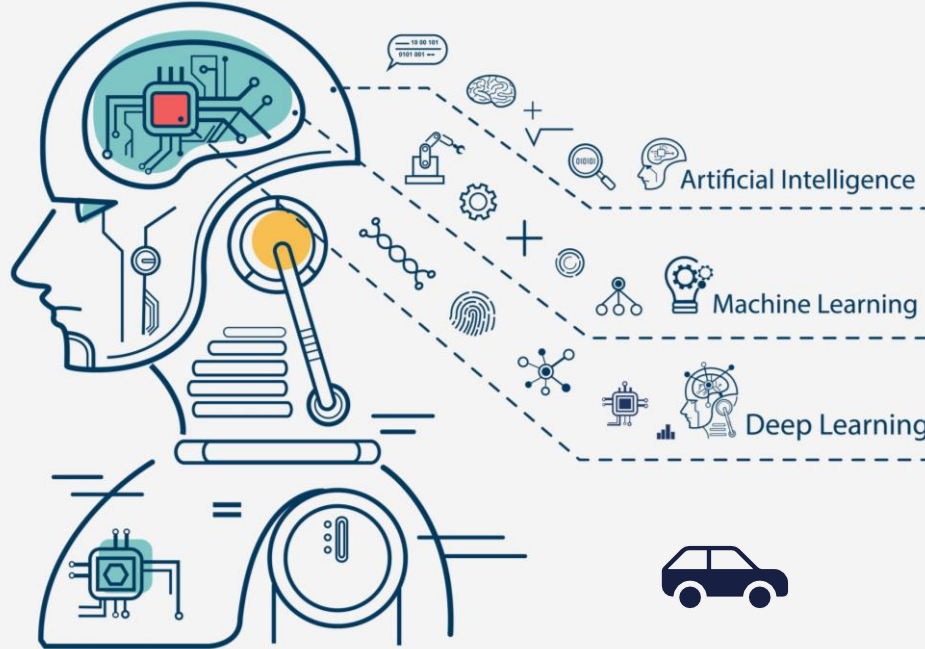
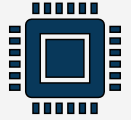




# APSSDC

Andhra Pradesh State Skill Development Corporation

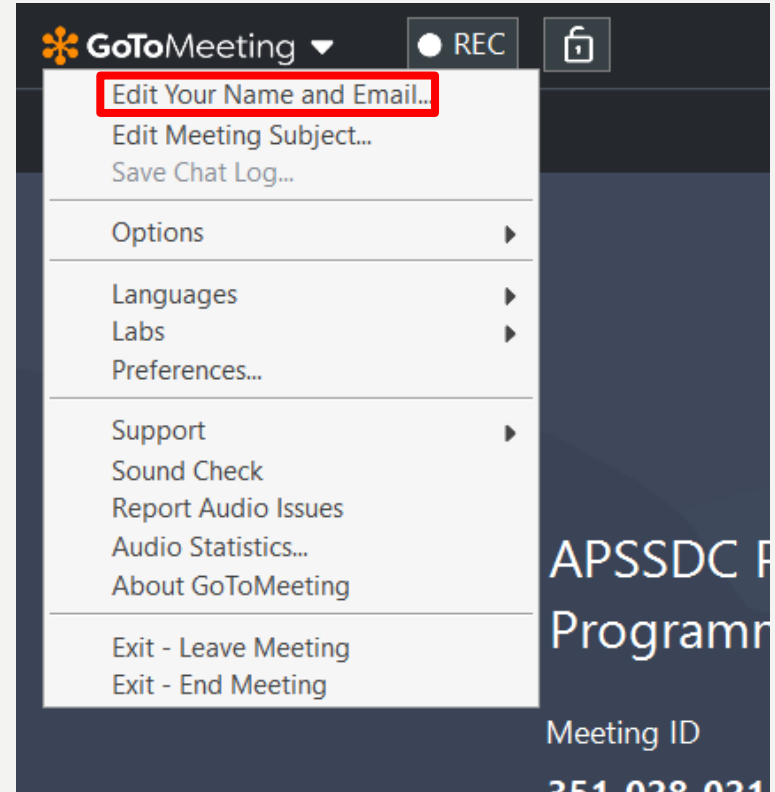
Skill AP  
APSSDC



## MACHINE LEARNING USING PYTHON

For Attendance and  
Verification Purpose

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

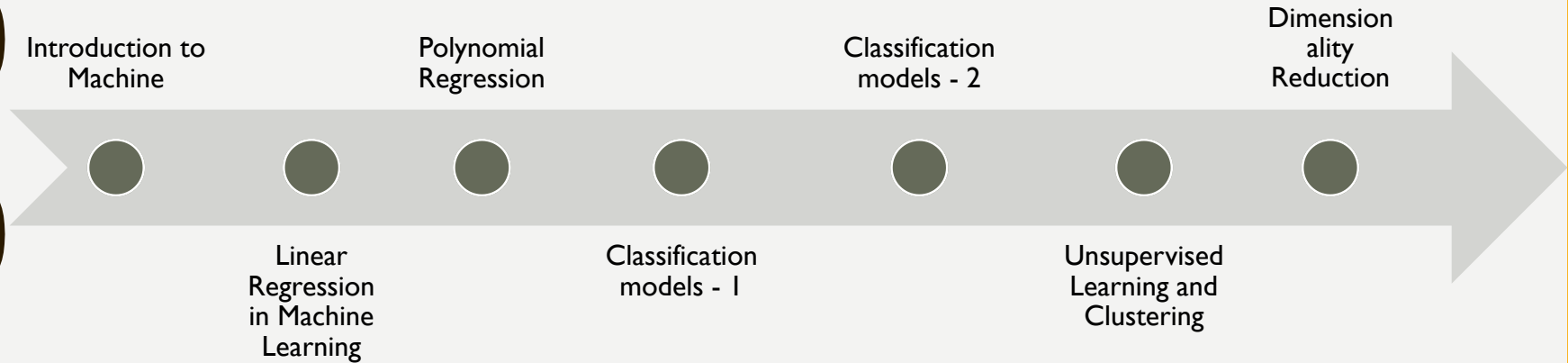


# SESSION RESOURCES

<http://bit.ly/apssdc-ml-eb3>

# 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. its is very useful in fruthure
2. to make it as a career
3. Interested to learn ML
4. good scope in ml in future based on python
5. for doing project
6. programming python using ML
7. to **deploy** a ml project.
8. **Learning about deep learning**
9. **Want to be good professional ML engineer in ml and research, scientist**
10. **machine learning is used in artificial intelligence** sir so in future we will use only artificial intelligence only
11. lam interested in learning top technology like ML along with B.tech Degree.
12. Now a days every thing is processed the data to **automate** the machine for learning
13. I want to became **data scientist** for that reason I learn ml
14. I'm doing project in machine Learning (**image classification**) so , I need to know more about it.
15. this is **4.0 technology** so for future req im learning ML
16. **ML & AL plays key role for trend setting for future world**
17. i want to learn **comuter vision** and ML

# 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

# QUIZ

Color	Shape	Weight	Size	What is it?/ Target
Red	Love Symbol	100grms	2.5"	<b>Strawberry, Heart, Apple, locket, rose, little hearts biscuits, teddy bear</b>  <b>Apple</b>
Red	Love Symbol	18grms	1.375"	Knowledge, Experience, learn before, Brain is not matured,
Green	Love Symbol	150grms	2.7"	Green Apples
Red	Love Symbol	223grms	3.25"	

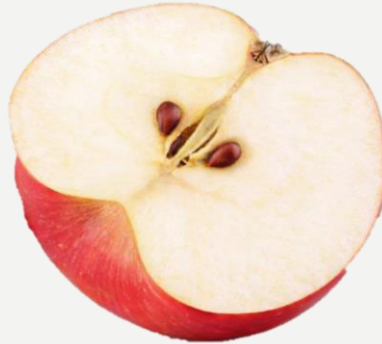




# QUIZ

Color	Shape	Weight	Size	What is it?
Red	Love Symbol	225grms 1000grms	2.5"	Apple, Cherry

# WHAT IS THIS FRUIT?



# 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

# 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

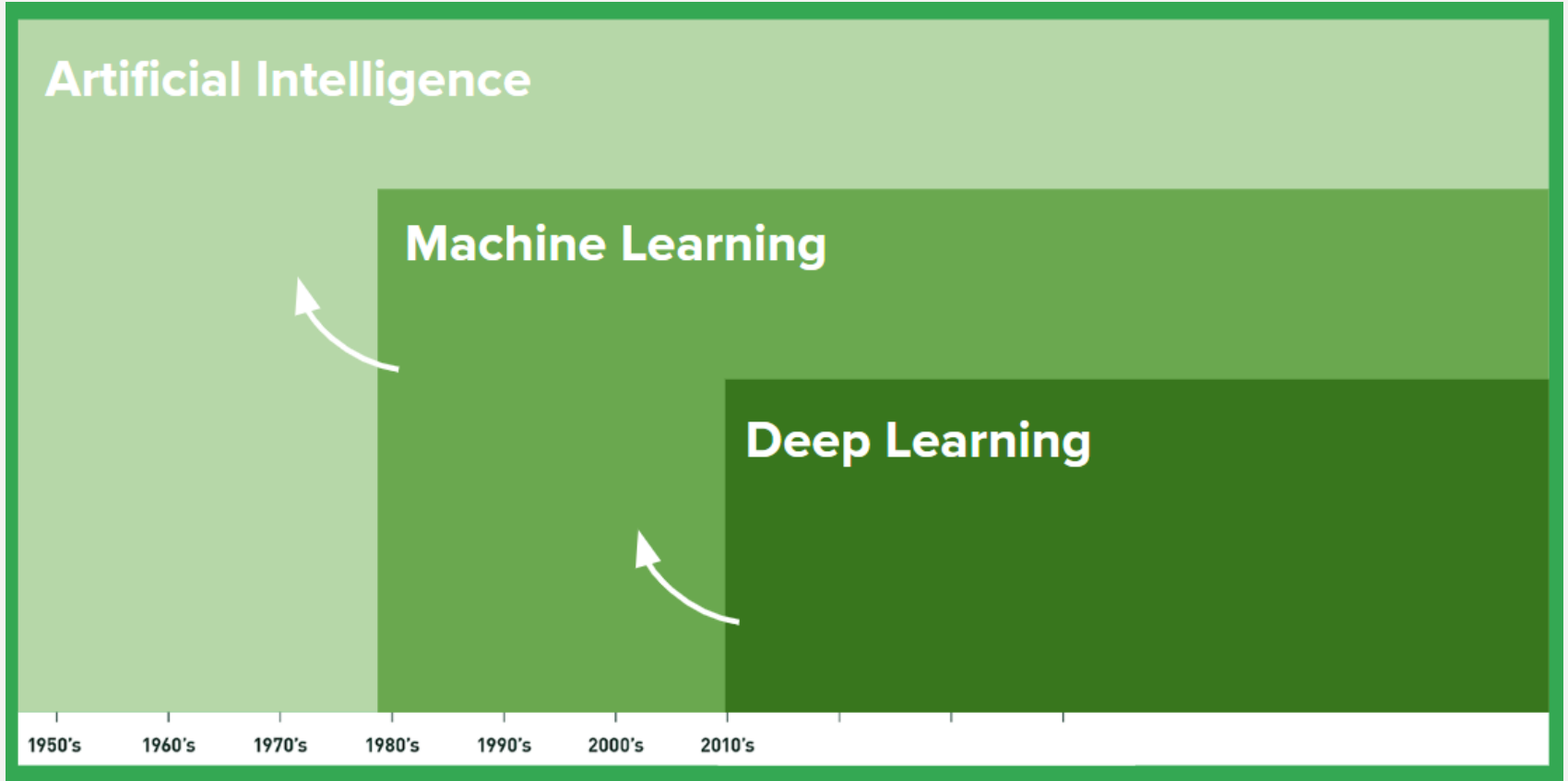
- Deep Learning (**DL** from here on) can be defined generally as:

**“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

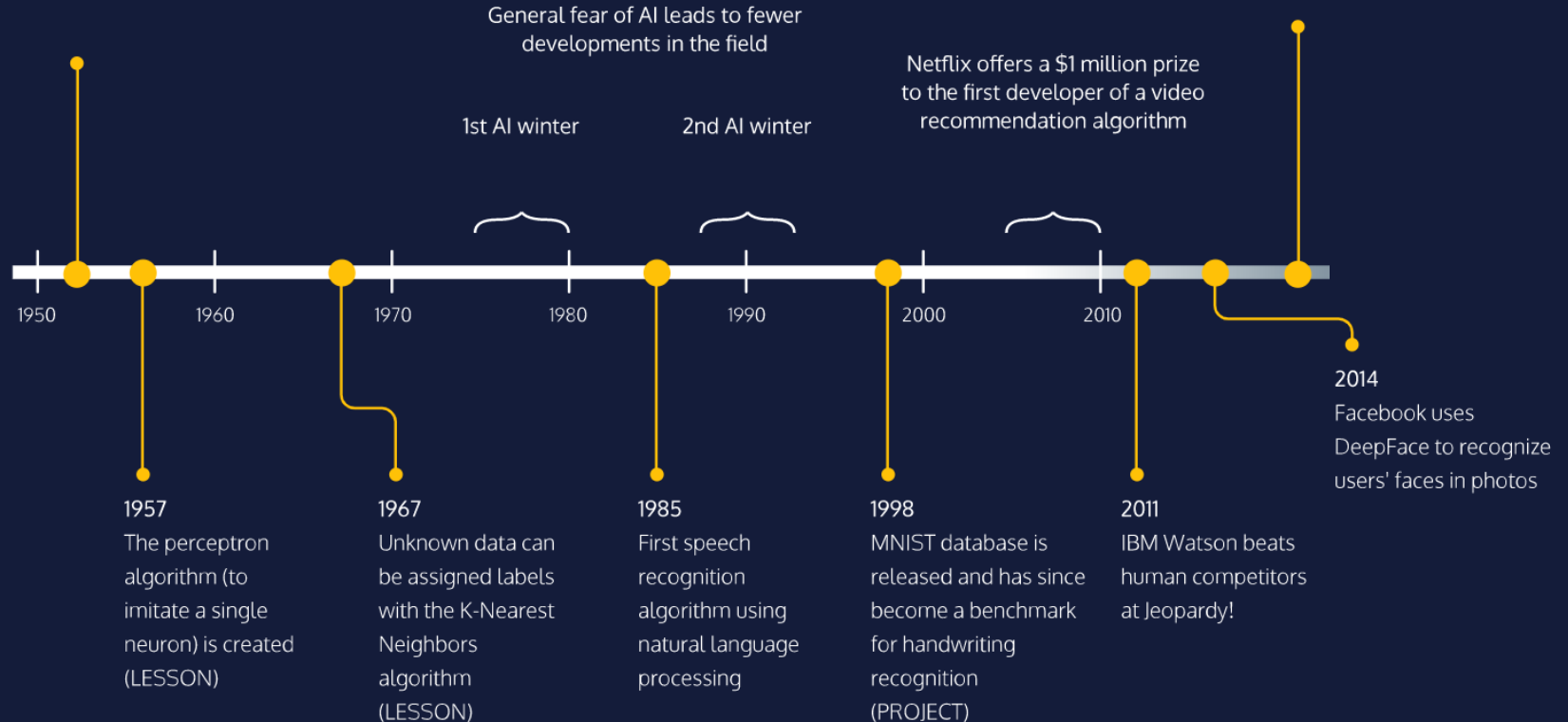


1950

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”

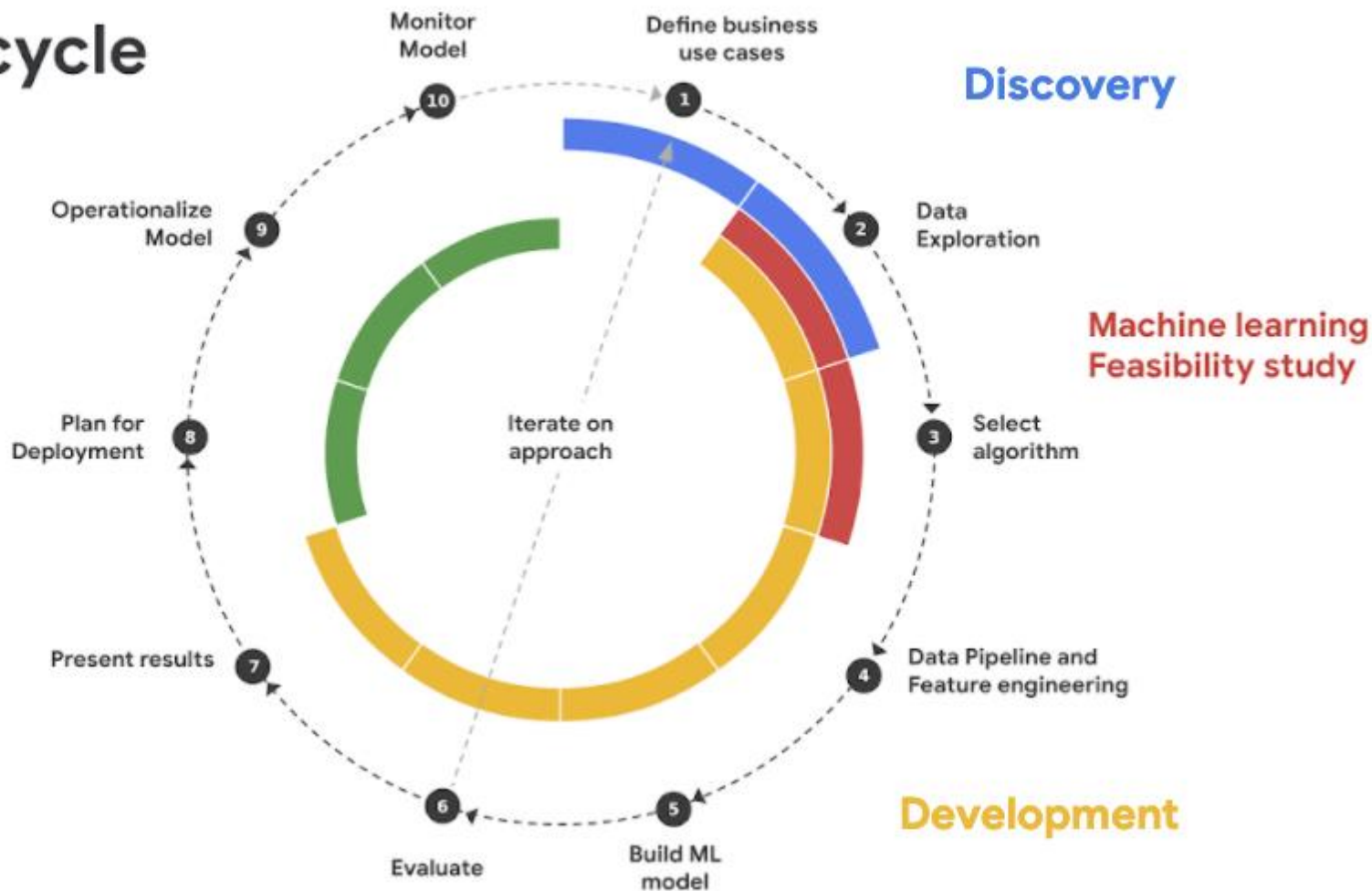
— Bill Gates, Microsoft Co-Founder

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

— Arthur Samuel's

# ML Lifecycle

Deployment

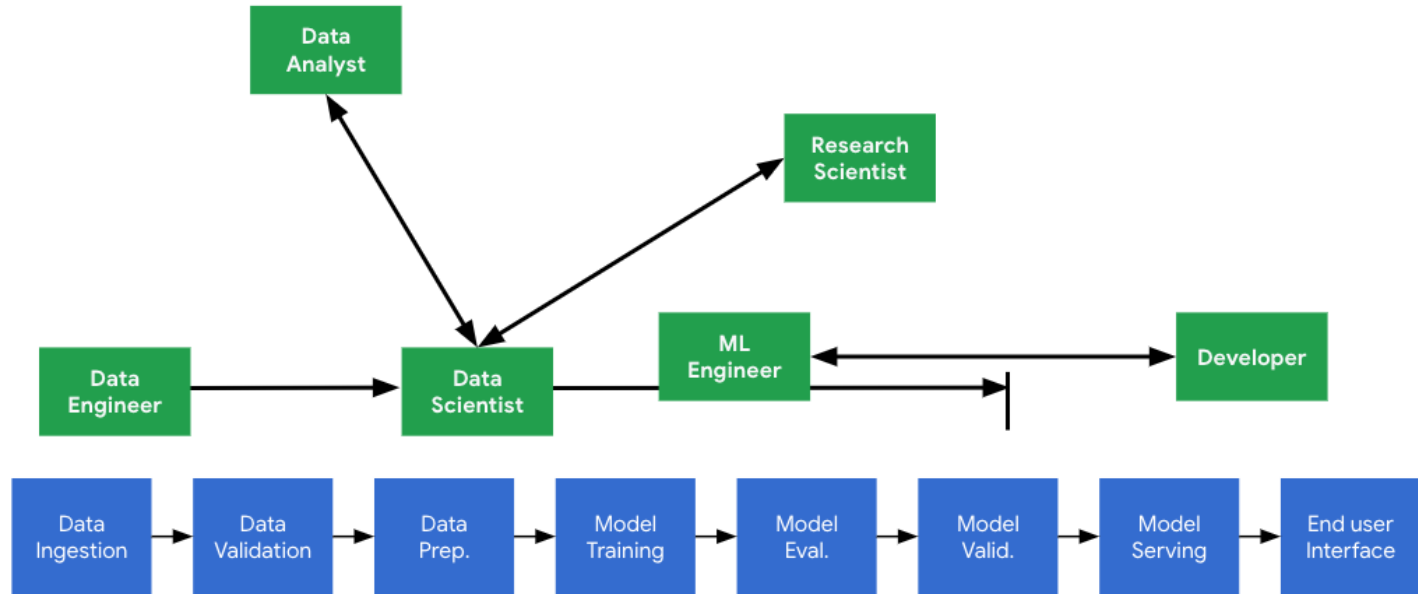


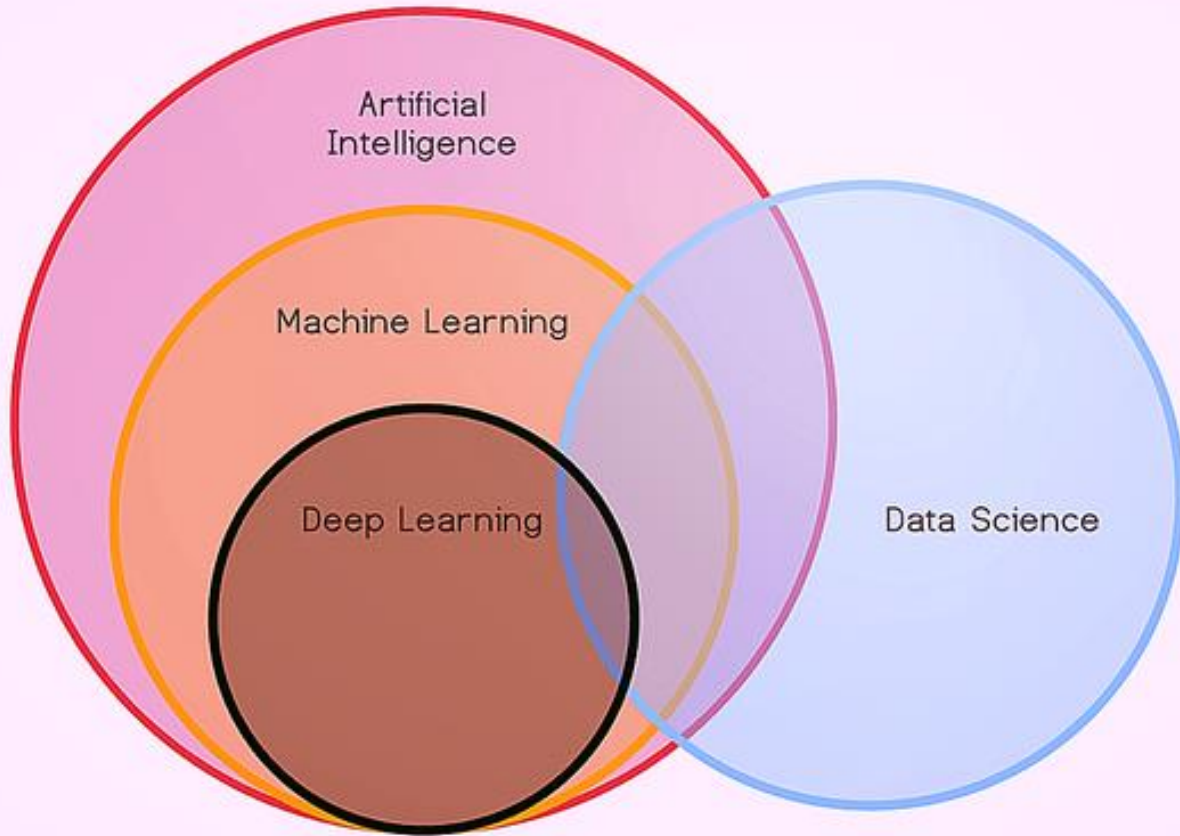
# THE NEED FOR MACHINE LEARNING DESIGN PATTERNS

Business

R & D

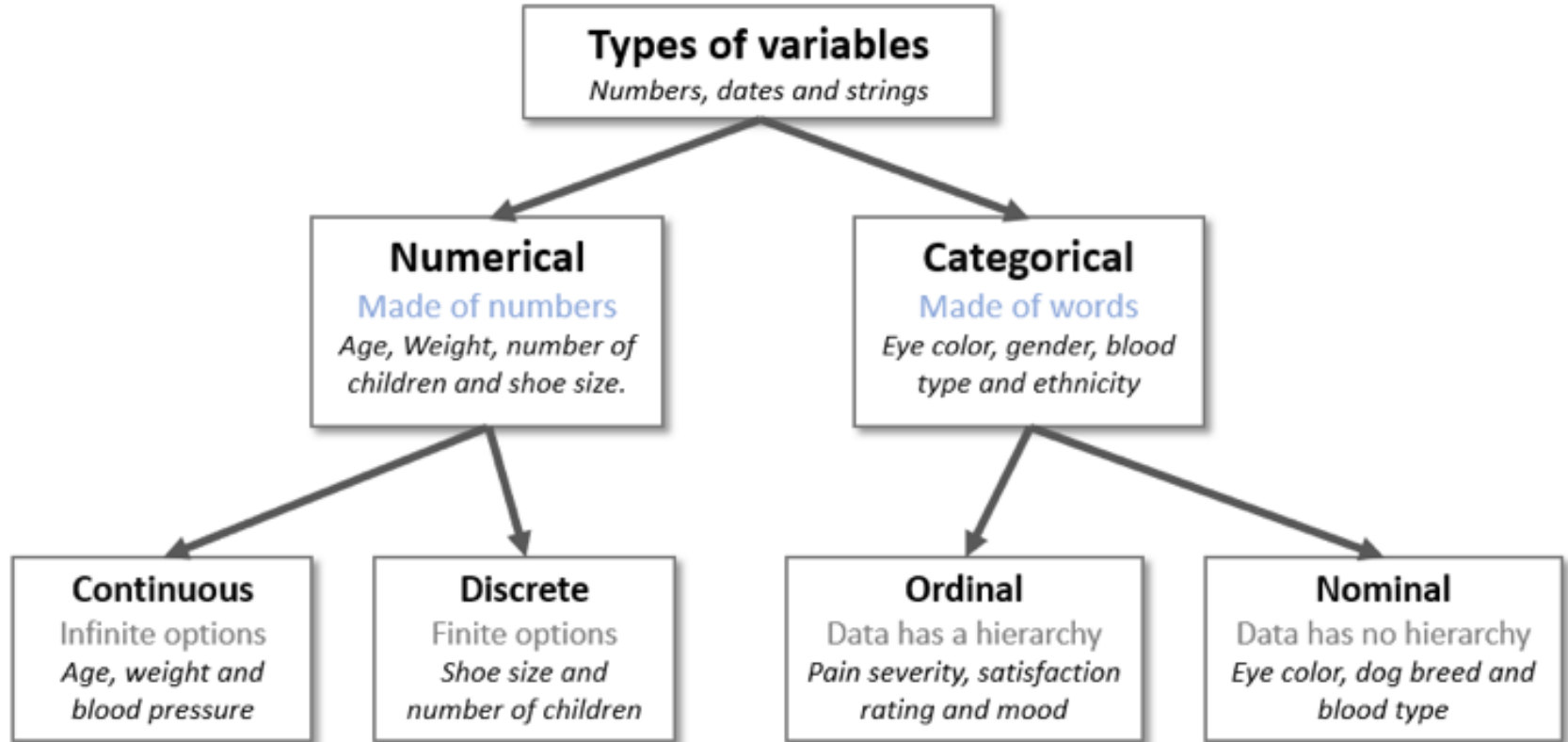
Engineering





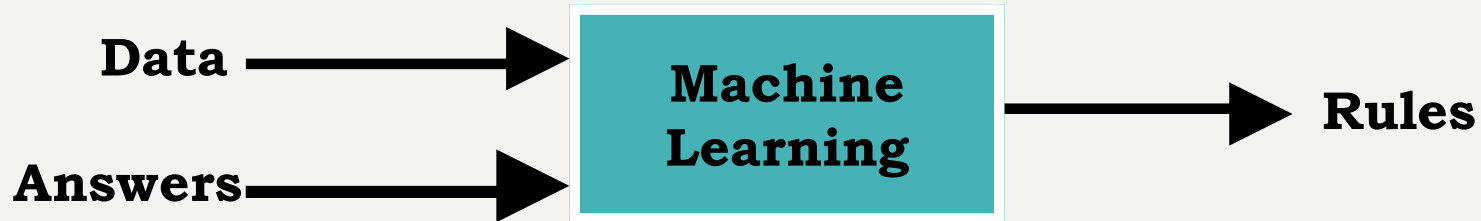


# TYPES OF VARIABLES

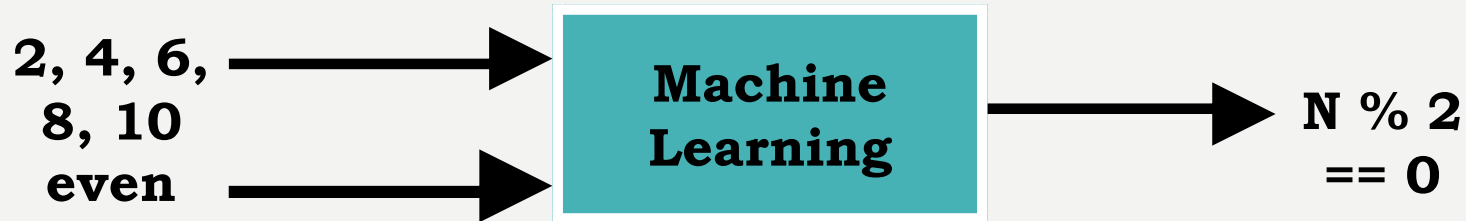


[https://en.wikipedia.org/wiki/Statistical\\_data\\_type](https://en.wikipedia.org/wiki/Statistical_data_type)

# CLASSICAL PROGRAMMING VS MACHINE LEARNING



# CLASSICAL PROGRAMMING VS MACHINE LEARNING

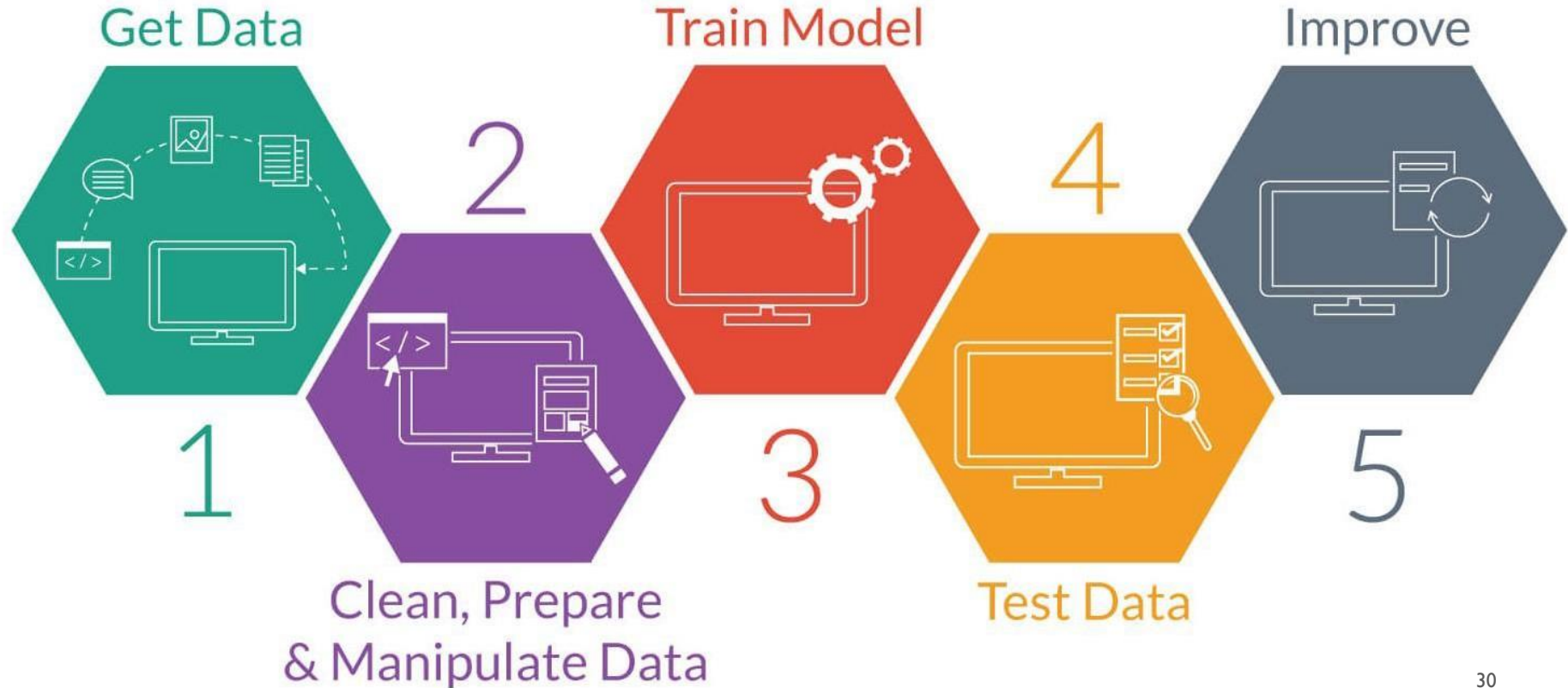


# PACKAGES FOR ML IN PYTHON



# HOW TO CHOOSE DATA TO TRAIN THE MODEL

# MACHINE LEARNING PROCESS



# FEATURES / ATTRIBUTES

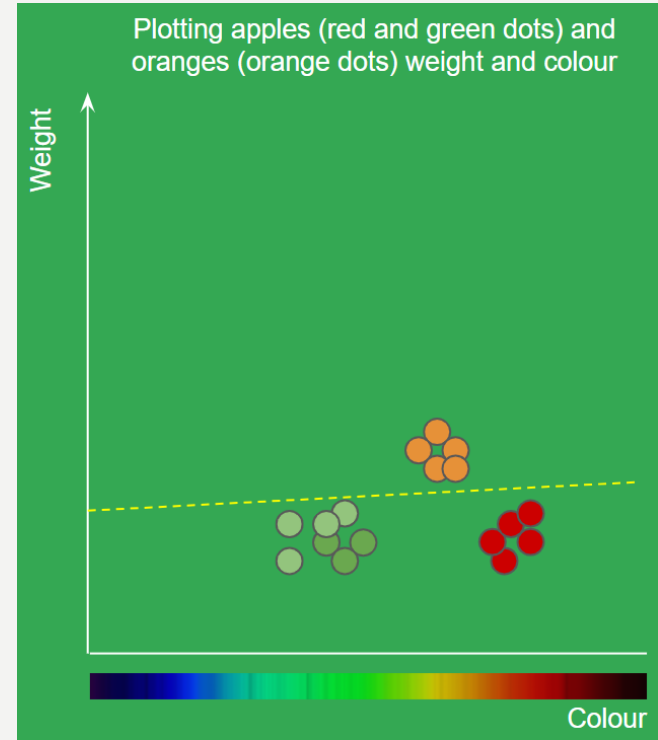
- **Features (aka attributes)** are used to train an **ML system**. They are the properties of the things you are trying to learn about.



# 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.

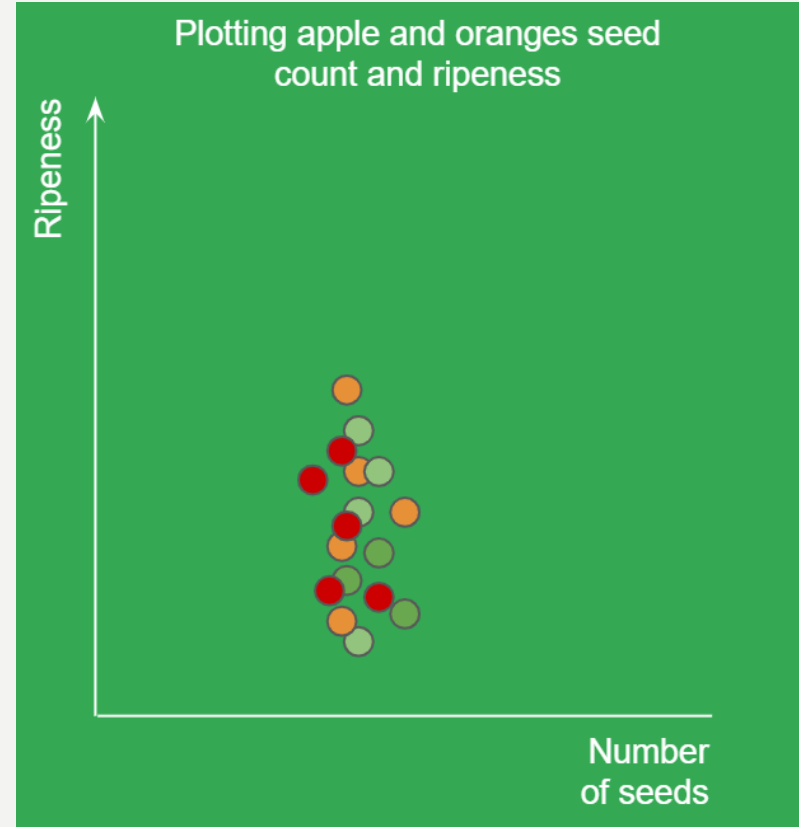
In the plot on the right, the ML system can learn to split the data up with a line to separate apples from oranges. This **can now be used to make future classifications** when we plot new points the system has not seen (anything above is orange, below is apple)





# 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)**

# 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

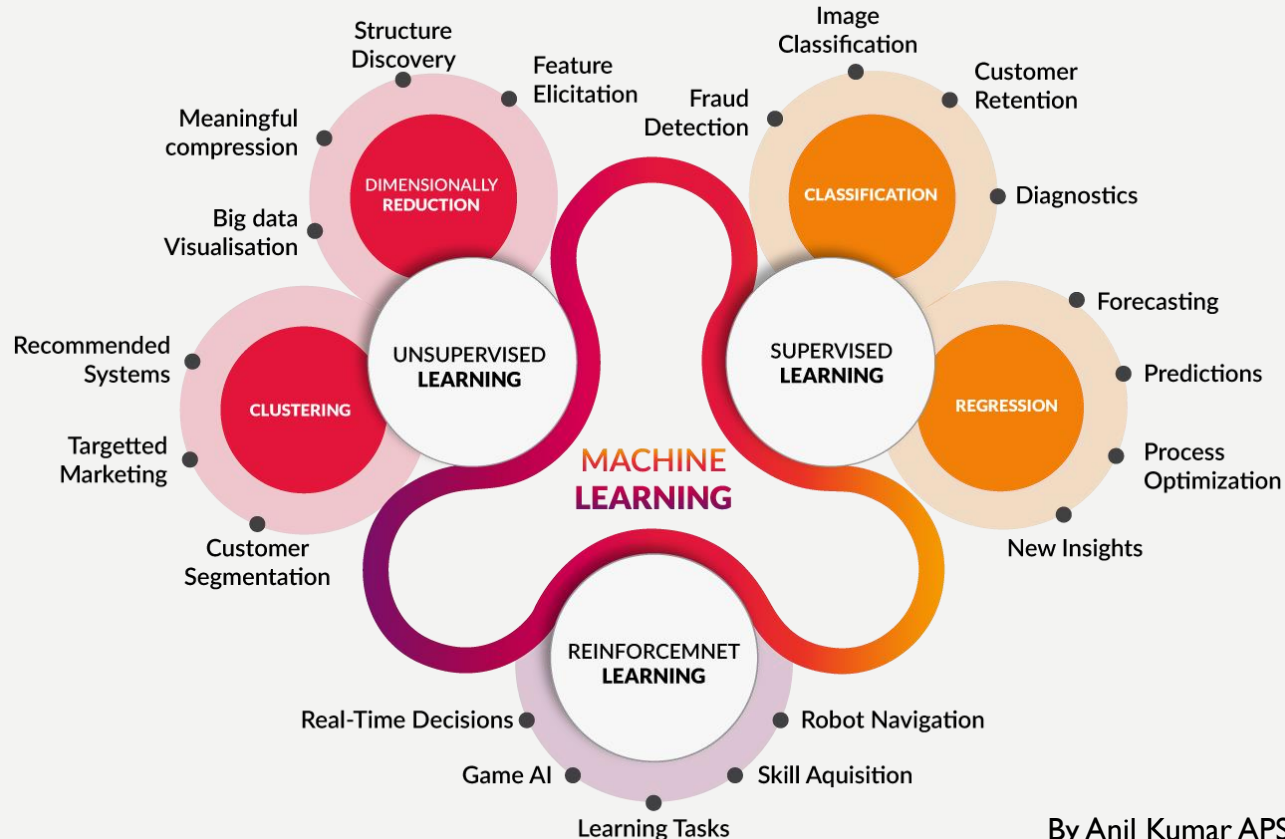


## Reinforcement Learning

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

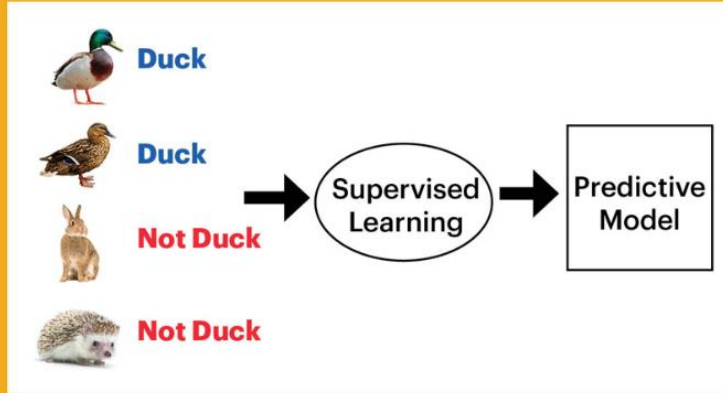


# MACHINE LEARNING CATEGORIES

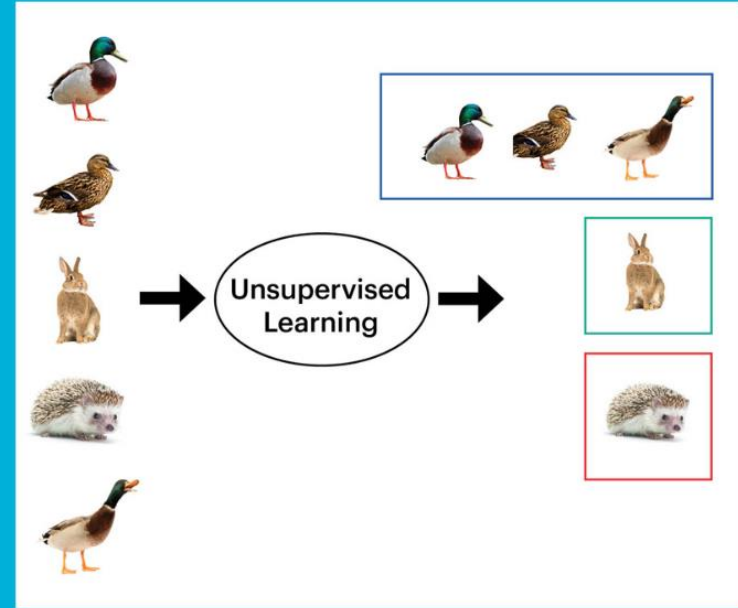


# SUPERVISED VS UNSUPERVISED

## Supervised Learning (Classification Algorithm)

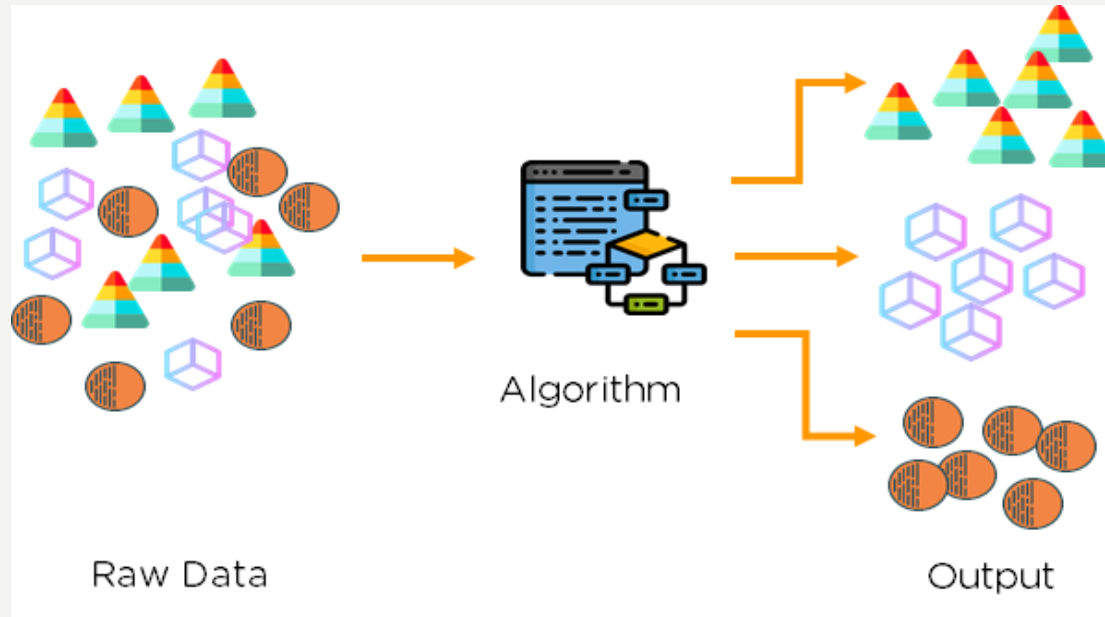


## Unsupervised Learning (Clustering Algorithm)



# 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
  - Simple Linear Regression

- Multi Linear 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

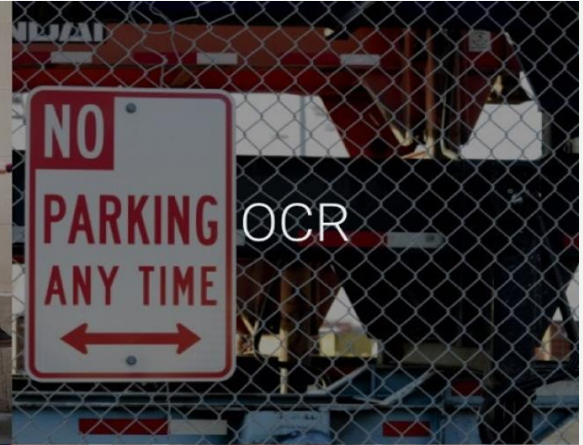




# CUSTOMER PREDICTION







# 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>