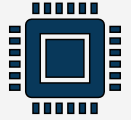
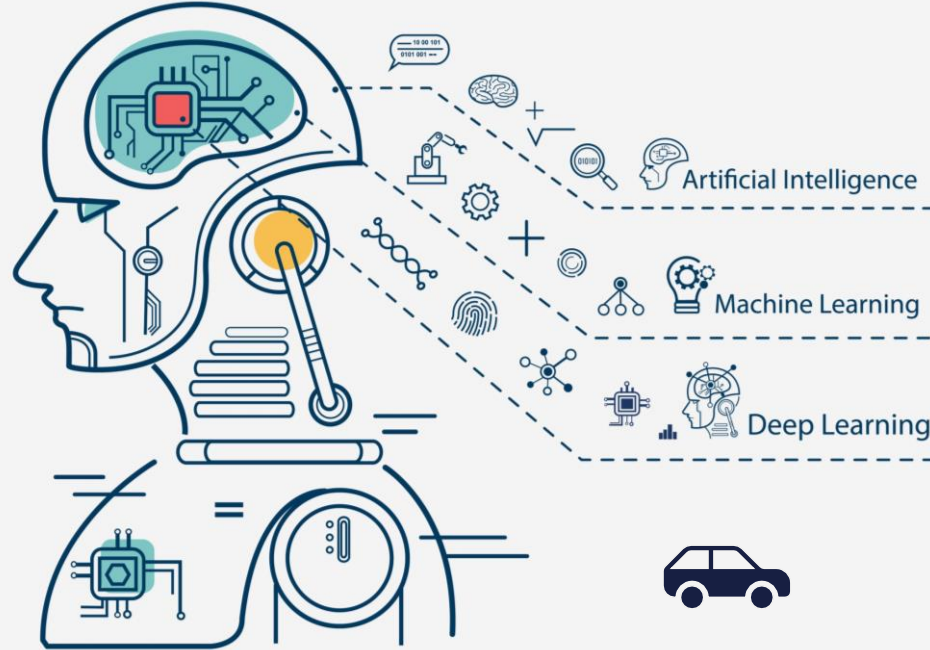




APSSDC

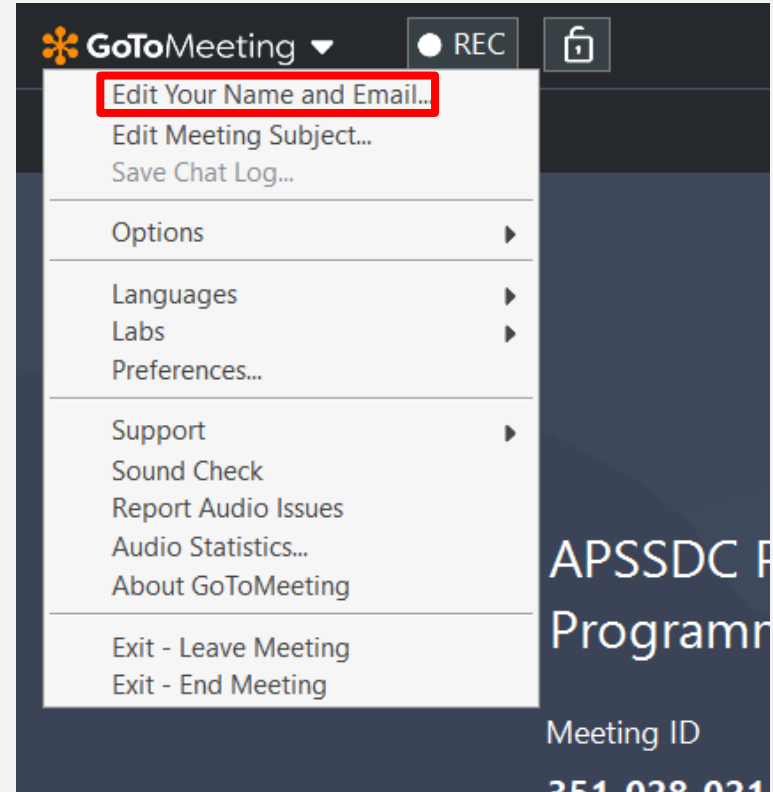
Andhra Pradesh State Skill Development Corporation



MACHINE LEARNING USING PYTHON

For Attendance and
Verification Purpose

**RollNo-Name-
CollegeCode/
CollegeName
And RegisteredEmail
ID**

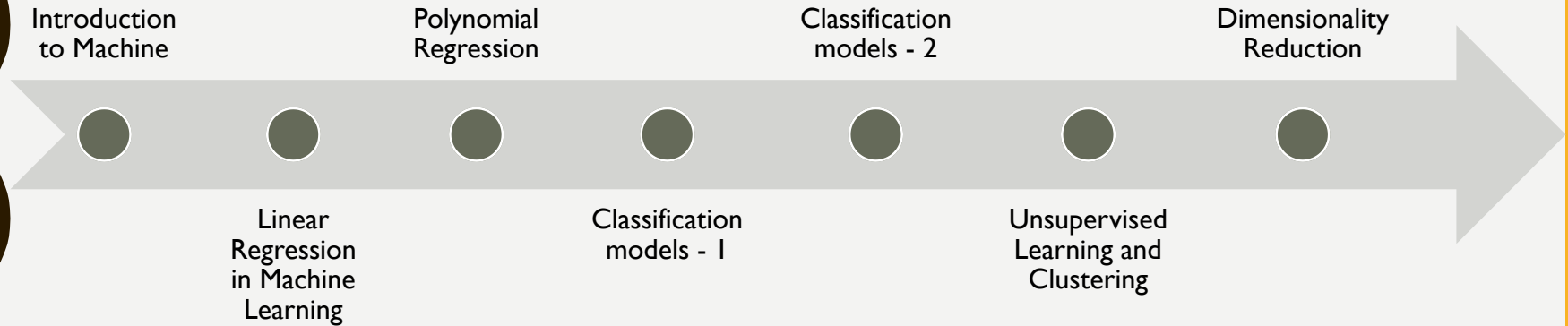


SESSION RESOURCES

<http://bit.ly/apssdc-ml-eb7>

MACHINE LEARNING USING PYTHON

AGENDA



DAY1 AGENDA

What is
Machine
Learning

Machine
Learning
Classification

Types of
Algorithms

Data
Importing
and
manipulating

WHY ARE YOU ATTENDING THIS TRAINING PROGRAM

1. AI → ML, DL
2. It is use future
3. I wanted be an ML engineer
4. it is most trending in the today industry...so iam very much intreasted in it sir
5. To get Knowledge In fields Of AI and ML to became Data Scientist
6. It's the booming technology and machine learning is an interesting concept
7. I am more interested to learn how to a machine will learn!
8. Everybody saying AI and ML are very important. I want to know whats inside it
9. It is booming technlogy,so i want to acquire knowledge in ml and data analysis
10. i wnat to become a data scientist so ml is a part of DS thats why i am intrested to lear ml

WHERE ML IS USING

- google voice Virtual assistants
- online shopping websites/ social media platforms
- Speech recognition or image recognition
- weather prediction
- Spam Email detection
- YouTube recommendations
- All types of automations
- In medical field
- Self driving vehicles, I think self driving vehicles comes under IoT???
- search engine result refining
- recognizing faces in google photos
- bussinuss field
- In space study
- Health Care, Retail sector and Banking

PREREQUISITES

1. Python Programming

- Jupyter Notebook Environment

2. Data Analysis Concepts:

- Data Manipulation using NumPy**
- Data Analysis using Pandas**
- Data Visualizations using Matplotlib & Seaborn**
- Data Preprocessing techniques using Sklearn

WHAT IS THIS FRUIT?



APPLE/Fruit

- Color, Shape, Seeing, Smell, eating, Weight
- Red, Heart Symbol, 150grms – 500grms

WHAT IS THIS FRUIT?



APPLE/Fruit

- Color, Shape, Seeing, Smell, eating, Weight
- Green, Heart Symbol, 150grms – 500grms

WHAT IS THIS FRUIT?



- Apple, Half Apple
- Color, Shape, Seeing, Smell, eating, Weight
- Red, Heart Symbol, 150grms – 500grms
- Seeds, Inner Color, Seed Location
- Small, White, Center

QUIZ

Color	Shape	Weight	Size	What is it?
Red	Heart Symbol	100grms	2.5"	
Red	Heart Symbol	18grms	1.375"	
Green	Heart Symbol	150grms	2.7"	
Red	Heart Symbol	223grms	3.25"	

QUIZ

Color	Shape	Weight	Size	What you can do?
Red	Heart Symbol	100grms	2.5"	
Red	Heart Symbol	18grms	1.375"	
Green	Heart Symbol	150grms	2.7"	
Orange	Circle	223grms	3.25"	
green	curved	75grms	3"	
Orange	Oval	150grms	3.5"	
green	circular	80grms	2.5"	
red	oval	550grms	5"	
green	circular	5grams	0.5"	
red	oval	50grms	2"	

QUIZ

Color	Shape	Weight	Size	What is it?
Red	Heart Symbol	10000 grms	2.5"	APPLE

WHAT MACHINE LEARNING ?



“A computer program is said to learn from experience(input data) **E** with respect to some class of tasks(Target) **T** and performance measure **P**, if its performance at tasks in T, as measured by P, improves with experience E.”

— Tom Mitchell, Professor at Carnegie Mellon University

- Computer Program \rightarrow Past Experience(Data) \rightarrow W.r. to Some task T \rightarrow with perromance P
- $P \rightarrow T \rightarrow E$

WHAT IS **ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING**



ARTIFICIAL INTELLIGENCE

Artificial Intelligence (**AI**) is the science of making things smart. Can be defined as:

“Human intelligence exhibited by machines”

A broad term for getting computers to perform human tasks. The scope of AI is disputed and constantly changing over time.

AI: COMMON USE CASES

- Object recognition
- Speech recognition / Sound detection
- Natural Language Processing / Sentiment analysis
- Creative (e.g. Style Transfer – Learning to draw an image in the style of an artist)
- Prediction – given some inputs, what is the expected output for unseen examples
- Translation between languages
- Restoration / Transformation – e.g. taking an image and using ML to figure out what should be there, or generating faces based on what it knows face to be.
- Some [AI Examples](#)

MACHINE LEARNING

- Machine Learning (**ML**) can be defined generally as:

“An approach to achieve AI through systems that can learn from experience to find patterns in a set of data”

ML involves **teaching a computer to recognize patterns by example, rather than programming it with specific rules.** These patterns can be found within data. In other words, ML is about creating algorithms (or a set of rules) that learn complex functions (or patterns) from data and make predictions on it –a form of “narrow AI”

DEEP LEARNING

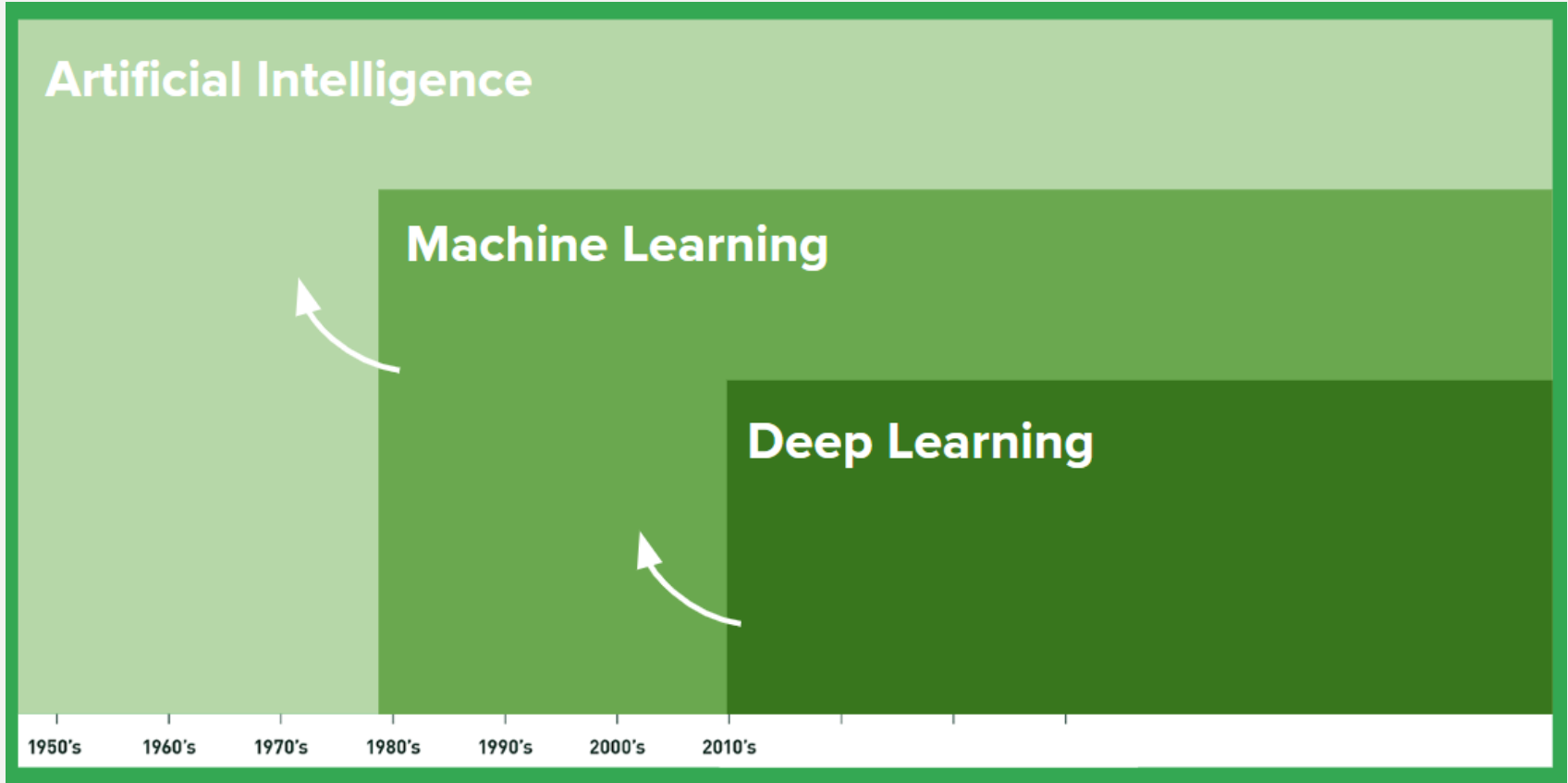
- Deep Learning (**DL** from here on) can be defined generally as:

“A technique for implementing Machine Learning”

One such DL technique is a concept known as **deep learning Neural networks (DNNs)** which you may have heard of.

Essentially DL in the context of DNNs is where the code structures you write **are arranged in the layers that loosely mimic the human brain, learning patterns of patterns.**

SUMMARY

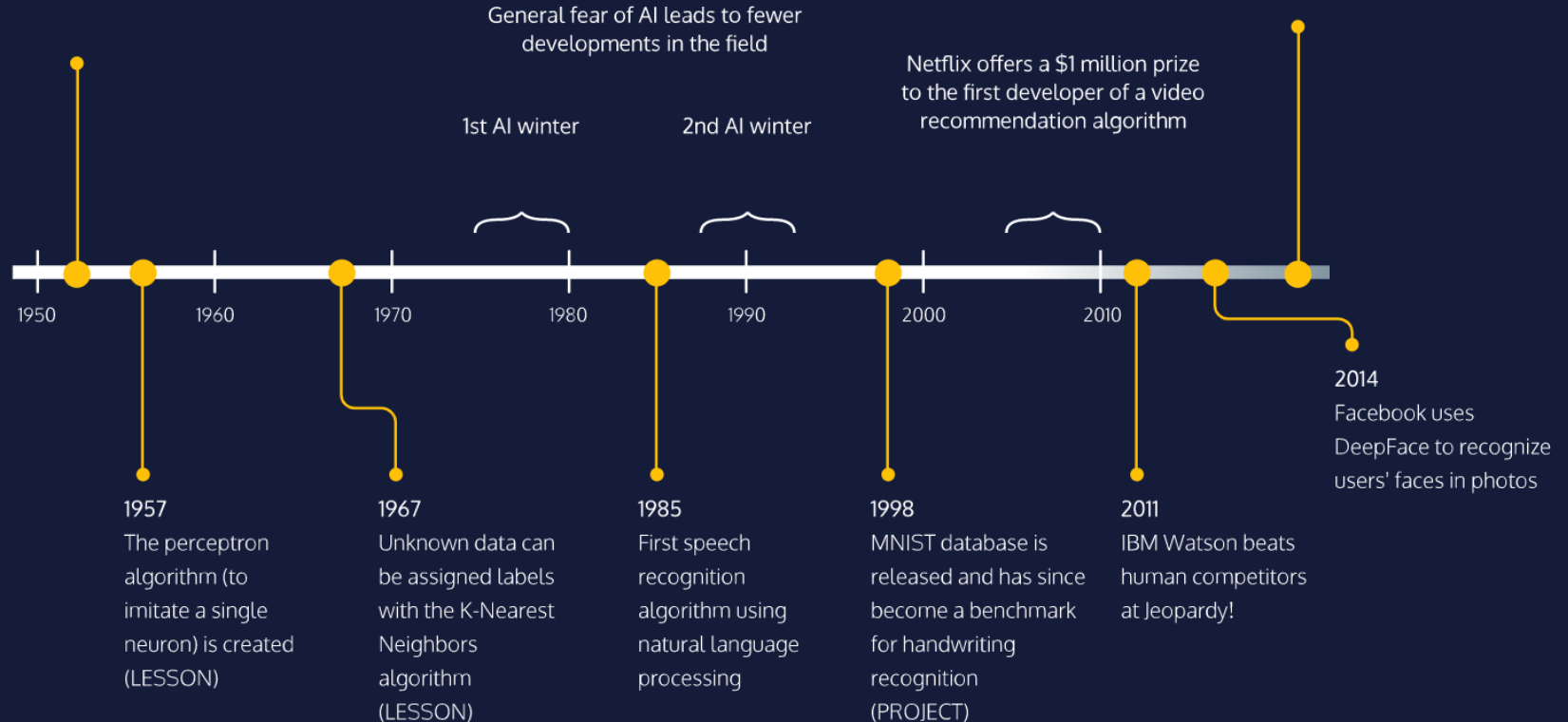


1950

Alan Turing publishes
Computing Machinery
and Intelligence
"Can machines think?"

2016

Google's AlphaGo
beats professional
players at Go
A notoriously difficult
board game studied
for centuries



FEW OTHER DEFINITIONS

“Machine learning is the hot new thing”

— John L. Hennessy, President of Stanford (2000–2016)

“A breakthrough in machine learning would be worth ten Microsoft”

— Bill Gates, Microsoft Co-Founder

“Machine learning is the field of study that gives computers the ability to learn without being explicitly programmed”

— Arthur Samuel's

MACHINE LEARNING TYPES

Supervised Learning

- Makes machine Learn explicitly
- Data with clearly defined output is given
- Direct feedback is given
- Predicts outcome/future
- Resolves classification and regression problems



Unsupervised Learning

- Machine understands the data (Identifies patterns/structures)
- Evaluation is qualitative or indirect
- Does not predict/find anything specific

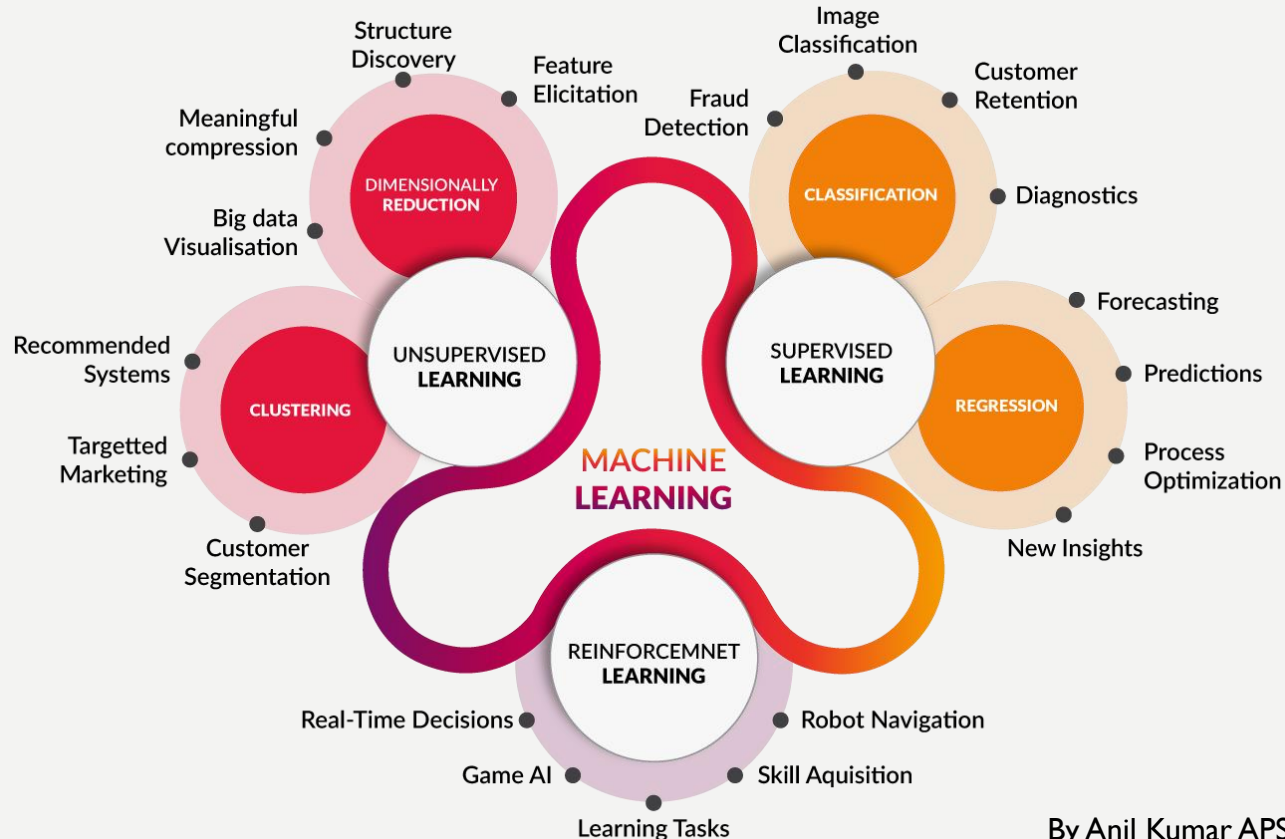


Reinforcement Learning

- An approach to AI
- Reward based learning
- Learning form +ve & +ve reinforcement
- Machine Learns how to act in a certain environment
- To maximize rewards

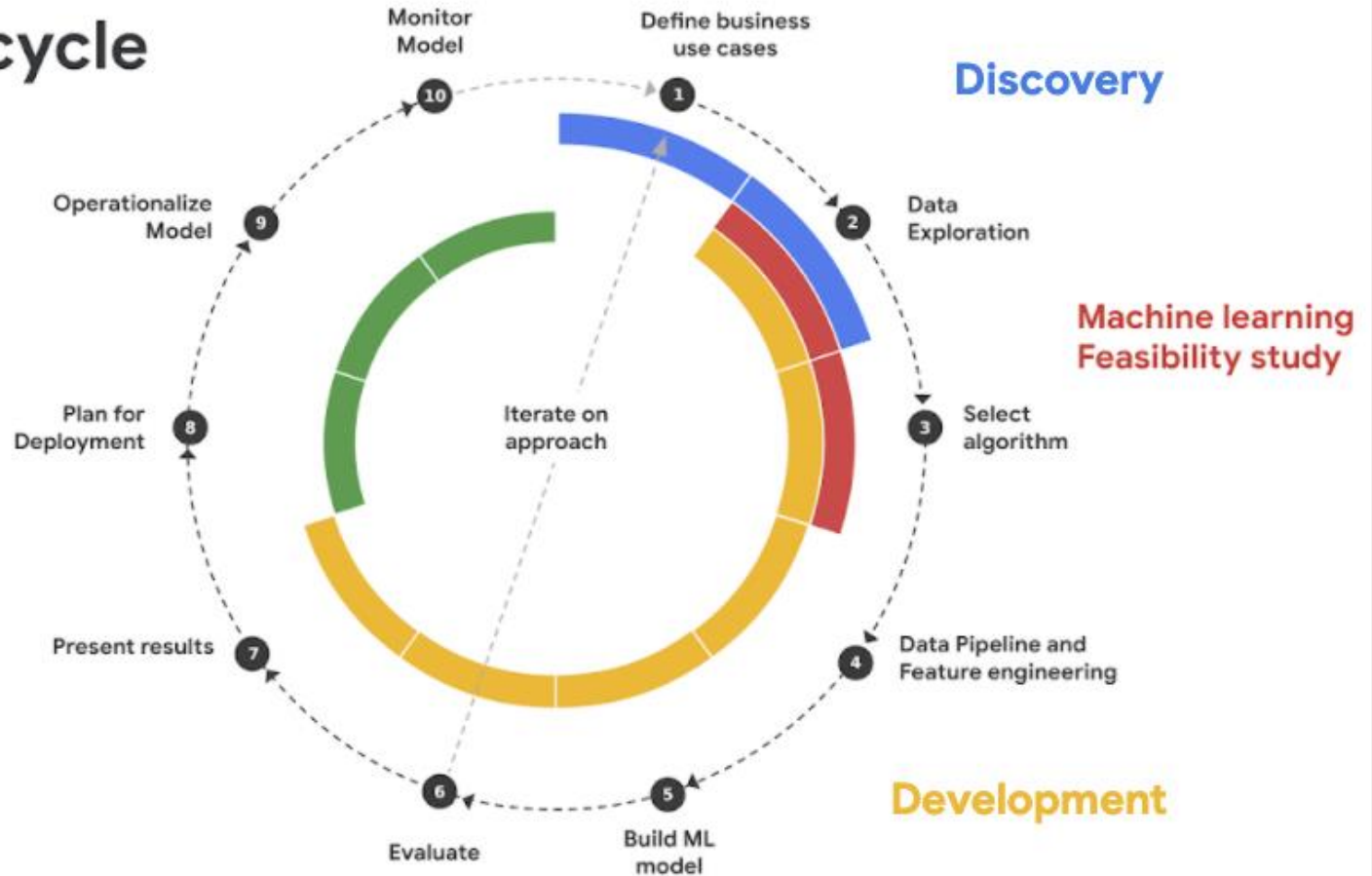


MACHINE LEARNING CATEGORIES

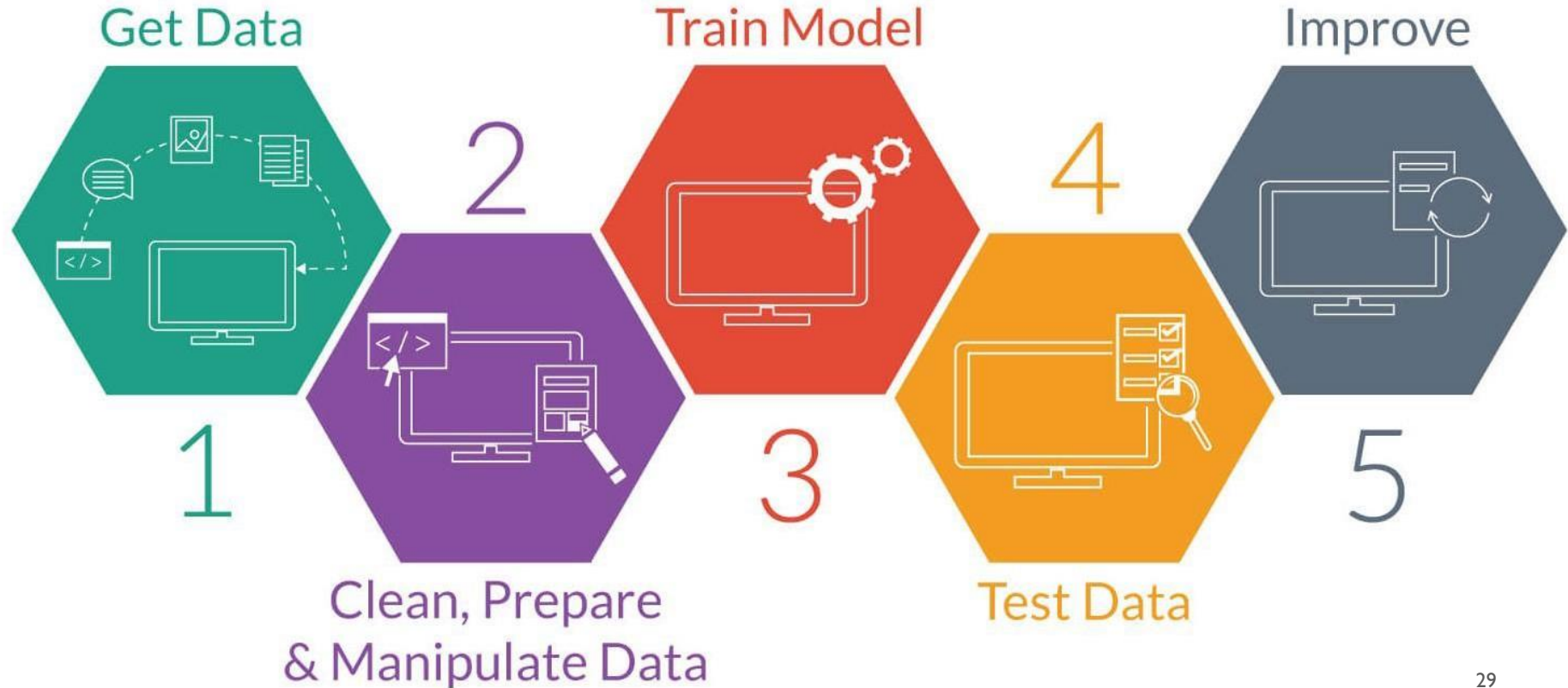


ML Lifecycle

Deployment



MACHINE LEARNING PROCESS



PACKAGES FOR ML IN PYTHON

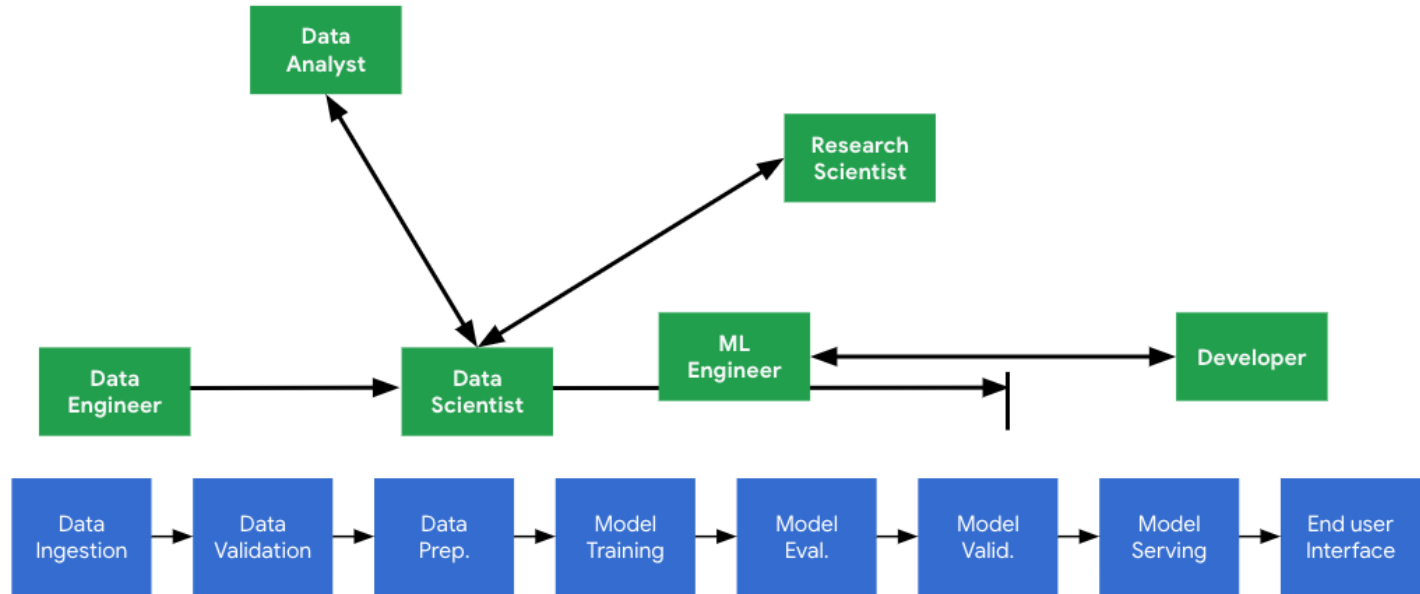


THE NEED FOR MACHINE LEARNING DESIGN PATTERNS

Business

R & D

Engineering



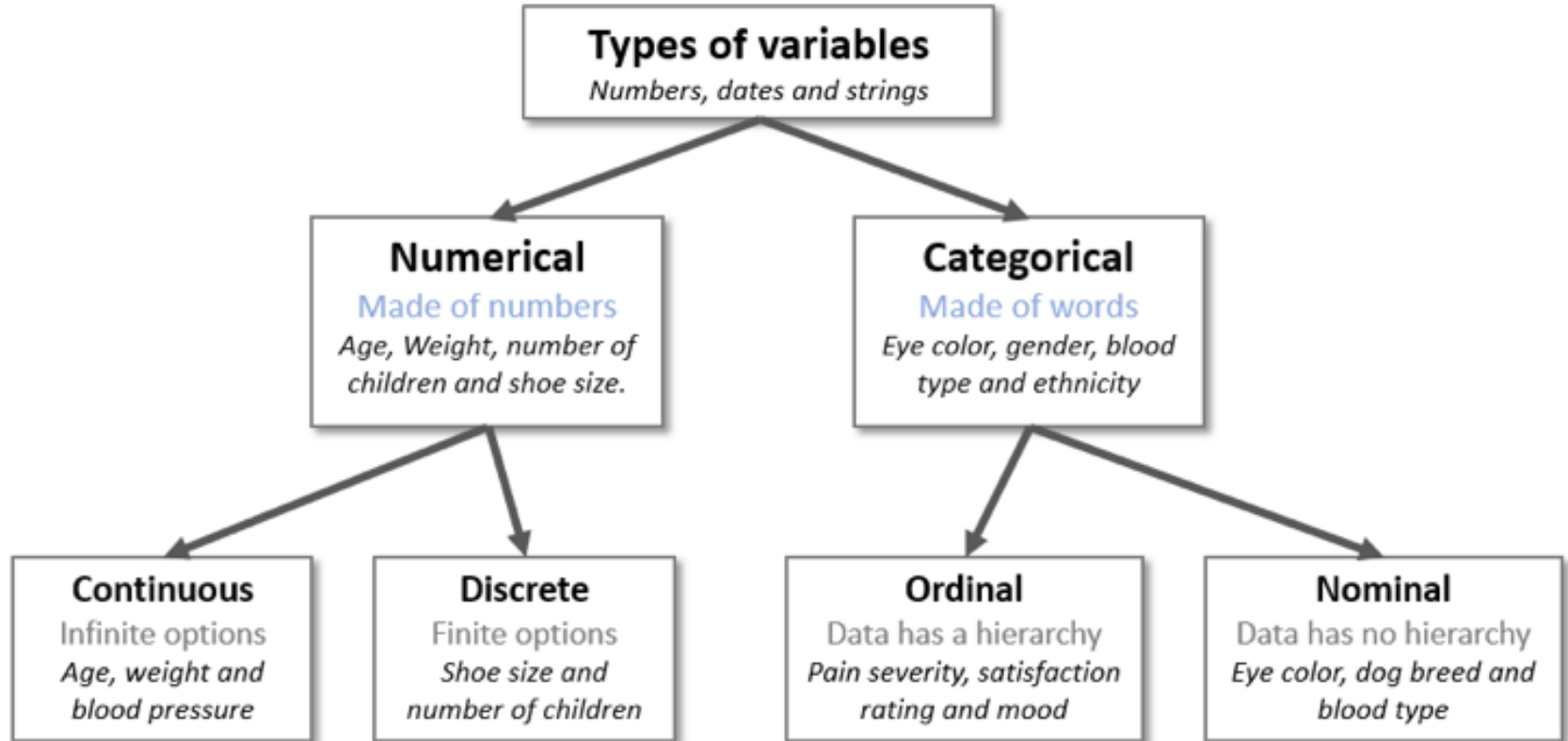
HOW TO CHOOSE DATA TO TRAIN THE MODEL

DATA CLASSIFICATION IN REAL WORLD

- Labeled, non labeled → Data
- Categorical, Numerical → statistics
- Structures → If data is having structure → CSV, Excel, DB, HTML Tables, TSV,
- Semi-structured, → XML, JSON, ... = {'Key': 'Value'}
- Unstructured → Text Files, PPT, Video, Images, Word, Audio,

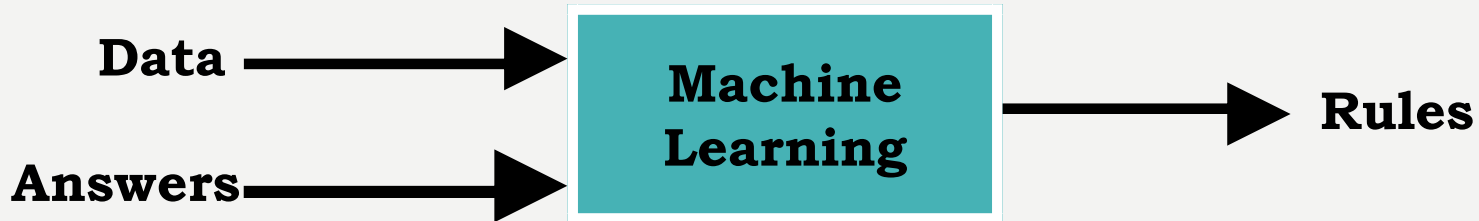
- Def ML
- AI, ML, DL
- Classification of ML
- Life Cycle of ML
- Classification real world data

TYPES OF VARIABLES



https://en.wikipedia.org/wiki/Statistical_data_type

CLASSICAL PROGRAMMING VS MACHINE LEARNING



CLASSICAL PROGRAMMING VS MACHINE LEARNING



FEATURES / ATTRIBUTES

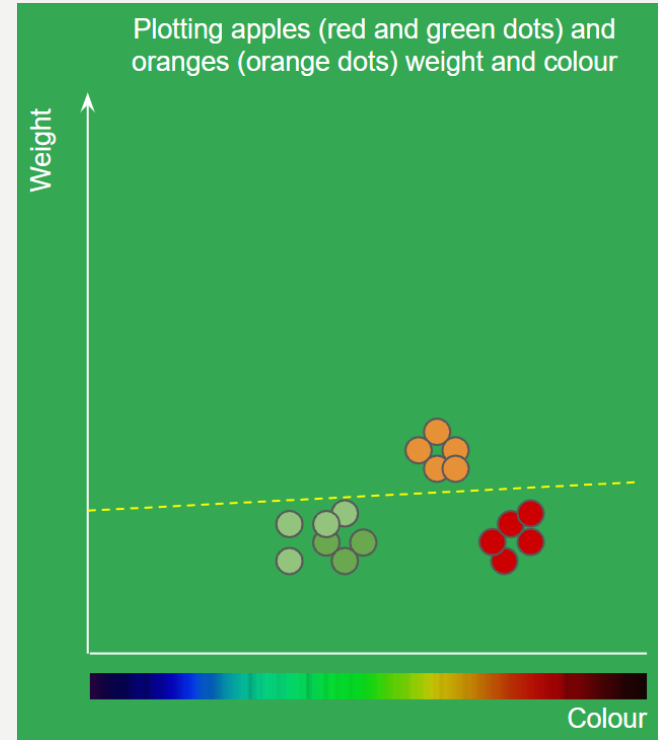
- **Features (aka attributes)** are used to train an **ML system**. They are the properties of the things you are trying to learn about.



FEATURES / ATTRIBUTES

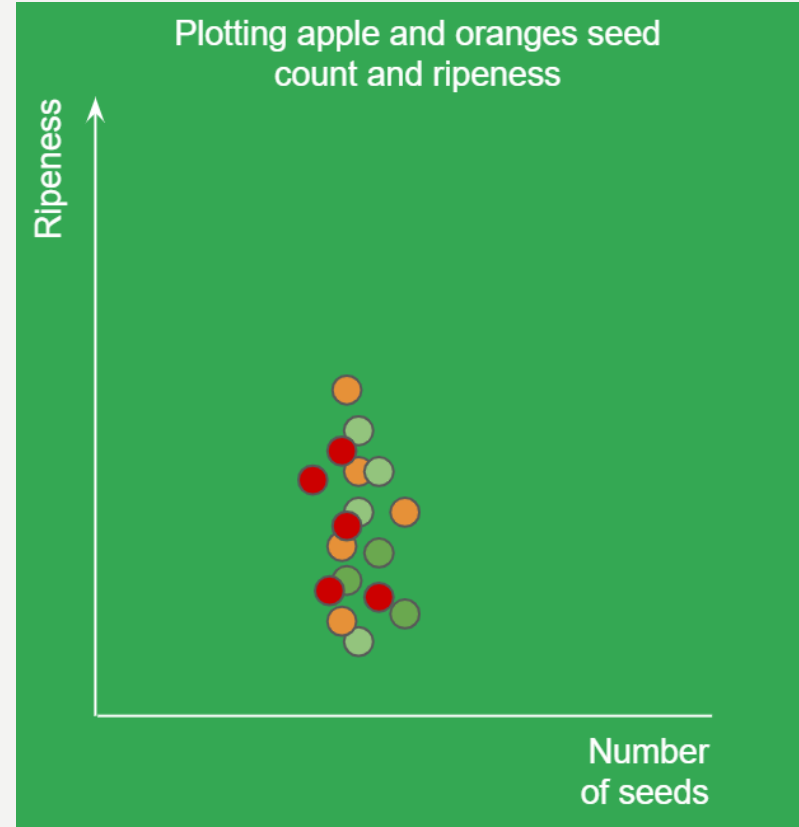
Taking fruit as an example. Features of a fruit might be weight and color. 2 features, would mean there are 2 dimensions. A 2D system may be plotted on a graph if features are represented in a numerical way.

In the plot on the right, the ML system can learn to split the data up with a line to separate apples from oranges. This **can now be used to make future classifications** when we plot new points the system has not seen (anything above is orange, below is apple)



FEATURES / ATTRIBUTES

- **Choosing useful features can have a big impact on the quality of the ML system.** Some features may not be useful enough to separate the data points.
- In this example we take bad features of fruits(ripeness and seed count) that do not allow us to learn any distinguishing factors for the fruit.



WHAT ML CANNOT PREDICT STUFF IT DOESN'T KNOW ABOUT

Lets say you teach an ML system about animals like this:

Number of Legs, Color, Weight, Animal:

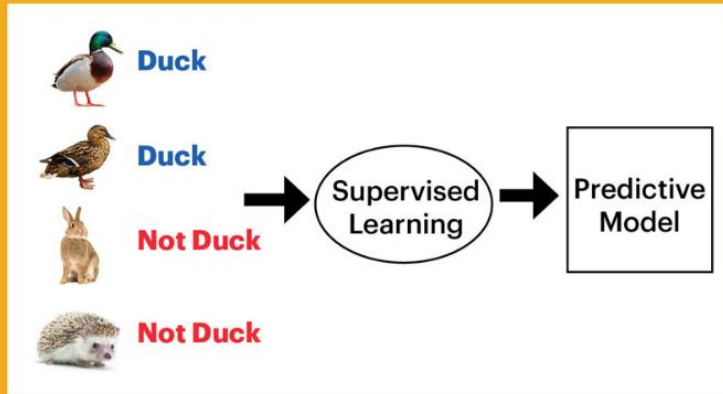
- 4, Black, 10KG, Dog
- 2, Orange, 5KG, Chicken

If you now present it with a Cow: 4 legs, black, 200KG it would predict “Dog”. This is because it only knows about dogs and chickens and this was the closest match.

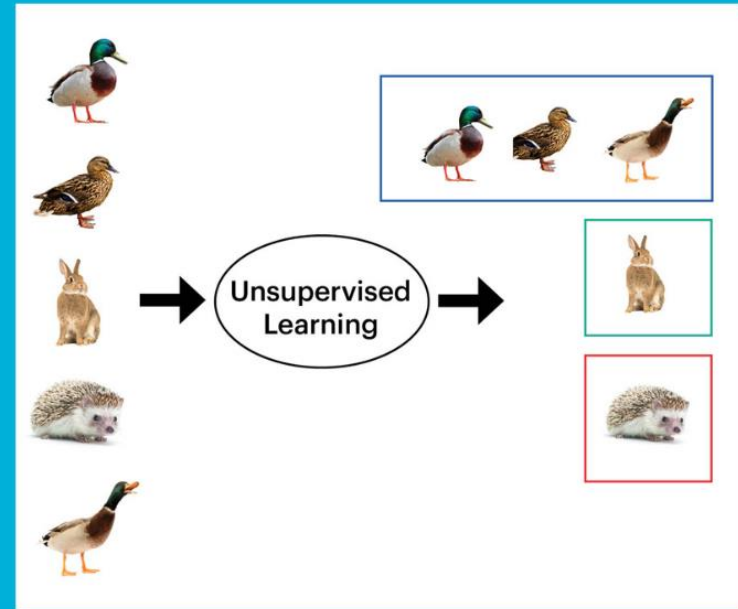
HOW ML SYSTEMS ARE TRAINED (LEARNING STYLE)

SUPERVISED VS UNSUPERVISED

Supervised Learning (Classification Algorithm)

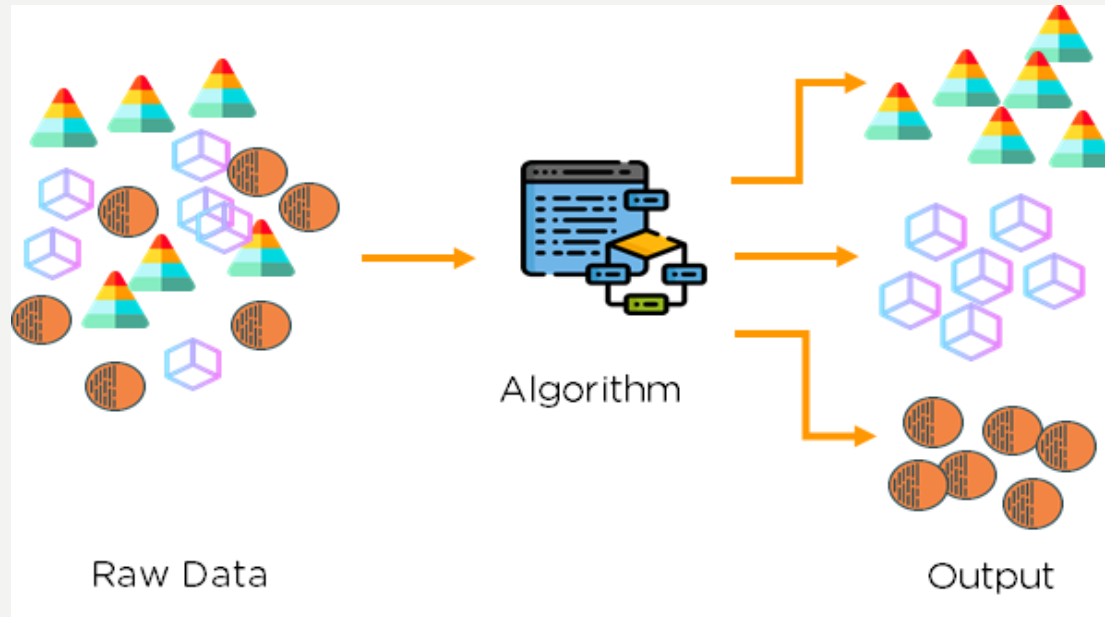


Unsupervised Learning (Clustering Algorithm)



UNSUPERVISED LEARNING

Unsupervised learning model learns through observation and finds structures in the data. When the model is feed data, it automatically finds patterns and relationships in the data by creating clusters in it. What it cannot do is adding labels to the cluster. Like the picture shown below.



By Anil Kumar APSSDC

MACHINE LEARNING ALGORITHMS

SUPERVISED

Regression

- Linear Regression
 - Simple Linear Regression
 - Multi Linear Regression
- Polynomial Regression
 - Polynomial Regression
 - Multi Polynomial Regression

Classification

- Linear Classifiers
 - Logistic Regression
- K - Nearest Neighbors
- Decision Trees
- Random Forest
- Support Vector Machines

CLASSIFICATION VS REGRESSION



Student Profile



Predicting Student
Pass Or Fail



Student Profile



Predicting Student Marks
Percentage

UNSUPERVISED

Clustering Types

- Hierarchical clustering
- K-means clustering
- DBSCAN
- Spectral clustering

Dimensionality Reduction

- Principal Component Analysis
- Independent Component Analysis
- randomized SVD

CLASSIFICATION



0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

FRAUD DETECTION



HOUSE PRICE PREDICTION



STOCK PREDICTION



CUSTOMER PREDICTION

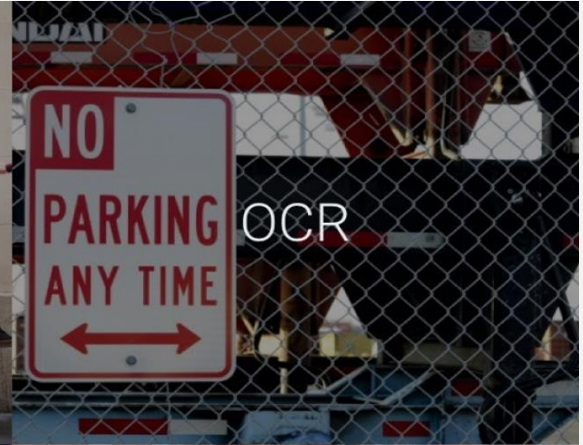




Label
Detection



Face
Detection



OCR



Explicit Content
Detection



Landmark
Detection



Logo Detection

Google

REFERENCES

- Machine Learning in 45 minutes by Jason Mayes, Senior Creative Engineer at Google
 - **Video:** <https://www.youtube.com/watch?v=X4I9QmcSEYo>
 - **Slides:** <https://goo.gl/fGJ8HJ>