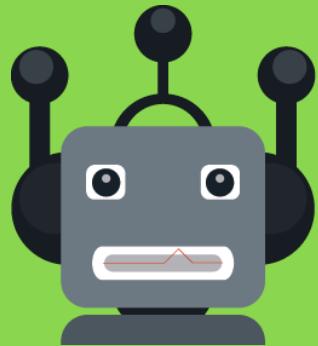


# Machine Learning Beginner Course

## 1. Introduction

## .1 .المقدمة



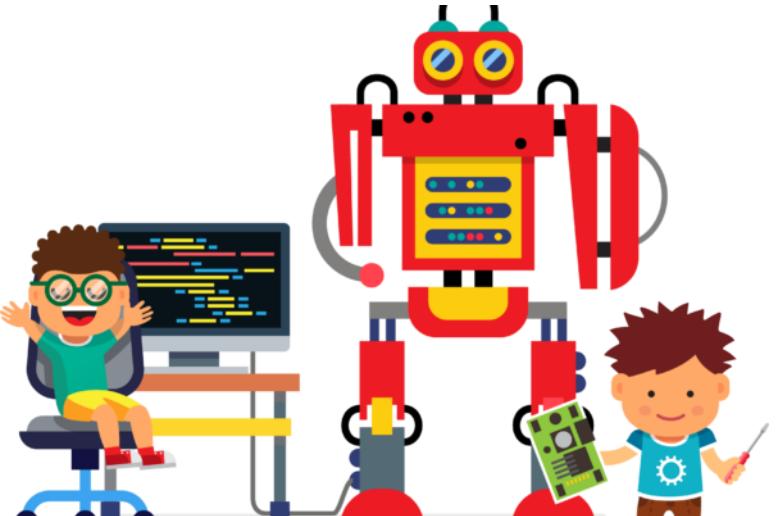
دورة تعلم الآلة للمبتدئين

# Hello!

**I am Younes Charfaoui**

And I will be you instructor in during this course.

You can find me at: [mxcsyounes@gmail.com](mailto:mxcsyounes@gmail.com)





*“AI is all about figuring what to do when  
you don’t know what to do”*

*- Peter Norvig.*

# 1. AI Philosophy

## What is Machine Learning

# What is AI?

Artificial intelligence is about creating machines capable of solving problems like we do, through reasoning, intuition and creativity, in other words AI is the simulation of intelligent, human-like processes by machines.

# Main Categories

Gaming

Natural  
Language

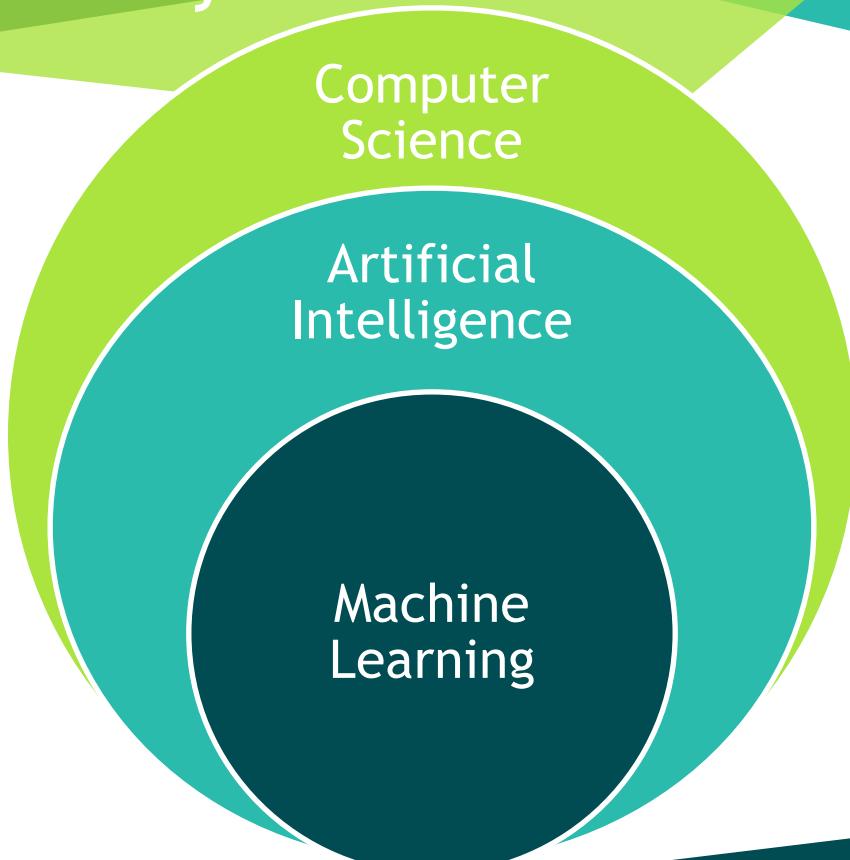
Machine  
Learning

Robotics

Computer  
Vision

# Artificial Intelligence

# General Hierarchy



# 2. Machine Learning

**Machine Learning  
is Not That !,  
because most of  
newcomers thing  
it like that.**



# Machine Learning

“Learning is any process by which a system improves performance from experience.”

- Herbert Simon (1978)

# Machine Learning

“Machine Learning is the study of algorithms that

- Improve their performance P
- At some task T
- With experience E.

A well-defined learning task is given by  $\langle P, T, E \rangle$ .”

- Tom Mitchell (1998)

# Machine Learning

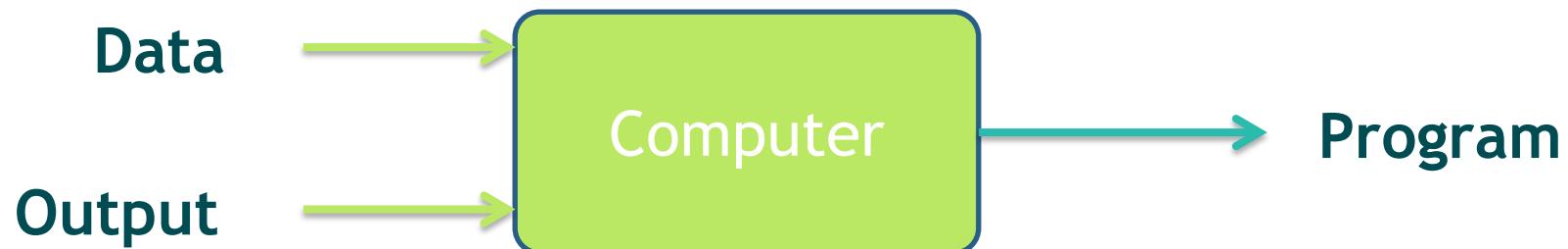
“Machine Learning is The Ability to machines to learn from the past experience, i.e. to learn from the data some correlation that help for taking a decision or doing predictions latter.”

- Younes Charfaoui (2018)

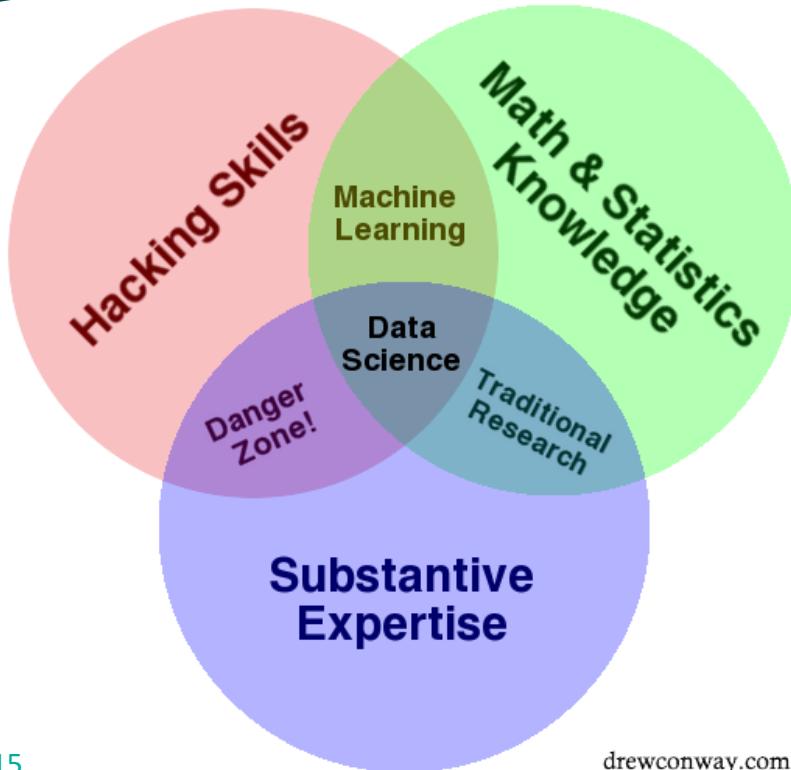
# Traditional Programming



# Machine Learning



## In General



In general ML, requires mathematical concepts and computer science concepts in order to get most of it.

# How to ML ?

What are the tool and the concepts need to make a good career in ML ?



# How to ML ?

$$\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$$

Calculus

$$\iint x y^2 \frac{x}{2a}$$

More Calculus

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Linear Algebra

$$\sum_{\substack{0 \leq i \leq m \\ 0 < j < n}} P(i, j)$$

Probability

$$\sum_k \binom{n}{k}$$

Statistics

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

Even More Calculus

How to ML ?

matplotlib



ANACONDA®



SciPy



K Keras

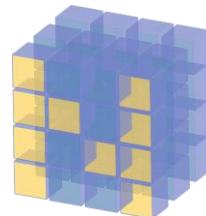
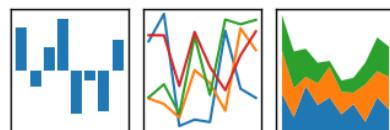


M ML Kit

PYTORCH

pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



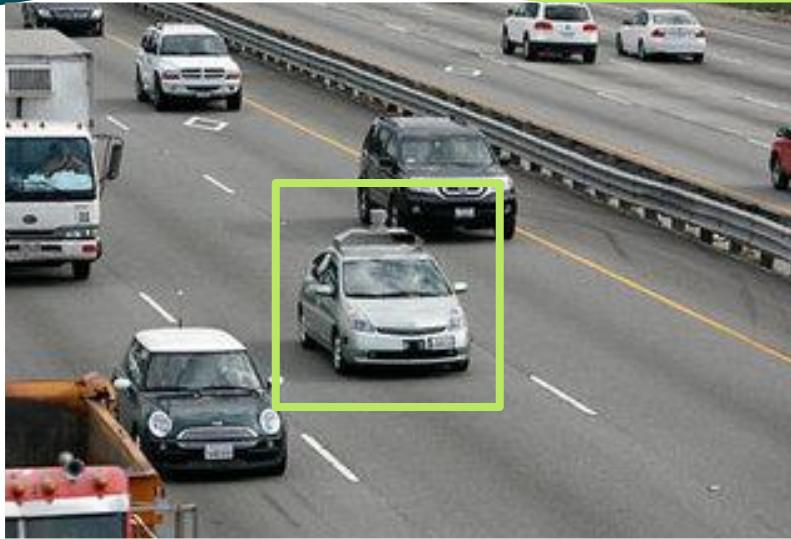
NumPy

C OpenCV

### 3. ML Applications

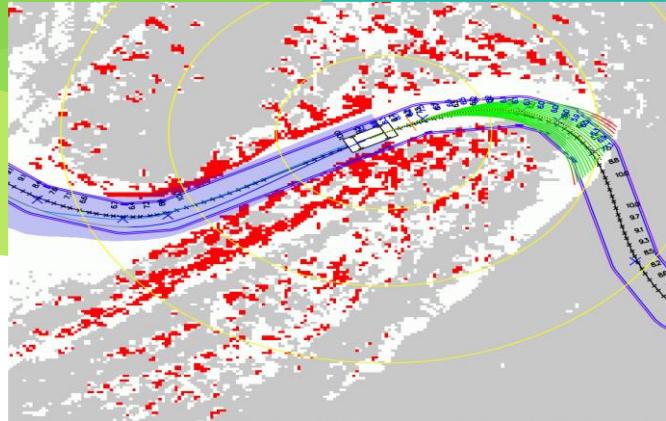


# Autonomous Cars



We can teach a car to identify object on the road such us cars, persons, street lane, etc..

# Autonomous Cars Technology



The best example is Stanley car in 2003 !!

# Robotics

From self-driving cars to auto-navigating drones, AI & ML extends into many parts of robotics and transportation. The ultimate aim is to use location and sensor data to create vehicles capable of operating without human input.



# Robotics

Always in Agriculture,  
Robots are trained to  
Crop picking !!



# Robotics

Robots are also playing great role in healthcare section !!



# Image Recognition

The Amazing Dog face,  
ML to identify faces and  
then add in image of  
ears and noses in the  
correct places, that how  
money is made !!

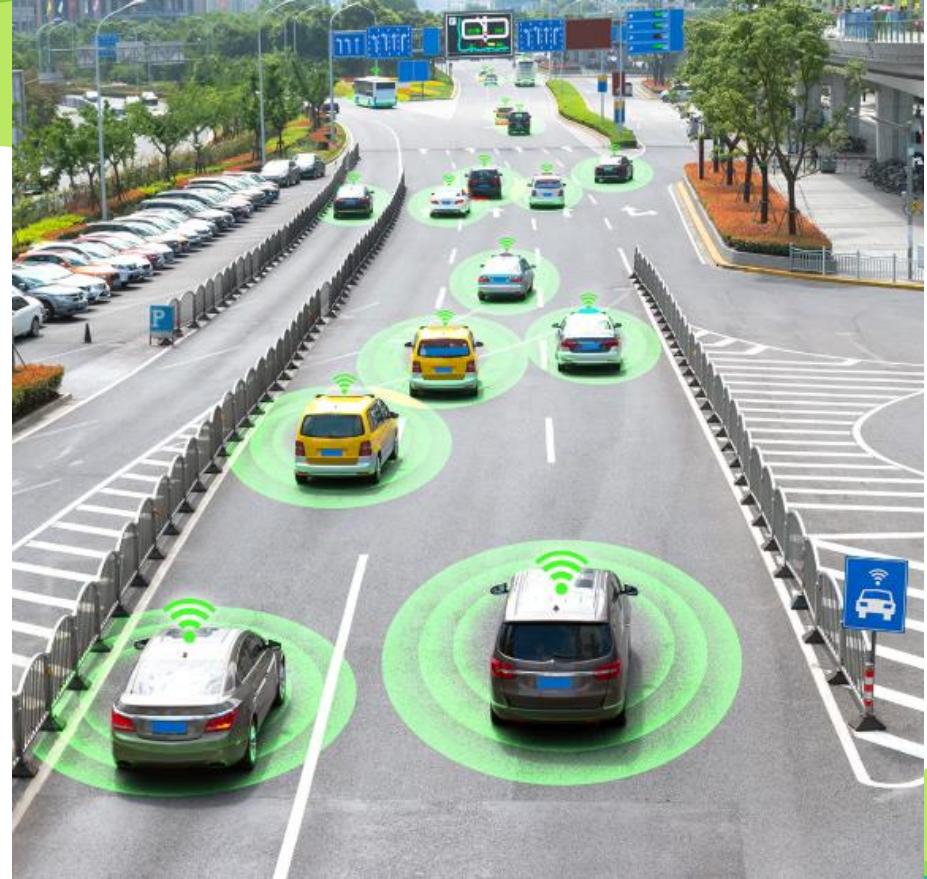


**Snapchat**



# Image Recognition

ML is used to track the neighboring object around self driving car !



# Image Recognition

ML is used in  
Agriculture, Crop  
Monitoring !! Really  
amazing.



# Image Recognition

To identify and  
recognize persons and  
objects from images,  
really this can be hard !!



# Image Recognition Positions



Even harder !!

Even more  
when races  
join the party  
of computer  
vision!!

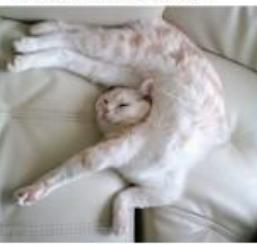




Viewpoint variation



Scale variation



Deformation



Occlusion



Illumination conditions



Background clutter



Intra-class variation

And of course  
the handy  
player,  
occlusion !!



# You are joking !



10  
Cats

Hell no !

It's a lion  
pretending  
a cat -\_- !!



# Hello Lovely Matrices



05	02	22	97	38	15	00	40	00	75	04	05	07	78	52	12	50	77	01	58
49	49	99	40	17	81	18	57	60	87	17	40	98	43	69	45	39	56	62	00
81	49	31	73	55	79	14	29	93	71	40	67	50	88	30	03	49	13	36	65
52	70	95	23	04	60	11	42	69	51	68	56	01	32	56	71	37	02	36	91
22	31	16	71	51	62	03	59	41	92	36	54	22	40	40	28	66	33	13	80
24	47	18	60	99	03	45	02	44	75	33	53	78	36	84	20	35	17	12	50
32	98	81	28	64	23	67	10	26	38	40	67	59	54	70	66	18	38	64	70
67	26	20	68	02	62	12	20	95	63	94	39	63	08	40	91	66	49	94	21
24	55	58	05	66	73	99	26	97	17	78	76	96	03	14	88	34	69	63	72
21	36	23	09	75	00	76	44	20	45	35	14	00	61	33	97	34	31	33	95
78	17	53	28	22	75	31	67	15	94	03	80	04	62	16	14	09	53	56	92
16	39	05	42	96	35	31	47	55	58	88	24	00	17	54	24	36	29	85	57
86	56	00	48	35	71	89	07	05	44	44	37	44	60	21	58	51	54	17	58
19	80	81	68	05	94	47	69	28	73	92	13	86	52	17	77	09	69	55	40
04	52	08	83	97	35	99	16	07	97	57	32	16	26	26	79	33	27	98	66
03	96	68	87	57	62	20	72	03	46	33	67	46	55	12	32	63	93	53	69
04	42	16	73	51	01	39	11	24	94	72	18	08	46	29	32	40	62	76	36
20	69	36	41	72	30	23	88	31	59	69	82	67	59	85	74	04	36	16	20
20	73	35	29	78	31	90	01	74	31	49	71	48	83	81	16	23	57	05	54
01	70	84	71	63	51	54	69	16	92	33	48	61	43	52	01	89	19	47	48

What the computer sees

image classification

82% cat  
15% dog  
2% hat  
1% mug

# And what about this ?



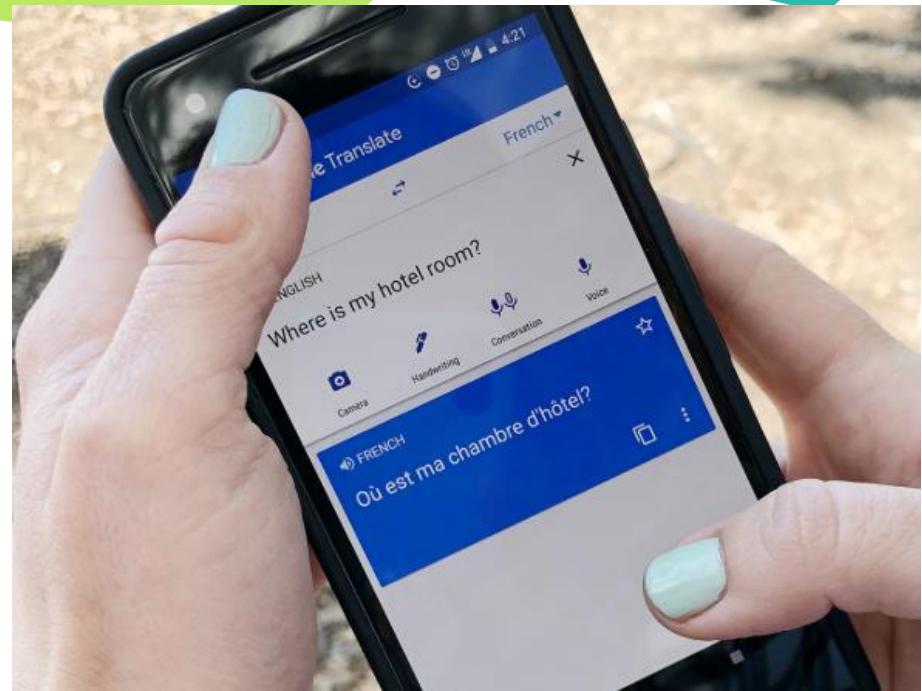
# Natural Language Processing

The use of assistants and smart home can't be accomplished without NLP. Famous examples of NLP voice control include Apple's Siri, Amazon's Alexa, and Microsoft's Cortana.



# Natural Language Processing

Translation is another side where ML & NLP played a great ball in it.



# Natural Language Processing

Beside using NLP & ML  
into reading texts,  
some government are  
using in Legal  
Document Processing.



# Natural Language Processing

Even more when ML & CV & NLP are joined together to create this awesome canvas



# Healthcare



# Healthcare

With CV and ML,  
diagnosis are made  
easily and accurately  
better than expert  
doctors.

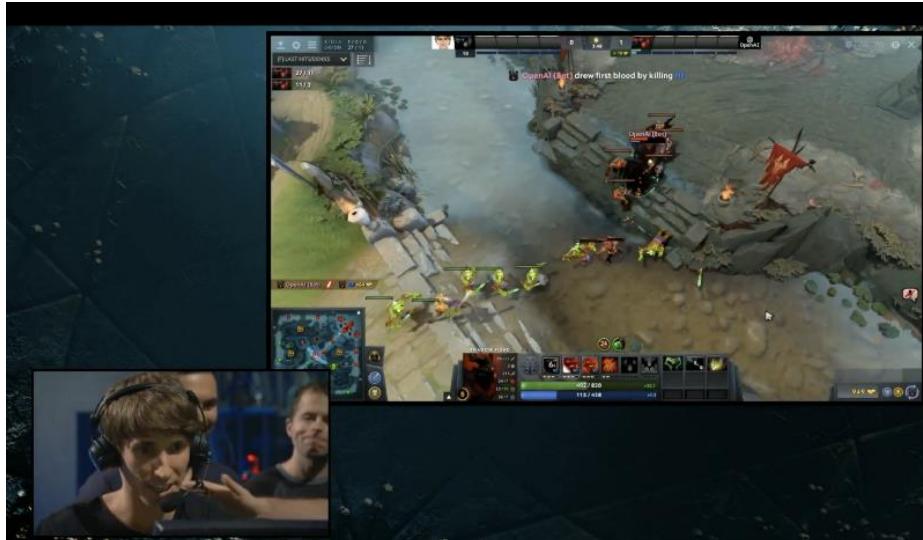


# Gaming

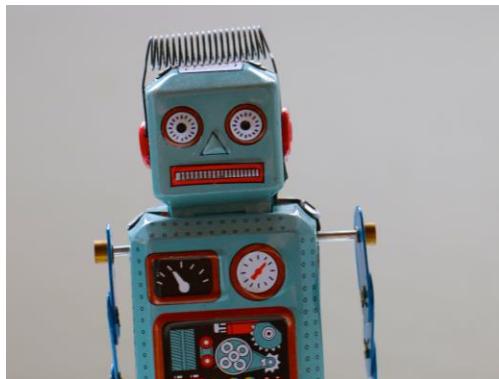


# Gaming

And finally The gaming section, where ML is also showing great results.

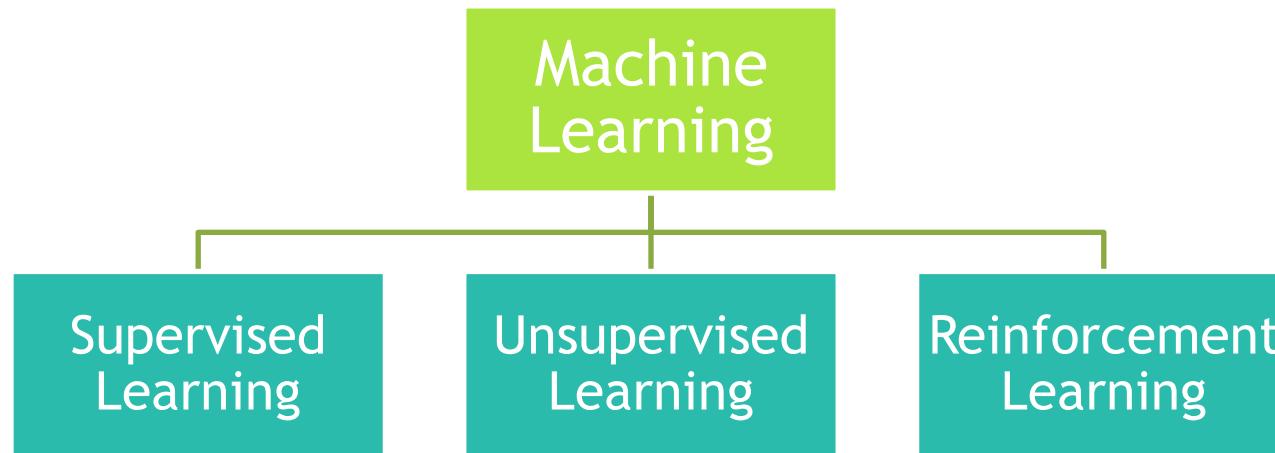


# And Much More



# 4. ML Types

# Overview of ML Types



# Supervised Learning

Supervised learning concentrates on learning patterns through connecting the relationship between variables and known outcomes and working with labeled datasets. Supervised learning works by feeding the machine sample data with various features (represented as “X”) and the correct value output of the data (represented as “y”).

# Supervised Learning

the training data you feed to the algorithm includes the desired solutions, called labels

1	2	3	4	5	6	7	10
1	4	9	16	25	36	?	?

# Unsupervised Learning

The training data does not include Targets here so we don't tell the system where to go , the system has to understand itself from the data we give, training data (without desired outputs)

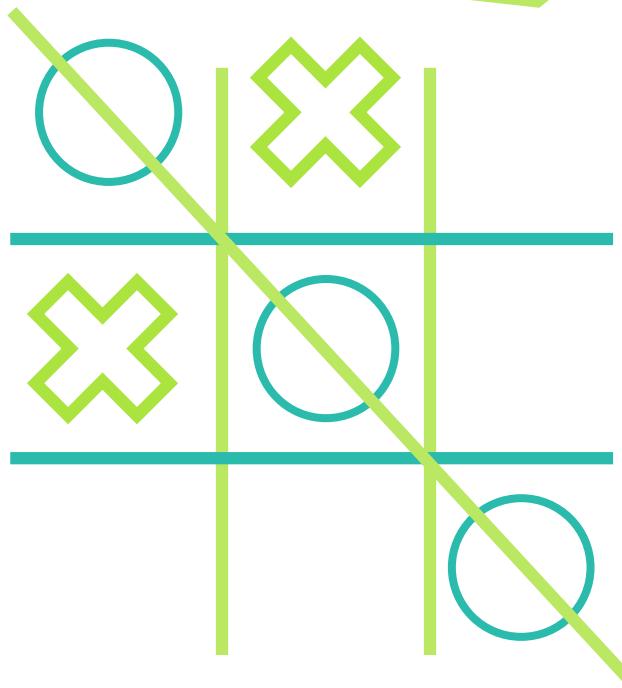
# Reinforcement Learning

Reinforcement Learning is a very different beast. The learning system, called an agent in this context, can observe the environment, select and perform actions, and get rewards in return (or penalties in the form of negative rewards)

# Reinforcement Learning



Bad Computer



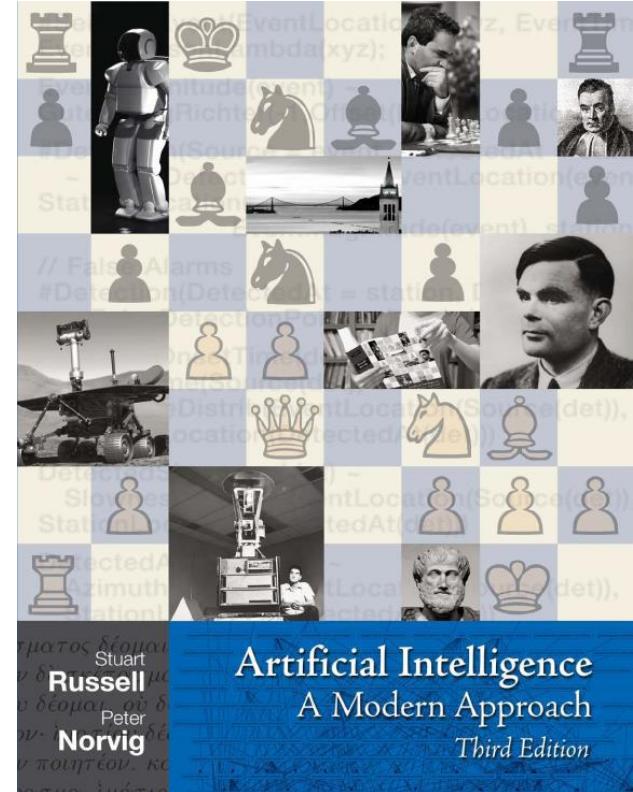
# Resources





# Artificial Intelligence A Modern Approach

*Stuart J. Russell and Peter Norvig*



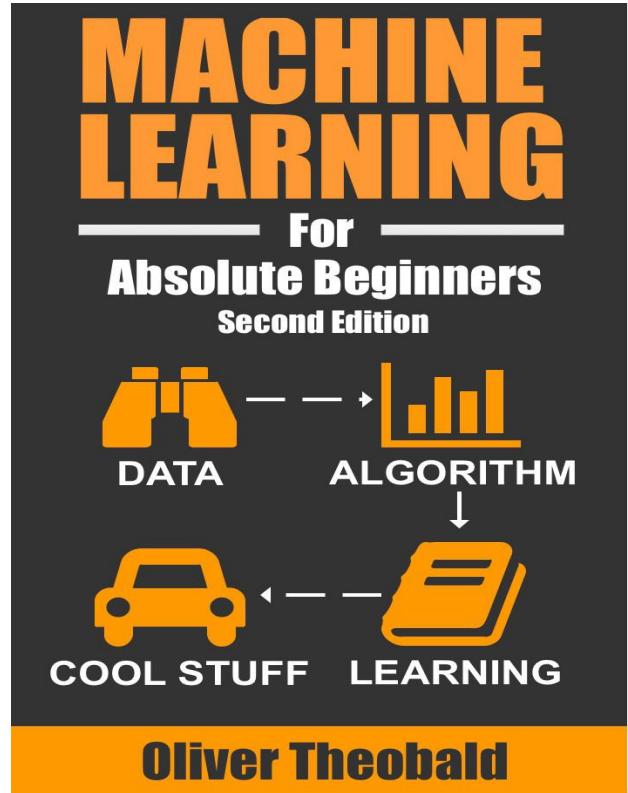
Artificial Intelligence  
A Modern Approach  
Third Edition

Stuart  
**Russell**  
Peter  
**Norvig**



# Machine Learning For Absolute Beginners

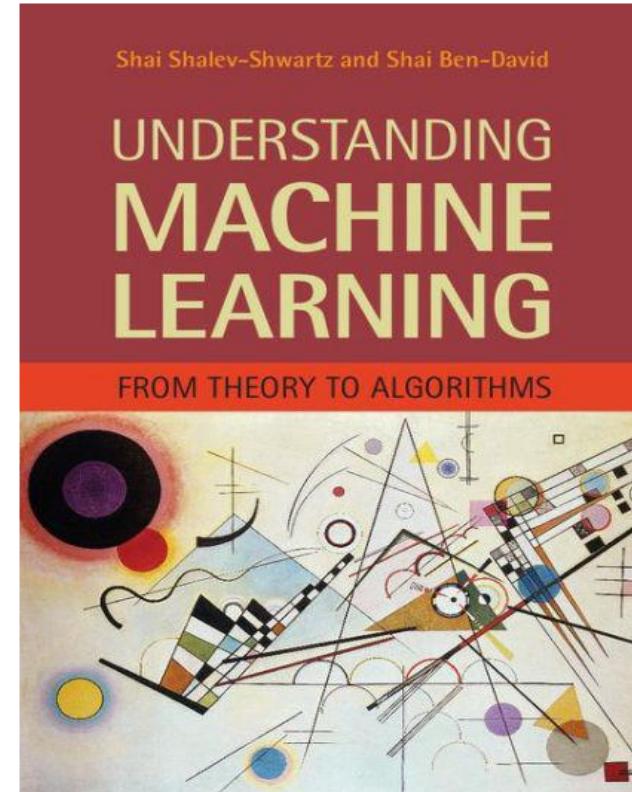
*Oliver Theobald*





# Understanding Machine learning

*Shai Shalev-Shwartz & Shai Ben-David*





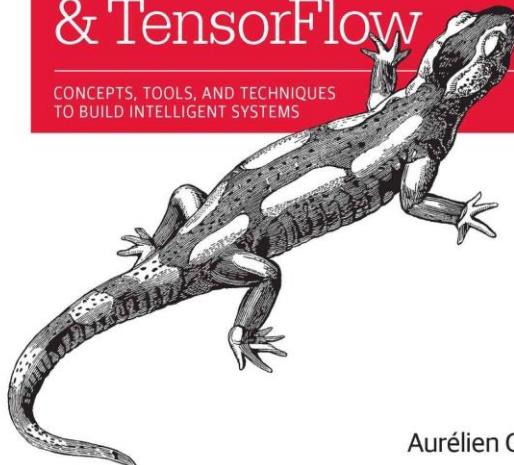
# Hands-On Machine Learning with Scikit-Learn and TensorFlow

Aurélien Géron

O'REILLY®

## Hands-On Machine Learning with Scikit-Learn & TensorFlow

CONCEPTS, TOOLS, AND TECHNIQUES  
TO BUILD INTELLIGENT SYSTEMS



Aurélien Géron



# Python Machine Learning By Example

*Yuxi (Hayden) Liu*





# What You Need to Know about Machine Learning

*Gabriel Cánepa*

Gabriel A. Canepa

## What you Need to Know about Machine Learning

Leveraging data for future telling and data analysis

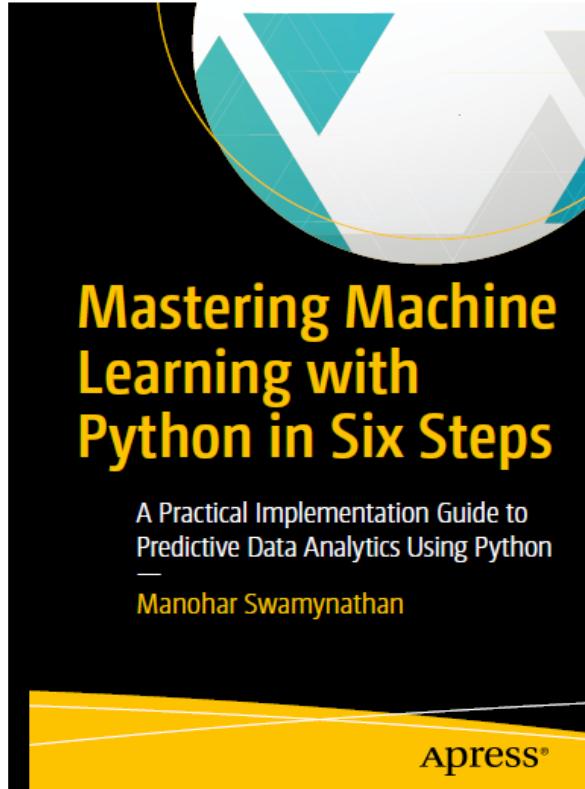


Packt



# Mastering Machine Learning with Python in Six Steps

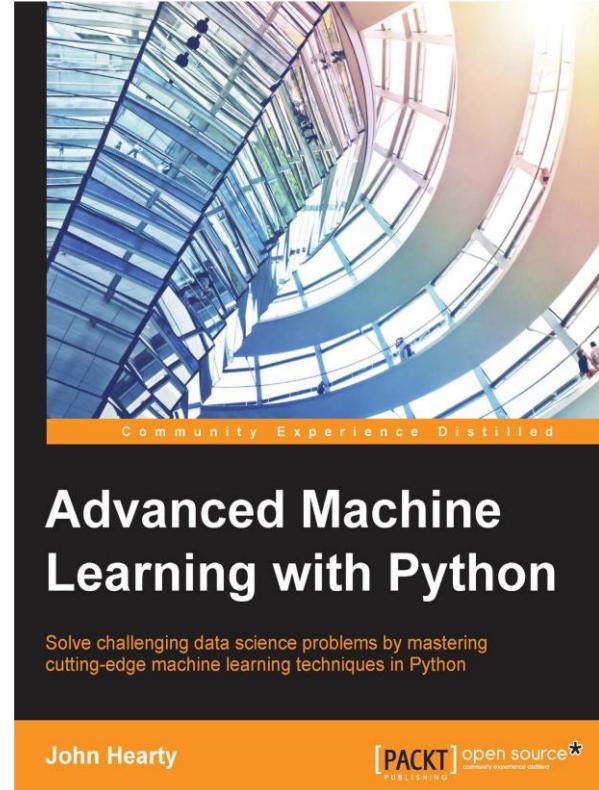
*Manohar Swamynathan*





# Advanced Machine Learning with Python

*John Hearty*



## Medium Articles/ Blogs

Read as much as you can medium blogs and some bloggers in ML community write very brilliant articles its strengthens your concepts and you see this of from other perspectives and gain more deeper insights of the concepts

- Analytics Vidhya Blogs
- Towards Data Science
  - Sebastian Ruder
  - Colah



Medium

Must subscribe to this Youtubers

1. Siraj Raval
2. Arxiv Insight
3. Sentdex
4. Two Minute Papers
5. Deep Lizard



# Community

- Wizards (Slack channel by Siraj Raval)
- Analytics Vidhya Community(Slack Channel)
- Reddit (/MachineLearning)
- Kaggle Discussions Forums
- Fast.ai Forums
- [github.com/topics/machine-learning](https://github.com/topics/machine-learning)



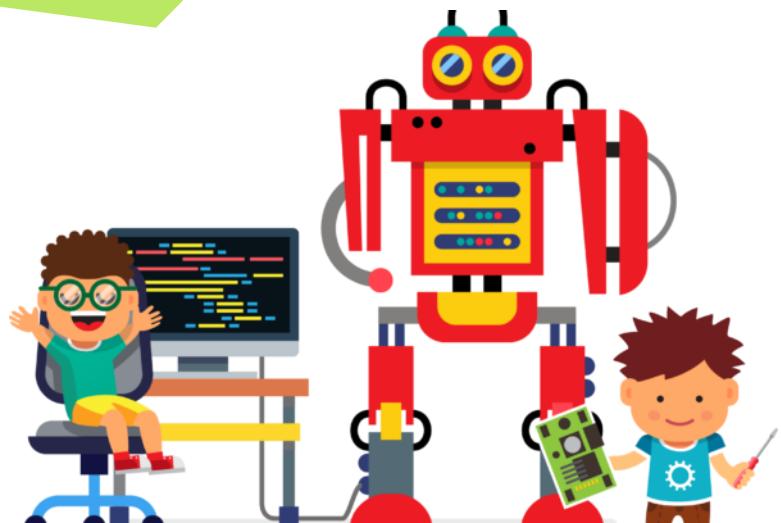
kaggle

# Coding Interview



Given a list of numbers and a number k, return whether any two numbers from the list add up to k. For example, given [10, 15, 3, 7] and k of 17, return true since  $10 + 7$  is 17.

Can you do this in one pass?



شكراً لدعمكم

Thanks for Assisting!