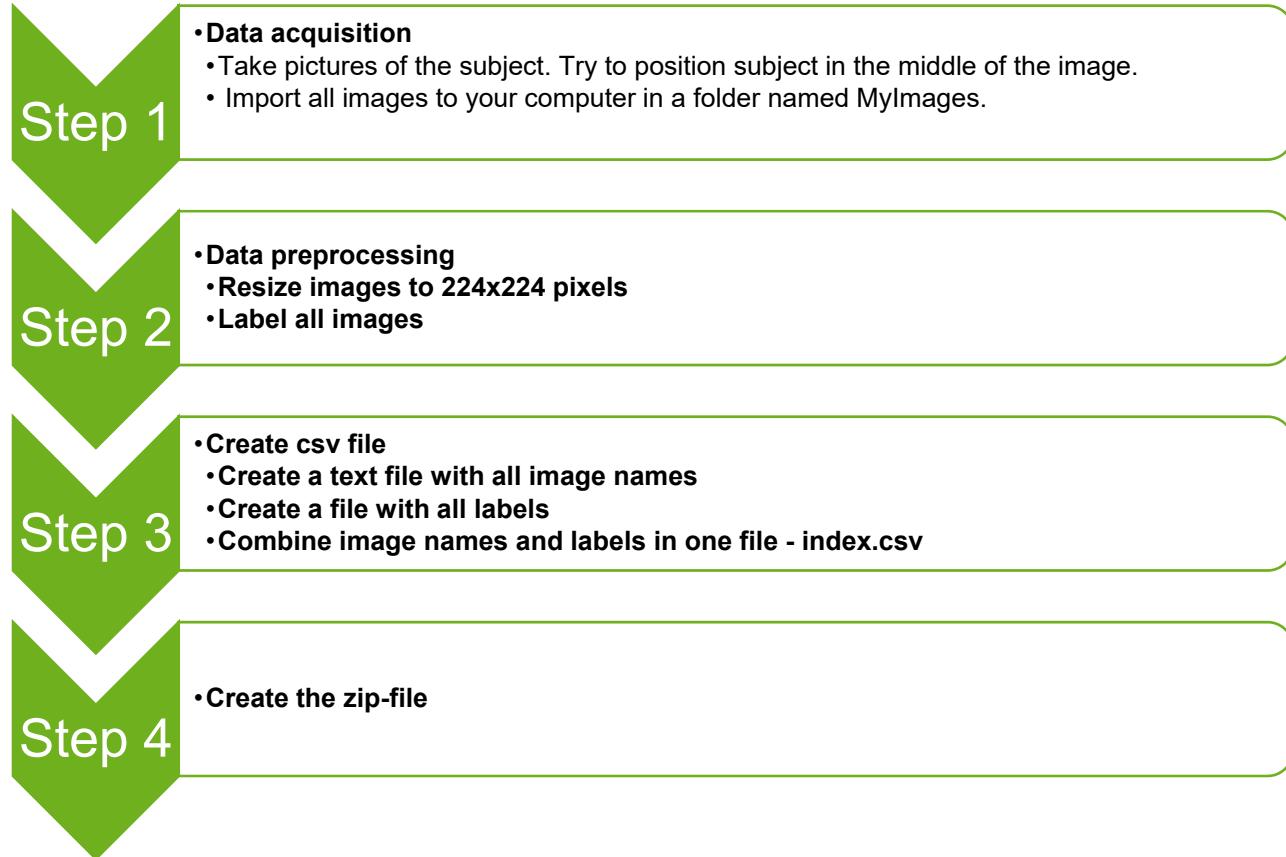
Individual Activity



30 mins



Creating a new dataset





Natural Language Processing

- 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).

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

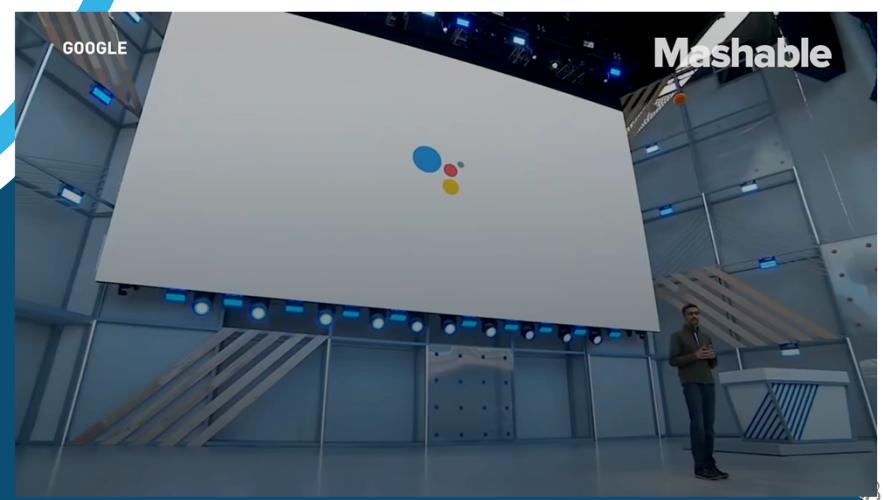


30 mins



15 Mins Break

bit.ly/google_duplex2019





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

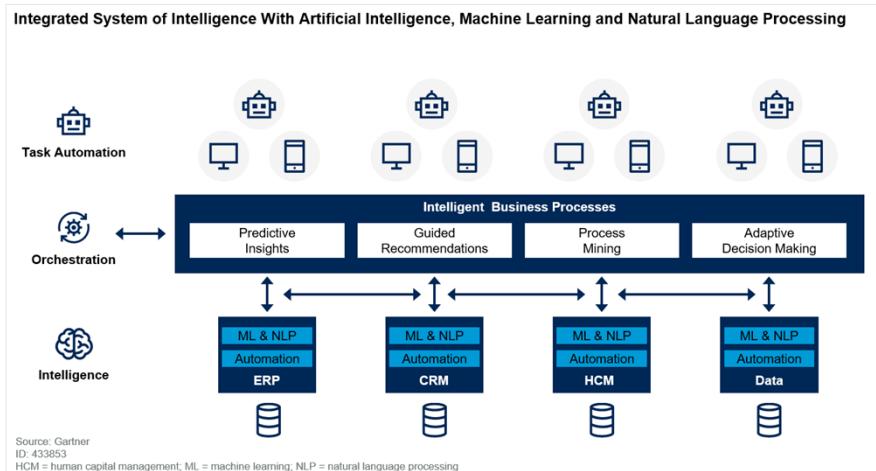
We're here to prove that "building the best product" is possible not only with Bubble.

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 Input, Checkbox, and Dropdown.

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

RPA



Adobe Acrobat Document

<https://www.youtube.com/watch?v=FV8IM9SIFQ8> 40



Dataset and Data Prep

- 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



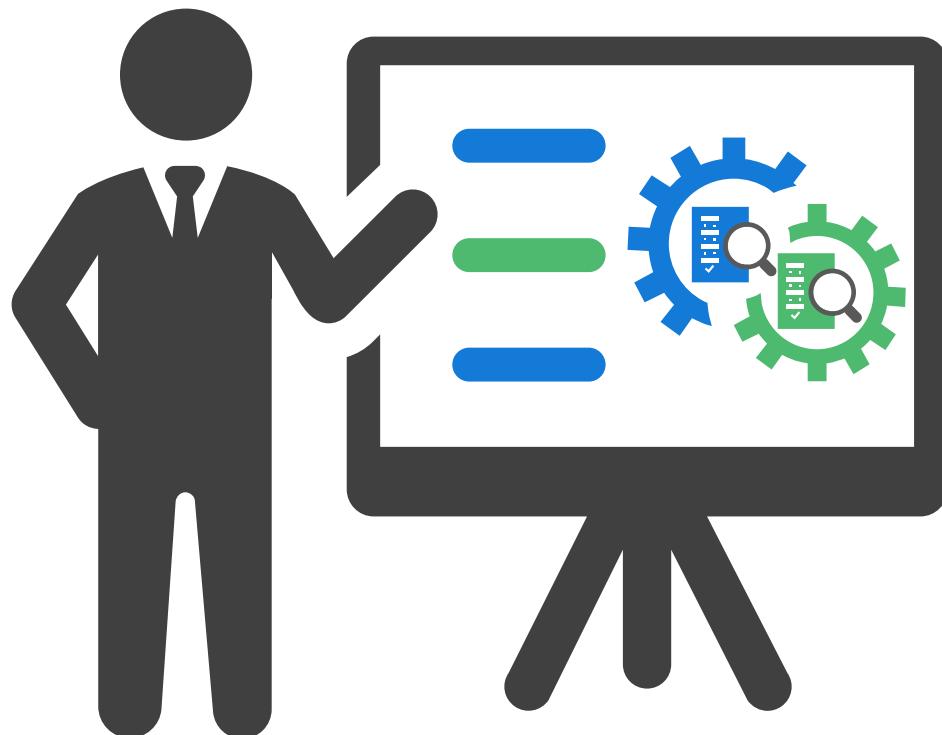
Quiz

https://bit.ly/kw_poll





Summary



Email
seow_khee_wei@rp.edu.sg

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

Source code:

43



Thank you