9-July-2025
Wednesday

- Supervised ML

  . Most popular ML method
  . Labelled data to learn and predict future events.
  . The model can be evaluated and fine-tuned to attain accurate Predictions.

- Unsupervised ML

  . Used when the past data used to train is neither classified nor labeled
  . The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from Unlabeled data.

~~- Semi-supervised ML~~

- Semi Supervised ML

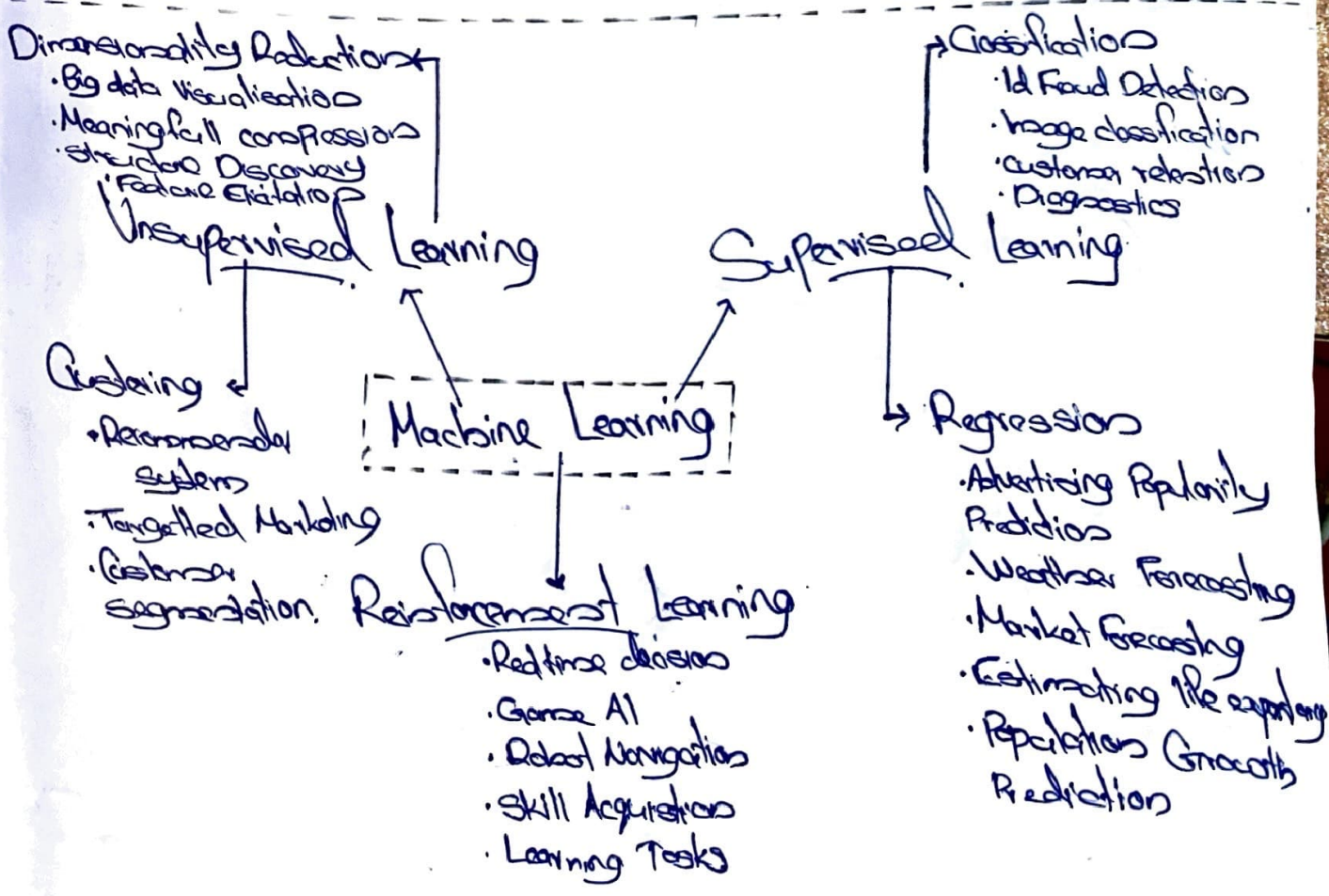
  • Fall between supervised & Unsupervised Learning, since they use both labeled and unlabeled data for training typically a small amount of labeled data and a large amount of unlabeled data.
  . The system that use this method can considerably improve learning accuracy

- Reinforcement Learning.

  . Learning by interacting with its environment by Producing actions and discovers errors or rewards.
  . This method allows to automatically determine the ideal behavior within a specific context in order to max perf
  . Simple reward feedback is required (reinforcement signal)

# - Machine Learning Algorithms

| | Unsupervised | Supervised |
|---|---|---|
| Continuous | ⊙ Clustering & Dimensionality Reduction<br>• SVD<br>• PCA<br>• K-means | ⊙ Regression<br>• Linear<br>• Polynomial<br>⊙ Decision Trees<br>⊙ Random Forest |
| Categorical | ⊙ Association Analysis<br>• Apriori<br>• FP-Growth<br>⊙ Hidden Markov Model | ⊙ Classification<br>• KNN<br>• Trees<br>• Logistic Regression<br>• Naive-Bayes |

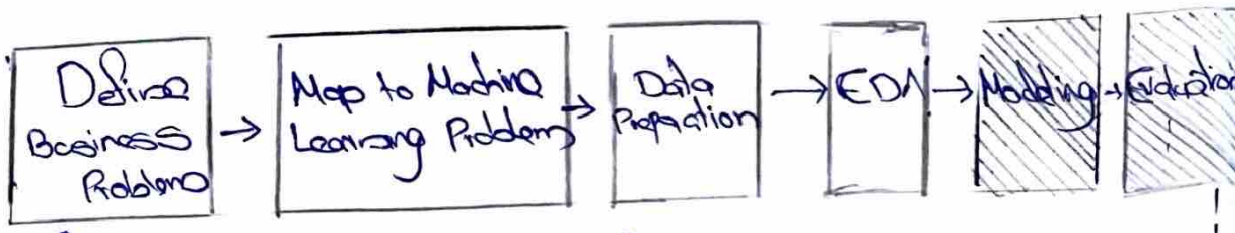


## ⊙ Data Science Workflow

- clearly defined business problem
- set success criteria
- Define clear DS objective

- Understanding data points and constants
- Formulate data analytics strategy
- Perform required transformation

- Experiment with multiple models
- Choose the most optimal model
- Create a feedback loop




- Break business problems to DS problem
- Identify ML Problem categories.
- Perform stats and visual analysis
- Discover and handle outlying errors
- shortlist Predictive modeling techniques.

## ⊙ Introduction to AI

Artificial Intelligence is the simulation of human intelligence in machines that are Programmed to think and learn like humans.

- Computer Vision:

  - Enabling Machine to see and interpret Visual Information
  - Includes image processing, feature extraction, and object recognition
  - Applications:
    - Facial Recognition
    - Gesture Recognition
    - Crop monitoring
    - Diagnostic Imaging

- Natural Language Processing

  (Bridging the Gap between Computers and Human language)

  - NLP is a branch of AI that focuses on the interaction between computer and human language.
  - Includes text processing, sentiment analysis, language generation
  - Application.
    - chatbots
    - language translation
    - Voice recognition

- Reinforcement Learning

  Reinforcement Learning is a type of ML where an agent learns to make decisions by taking actions in an environment to maximize cumulative rewards

  - Applications:
    - Gaming
    - Robotics &
    - Autonomus system

- Generative Adversal Network (GAN)

- GANs are a class of AI algorithms used in Unsupervised ML for generating synthetic data.

- Application:
  - Image generation
  - Style transfer
  - Data Augmentation