Project Cycle

CLASS 10

EFFORT IS IMPORTANT BUT KNOWING WHERE TO MAKE AN EFFORT MAKES ALL THE DIFFERENCE

PROJECT CYCLE

Start

Step by step pocess to solve problems using proven scientific methods.

Based on a Machine learning experience with the data fed.

What

Components of Project Cycle

Problem Scoping
- 4Ws Of Problem Scoping
- Problem Statement Template
- SDG (Development Goals)

Data Acquisition
- Data Sources
- Data Features

Data Exploration
- Tools for Data Visualisation

Modelling

Evaluation

Machine Learning Based

(*Labelled Data*) Supervised Learning
- Regression
- Classification

(*Unlabelled data*) Unsupervised Learning
- Clustering
- Dimensionality Reduction

(*Trial and Error*) Reinforcement Learning
- Clustering
- Association

Rule Based Learning

Modelling in Detail

Modelling

Machine works on the rules defined by the developer

Data Sets

Traning Data

Testing Data

Data and Project Cycle

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" Success is when you are one, whom you inspired to be "

~Lalit Kumar

WHAT IS PROJECT CYCLE

Project Cycle is a step-by-step process to solve problems using proven scientific methods and drawing inferences about them.

COMPONENTS OF PROJECT CYCLE

Components of the project cycle are the steps that contribute to completing the Project. The Components of AI Project Cycle are:-

- Problem Scoping - Understanding the problem
- Data Acquisition - Collecting accurate and reliable data
- Data Exploration - Arranging the data uniformly
- Modelling - Creating Models from the data
- Evaluation - Evaluating the project

PROBLEM SCOPING

Problem Scoping refers to understanding a problem, finding out various factors which affect the problem, define the goal or aim of the project.
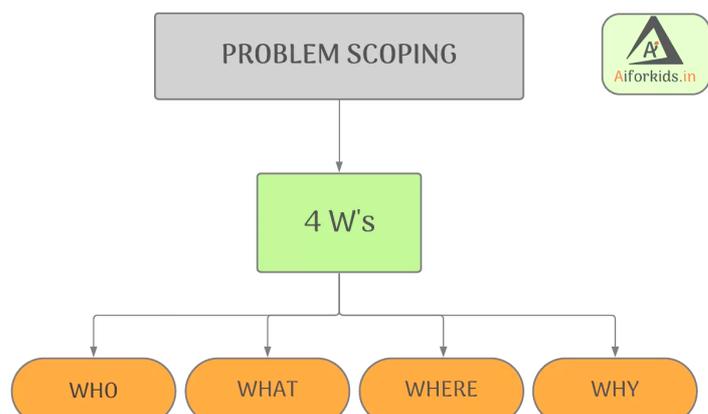
1 SUSTAINABLE DEVELOPMENT GOALS

Sustainable Development: To Develop for the present without exploiting the resources of the future.

- 17 goals announced by United Nations.
- Aim to achieve them by 2030.
- Pledge taken by all the member nations of the UN.

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity

* Image is the property of individual organisation and is used for reference only.

2 4 W'S OF PROBLEM SCOPING

The 4W's of Problem Scoping are Who, What, Where, and Why. This Ws helps in identifying and understanding the problem in a better and efficient manner.

- **Who** - "Who" part helps us in comprehending and categorizing who all are affected directly and indirectly with the problem and who are called the <u>Stake Holders</u>

- **What** - "What" part helps us in understanding and identifying the <u>nature of the problem</u> and under this block, you also gather evidence to prove that the problem you have selected exists.

- **Where** - "Where" does the problem arise, <u>situation, context, and location.</u>

- **Why** - "Why" is the given problem <u>worth solving.</u>

4 PROBLEM STATEMENT TEMPLATE

The Problem Statement Template helps us to summarize all the key points into one single template.

So that in the future, whenever there is a need to look back at the basis of the problem, we can take a look at the Problem Statement Template and understand its key elements of it.

Have a look at Problem Statement Template.

The	Stakeholder	Who
Have a problem	Issue/Problem	What
When/While	Context/Situation/Location	Where
Ideal Solution	How the Solution will help Stakeholders	Why

[Problem Statement Template]

DATA ACQUISITION

2 Types of Data Sets

The process of collecting accurate and reliable data to work with.

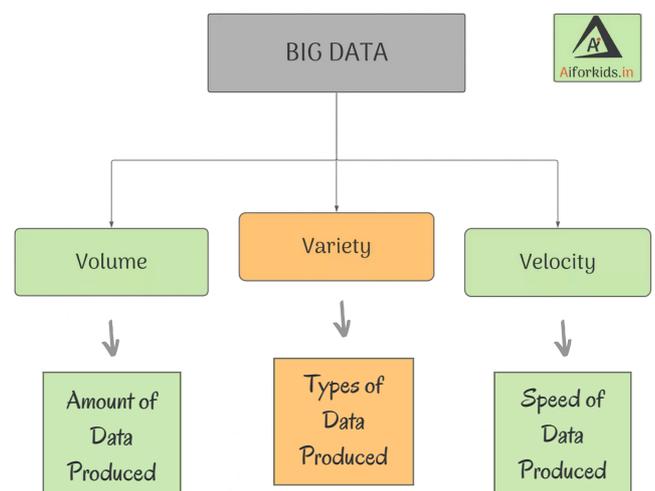| Base	Training Set	Testing Set
Use	Used for Training the Model	Used for Testing the Model after it is trained
Size	Is allot bigger than testing data and constitutes about 70% to 80%	It is smaller than Training Set and constitutes about 20% to 30%

Data features ☉_☉ → Refer to the type of data you want to collect.

Ex: salary amount, increment percentage, increment period, bonus, etc.

Big Data ☉_☉

It includes data with sizes that exceed the capacity of traditional software to process within an acceptable time and value.

The main focus is on unstructured type of data.

BIG DATA

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Volume → Amount of Data Produced

Variety → Types of Data Produced

Velocity → Speed of Data Produced

2 DATA SOURCES

Web Scraping

- Web Scraping means collecting data from web using some technologies.

- We use it for monitoring prices, news and etc.

- Example: Web Scrapping. using beautiful soup in python.

Sensors

- Sensors are very Important but very simple to understand.

- Sensors are the part of IoT (Internet of things)

- Sensers collect the physical data and detect the changes.

Cameras

- Camera captures the visual information and then that information which is called image is used as a source of data.

- Cameras are used to capture raw visual data.

Observations

- When we observe something carefully we get some information

- For ex: Scientists Observe creatures to study them.

- Observations is a time consuming data source.

API

- Application Programming interface.

- API is a messenger which takes requests and tells the system about requests and gives the response.

- Ex: Twitter API, Google Search API

Surveys

- The survey is a method of gathering specific information from a sample of people.

- Example, a census survey for analyzing the population.

DATA EXPLORATION

Data Exploration is the process of arranging the gathered data uniformly for a better understanding. Data can be arranged in the form of a table, plotting a chart, or making a database.

To analyse the data, you need to visualise it in some user-friendly format so that you can:

- Quickly get a sense of the trends, relationships and patterns
- Define strategy for which model to use at a later stage
- Communicate the same to others effectively

1 DATA VISUALISATION TOOLS

The tools used to visualise the acquired data are known as data visualisation or exploration tools.

Few data visualisation tools are: Google Charts, Tableau, Fusion Charts, Highcharts

TOOLS FOR DATA EXPLORATION

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- GOOGLE CHARTS
- TABLEAU
- FUSION CHARTS
- HIGH CHARTS
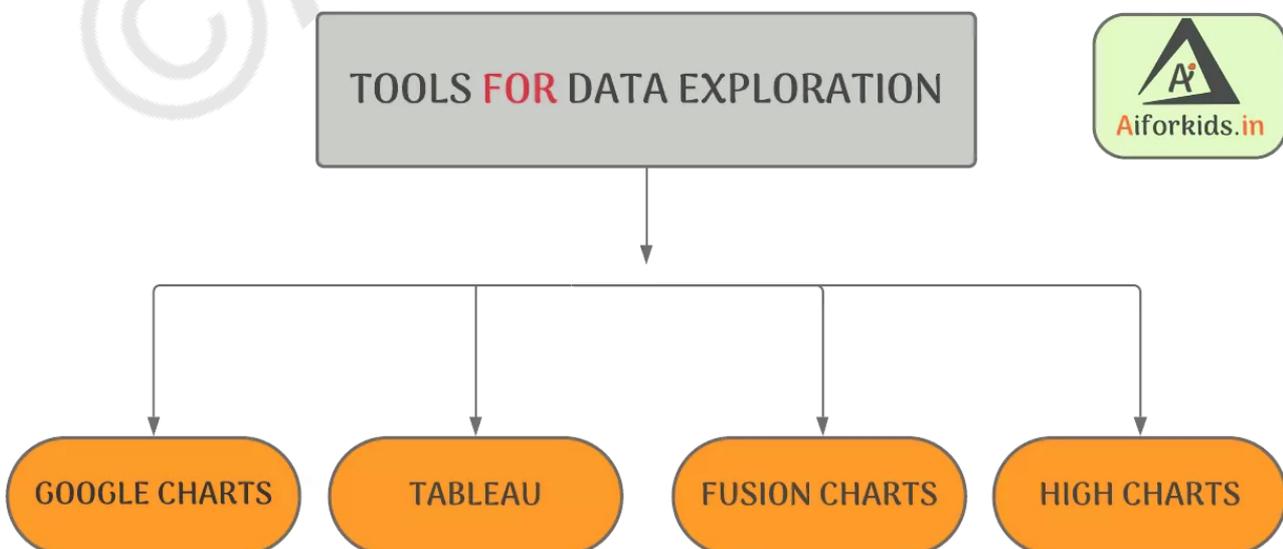
AI MODELLING → 2 ways/Approaches → Rule Based Approach
→ Learning Based Approach

Modelling is the process in which different models based on the visualized data can be created and even checked for the advantages and disadvantages of the model.

1 RULE BASED APPROACH

- Rule Based Approach Refers to the AI modelling where the relationship or patterns in data are defined by the developer.

- That means the machine works on the rules and information given by the developer and performs the task accordingly.

Ex: You trained your model with 100 images of apples and bananas. Now If you test it by showing an apple, it will figure out and tell if it's an apple or not. Here Labeled images of apple and banana were fed, due to which the model could detect the fruit.

Data Sets

*Labeled Images: Simply, when the model is told about what the image is.

Dataset is a collection of related sets of information that is composed of separate elements but can be manipulated by a computer as a unit.

- Training Data – A subset required to train the model

- Testing Data – A subset required while testing the trained the model

Data set

| Training Dataset		Testing Dataset
Train the Model (70%)		Test the Model (30%)
Train Model		Test Model
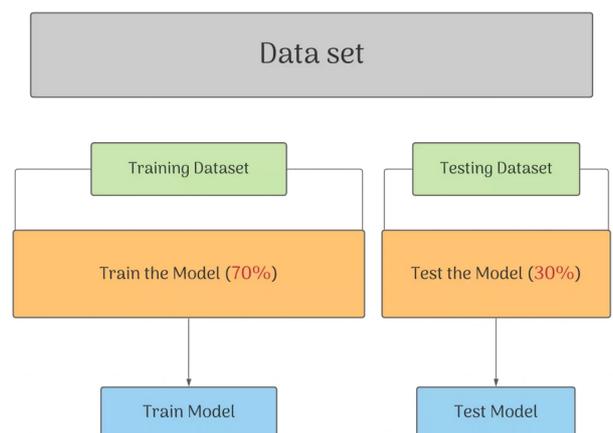
1 LEARNING BASED APPROACH

The learning-Based Approach is based on a Machine learning experience with the data fed.
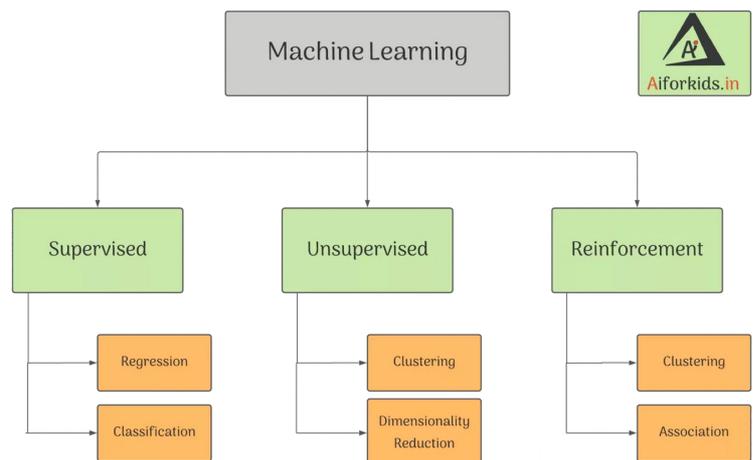
Machine Learning (ML)

Machine learning is a subset of artificial intelligence (AI) that provides machines the ability to learn automatically and improve from experience without being programmed for it.
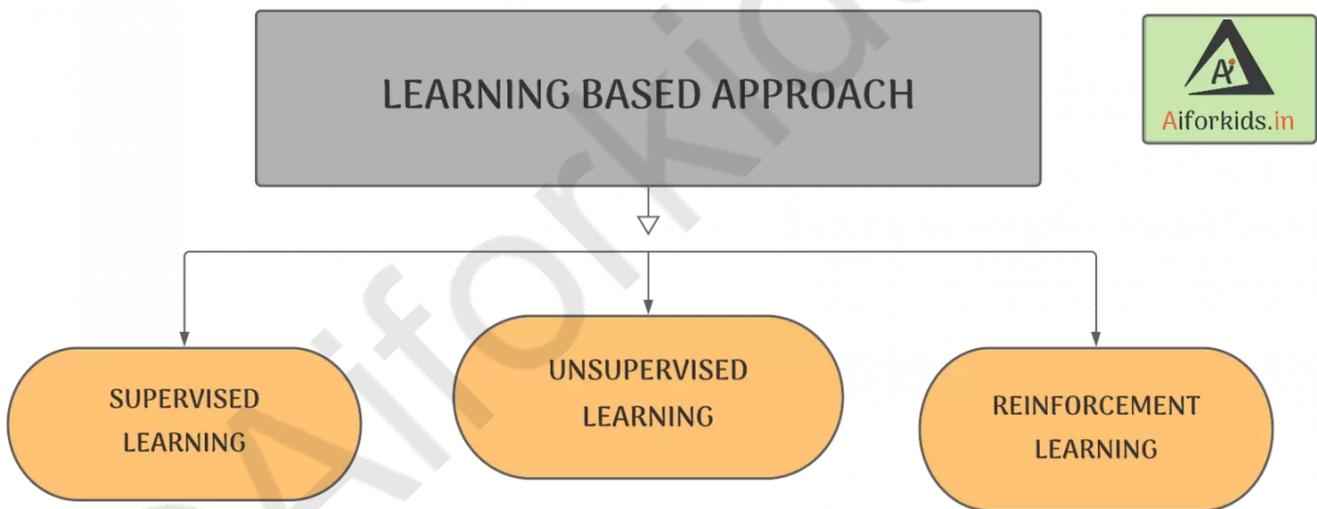
Types of Machine Learning

3 types of Machine Learning:-

- Supervised Learning
- Unsupervised Learning
- Semi-supervised or Reinforcement Learning

Supervised learning → 2 Categories → Classification → Regression

Supervised learning is where a computer algorithm is trained on input data that has been <u>labeled</u> for a particular output.

→ Classification

Here, Data is categorized under different labels according to some parameters given in the input and then the labels are predicted for the data.
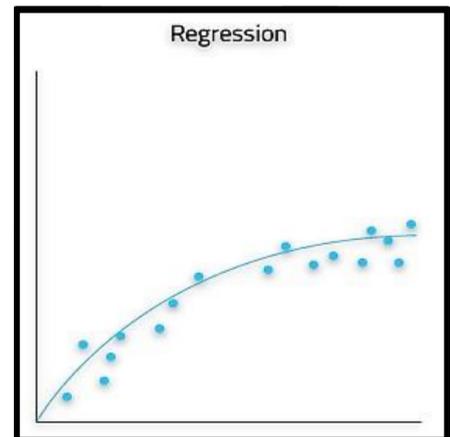
Example: To predict which of them is apple and banana.

Classification
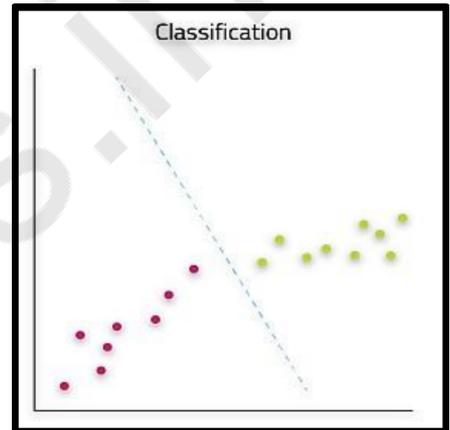
→ Regression

Regression is a type of supervised learning which is used to predict continuous value.

Example: To <u>predict your next salary,</u> put in the data of your previous salary, any increments, etc., train the model.

Example: Weather Prediction using past data.

Here, the data which has been fed to the machine is continuous.

Regression

Unsupervised Learning

In terms of machine learning, unsupervised learning is in which a system learns through data sets created <u>on its own</u>. In this, the training is <u>not labeled</u>.

Important Points:

- An unsupervised learning model works on <u>unlabelled dataset</u>.

- This means that the data which is fed to the machine is <u>random</u> and there is a possibility that the person who is training the model does not have any information regarding it.

- The unsupervised learning models are used to <u>identify relationships</u>, <u>patterns and trends</u> out of the data which is fed into it

- It helps the user in understanding → What the data is about

→ What are the major features identified by the machine

Example: Suppose a boy sees someone performing tricks with a ball, so he also learnt the tricks by himself. This is what we call unsupervised learning.

→ Clustering

- Its an algorithm which can cluster the unknown data according to the patterns or trends identified out of it

- The patterns observed can be known to the developer or it can be unique.
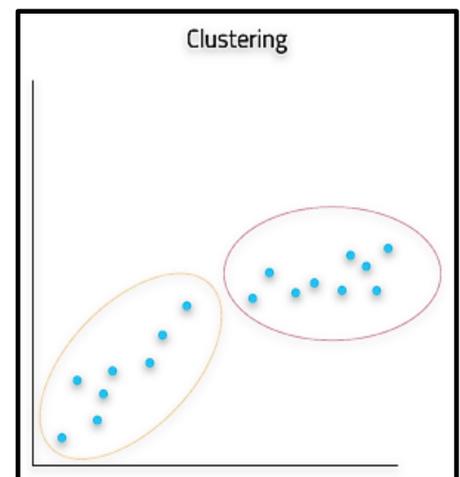
Note: Classification ≈ Division, Clustering ≈ Grouping

Clustering

→ Dimensionality Reduction:

- We can visualize up to 3-Dimensions only.

- To reduce the dimensions and still be able to make sense of the data, we use Dimensionality Reduction.

- The ball in our hand is 3-Dimensions. But if we click its picture, the data transform to 2-D.
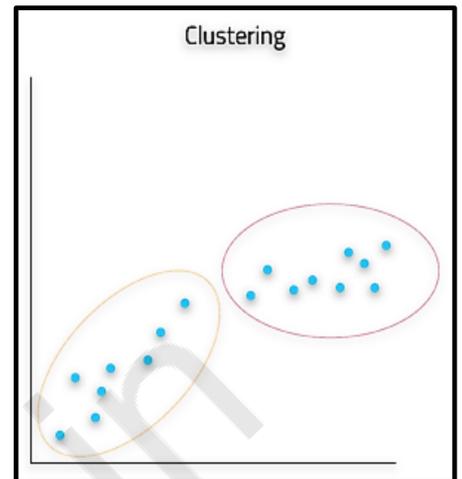
Note: Classification ≈ Division, Clustering ≈ Grouping

Clustering

Reinforcement Learning

Learning through feedback or trial and error method is called Reinforcement Learning.

The system works on Reward or Penalty policy. In this an agent performs an action positive or negative, in the environment which is taken as input from the system, then the system changes the state in the environment and the agent is provided with a reward or penalty.

Example: A very good example of these is Vending machines.

Actions

Agent   Environment

State

Reward
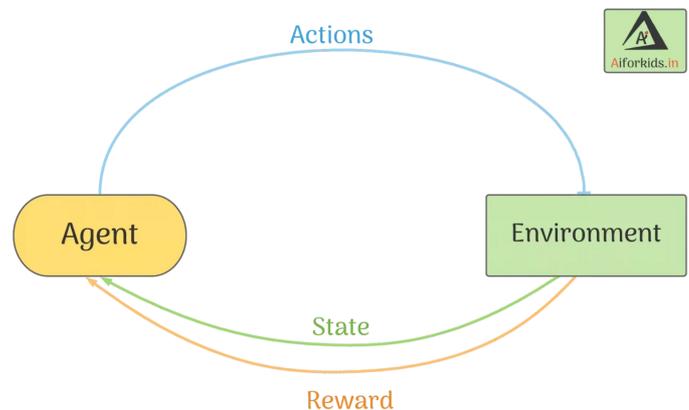
Training vs Testing Data

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EVALUATION

Evaluation is the process of understanding the <u>reliability of any AI model,</u> based on outputs by feeding the test data into the model and comparing it with actual answers.

- There can be different Evaluation techniques, depending on the type and purpose of the model.

💡 More about Evaluation at – <u>Unit 7 Evaluation</u>

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Path to AI   Start Learning Artificial Intelligence, Smarter Way