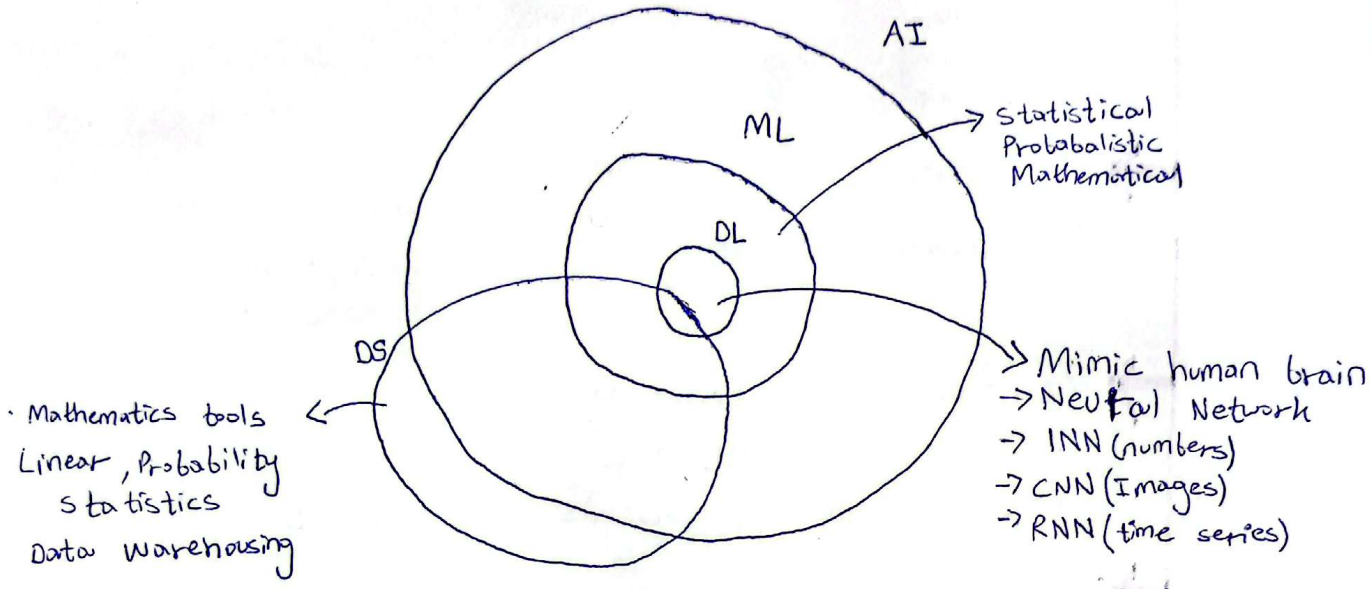
ARTIFICIAL INTELLIGENCE

1) DIFFERENCE (AI vs ML/DL/DS)



2) TYPES

a) NARROW AI (WEAK AI)

Designed to perform a specific task.
(e.g Siri, spam filters)

b) GENERAL AI (STRONG AI)

- Possess human like cognitive abilities.
- Can learn & adapt to various tasks.
- Still a theoretical concept.

c) SUPER AI

- Hypothetical AI surpassing Human Intelligence.
- Potential for self improvement & decision making.

3)

- **Supervised Learning** ← past data
  - → rapid development
  - → real world applications
  - **Regression**
    - Predict number
    - Infinitely many possible solutions
  - **Classification**
    - Predict category.
- **UnSupervised Learning**
  - k-means, Hierarical
  - → finds patterns
  - → Don't know what to make of data.
- **Reinforcement Learning**
  - feed based ML Algo.
  - Learning through rewards & punishment.
- **Recommendes systems.**

4) Very Broadly

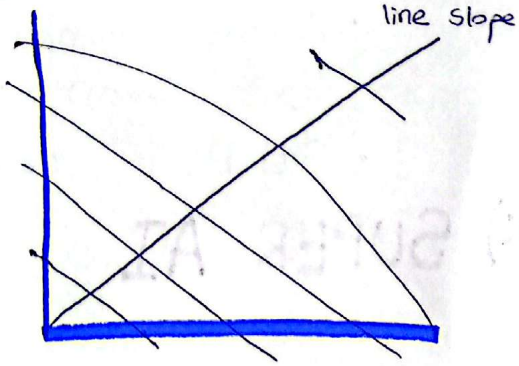
→ Wrong statement

"I do ML Modelling" or "I am developing a model"

→ Data training set X

70 % Training Model f

Prediction $\hat{y}$



5) ESSENTIAL CONCEPTS

- Forward / Backward propagation.
- Gradient Decent.
- Overfitting & underfitting.
- Cross - Validation
- Feature Engineering
- Bias - Variance Trade off.
- Ensemble Methods.
- Regularization
- Evaluation Metrices
- Hyperparameter Tuning.

6) REGRESSION

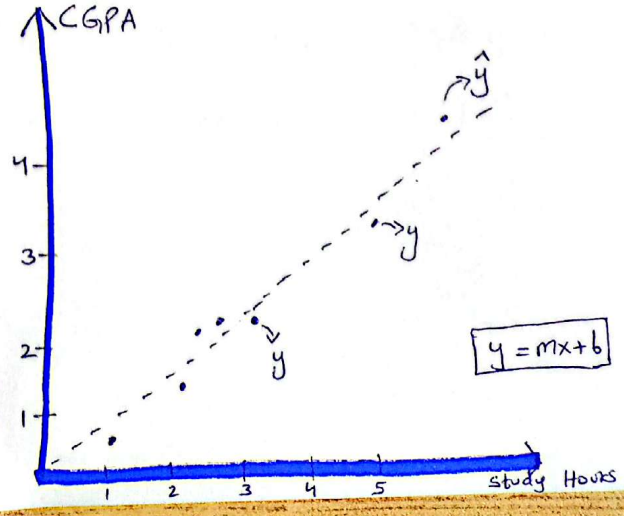
- To model relationship between a dependent (target) variable and one or more independent (predictor) variables.
- Identify patterns and relationships between variables.

x = input feature (independent)

y = predicted feature (dependent).

EXAMPLE

Study Hours	CGPA
5	3.6
4	2.3
3	2.5
2	1.5
1	1
2	1.5



PERFORMANCE MATRICES

- Mean Absolute error (MAE)

$$MAE = \frac{1}{n} \sum_{i=1}^{n} |y_i - \hat{y}_i|$$

Measures the absolute difference between actual and predicted values.
The lower MAE the better will be model's performance.

- Mean Squared Error (MSE)

$$MSE = \frac{1}{n} \sum_{i=1}^{n} (y_i - \hat{y}_i)^2$$

Penalizes large errors more than MAE.

- Root Mean Square Error (RMSE)

$$RMSE = \sqrt{MSE}$$

Provides the error in same unit as dependent variables.

- R-squared (R^2) score

$$R^2 = 1 - \frac{\sum (y_i - \hat{y}_i)^2}{\sum (y_i - \bar{y}_i)^2}$$

Measures how well the regression model explains variance in the data.
Ranges from $0 \sim 1$ (higher is better).