CSE(AI&ML) Machine learning Assignment

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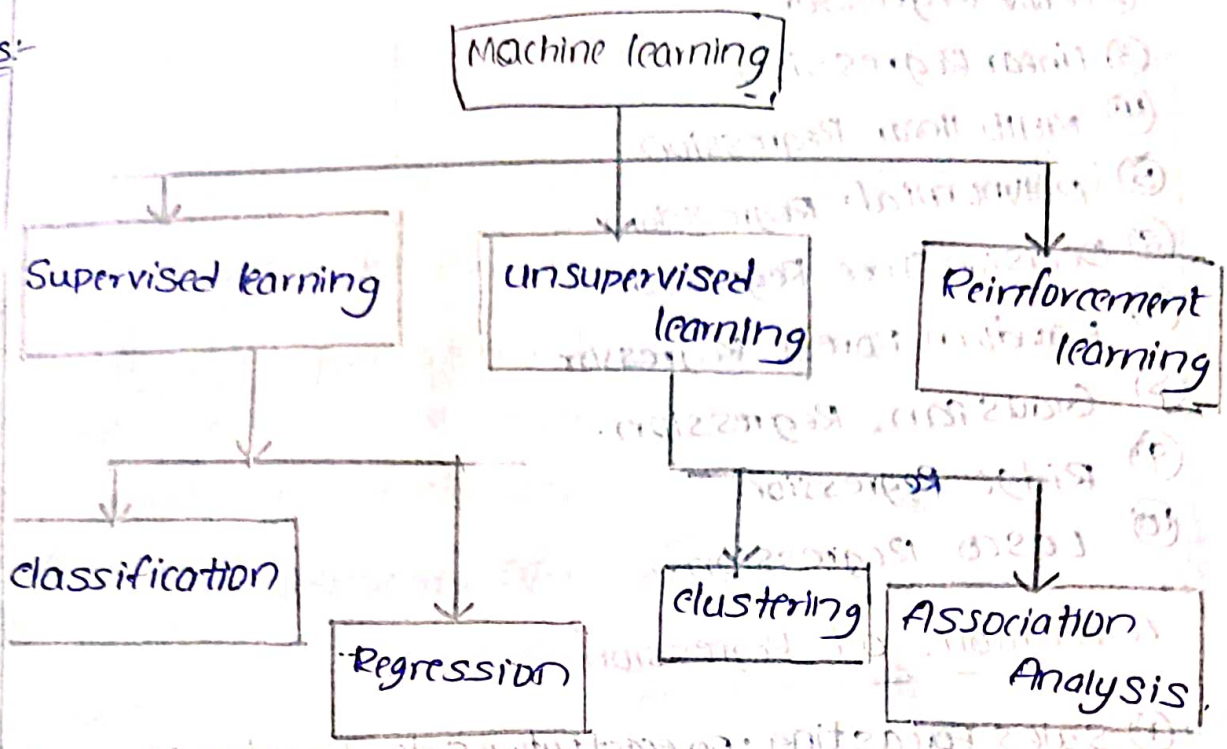
① Analyze Supervised learning, unsupervised learning and reinforcement learning with Domain, applications and Algorithms?

Ans:-



= Supervised learning is the types of Machine learning in which machines are trained using well "labelled" training data, and on the Basis of the data, machines predict the data (or) output. The labelled data means some input data is already tagged the correct output.

= Supervised learning is a process of providing input data as well as correct output data to the machine learning model. The aim of a supervised learning algorithm is to find a mapping function to map the input variable (x) and the output variable (y).

① Regression:-

Regression algorithms are used if there is a relationship blw the input variable and the output variable. It is used for the prediction of continuous variables, such as weather forecasting, Market trends etc.

Some popular Regression algorithms:-

1. SVM Regressor
2. kNN Regressor
3. Linear Regression
4. Multi-linear Regression
5. Polynomial Regression
6. Decision Tree Regressor
7. Random Forest Regressor
8. Gaussian Regression.
9. Ridge Regression
10. Lasso Regression.

Applications of Regression:-

1. Sales Forcasting: Forecast Future sales based on historical data.
2. Stock Market prediction
3. Real estate price prediction
4. Demand Forecasting
5. Medical Diagnosis: Method used for predicting Medical outcomes like patient recovery time, blood pressure levels etc..
6. Climat change
7. Energy consumption prediction
8. Customer Service (or) product Prediction
9. Crop yield Prediction
10. Credit Risk Assessment: Credit risk Assement involves analyzing various factors related to the applicant's financial history, income, employment status another relavent information.

assification :-

Classification Algorithms are used when the output variable is categorical, which means there are two classes such as Yes-No, Male-Female, True-False etc.

Output = classes, categorical (or) 0, 1 output.

Some popular classification Algorithms :-

1. logistic Regression (classification Alg)
2. Decision Tree classifier.
3. Random Forest classifier
4. K-Nearest Neibours (kNN) classifier.
5. Artificial Neural Networks
6. Naive Baye's classifier
7. Support vector machines (SVM) classifier
8. Boosting & Bagging classifiers
   - XGBoost Classifier
   - AdaBoost Classifier
   - Bagging Classifier.

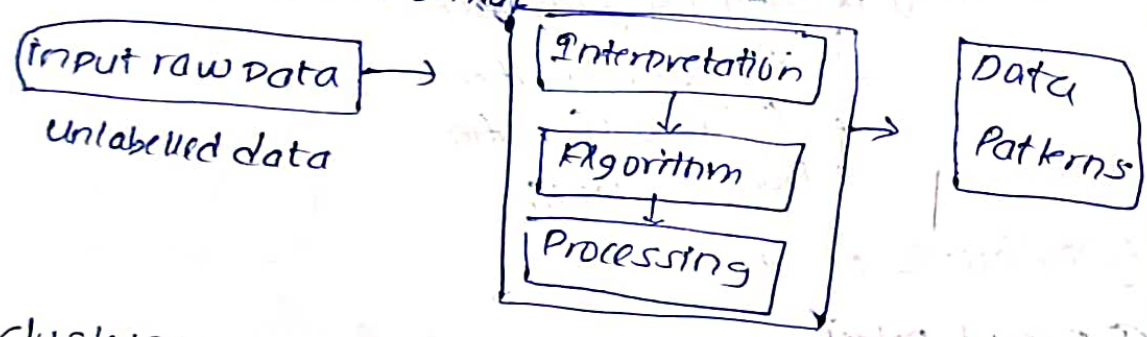
Applications of classification.

1. Fraud Detection
2. Facial Recognition
3. Customer Behaviour prediction
4. Voice Recognition
5. Image classification
6. Medical Diagnostic test
7. Product categorization
8. Biometric Identification
9. handwriting Recognition
10. Disease Prediction
11. Play (or) Not

Unsupervised learning :-

= Unsupervised learning is a type of Machine learning in which Models are trained using unlabeled dataset and allowed to act on the data without supervision.

= Unsuperised learning cannot be directly applied to a regression (or) classification problem because unlike supervised learning, we have the input data but no corresponding output data. The goal of unsupervised learning is to find the underlying structure of dataset, group the data according to similarities, and represent that dataset in a compressed format.



Clustering :-

Clustering (or) cluster analysis is a Machine learning technique, which groups the unlabelled dataset. It can be defined as "A way of grouping the data points into different clusters, consisting of similar data points. The objects with the possible similarities remain in a group that has less (or) no similarities with another group.

Some popular clustering Algorithms:-

1. K-Means clustering
2. DBSCAN (Density Based Spatial clustering of Applications with Noise).
3. Hierarchical clustering
4. Mean shift
5. Gaussian Mixture Model
6. Spectral clustering
7. Agglomerative clustering
8. OPTICS (ordering points to identify the clustering structure).

Application of clustering:-

1. Customer Segmentation
2. Image Segmentation.
3. Anomaly Detection
4. Document clustering
5. Genomics and Bioinformatics
6. Social Network Analysis.
7. Recommendation Systems
8. Sensor Data Analysis
9. Traffic Analysis
10. Market Segmentation

Association Analysis

Association rule learning is a type of unsupervised learning technique that checks for the dependency of one data item on another data, and maps accordingly so that it can be more profitable. It tries to find some interesting relations (or) associations among

the variables of dataset. It is based on different rules to discover the interesting relations b/w variables in the dataset.

Some popular classification Algorithms:

1. Apriori Algorithm
2. FP-growth (Frequent pattern Growth)
3. Eclat Algorithm
4. Max-Miner
5. AIS (Agrawal, Imielinski and Swami)
6. CAR (classification on Association Rules)
7. SAM (Sequential Association Mining)
8. SPADE (Sequential Association Mining)

Applications of Association:-

1. Market Basket analysis
2. Web usage mining
3. Continuous prediction.
4. Healthcare
5. Text Mining
6. Customer Behaviour Analysis
7. Product Bunding
8. Image analysis
9. Supply chain Optimization

Reinforcement learning:-

Reinforcement learning is a feedback-based Machine learning technique in which an agent learns to behave in an environment by seeing the results of Actions. For each good action the

agent gets positive Feedback, and for each bad action, the agent gets Negative feedback or Penality.

= In Reinforcement learning, the agent can learn automatically using Feedback without any unlabeled data, like supervised learning.

= Since, there is no labelled data, so the agent is Bound to learn by its experience only.

Note:- (complex to understand and Apply.

Reinforcement learning is a type of Machine learning method where an intelligent agent (computer program) interacts with the environment and learns to act within that.

Some Popular Reinforcement Alg:-

1. Q-learning
2. Sarsa.

Applications of Reinforcement learning

1. Self-driving cars
2. Intelligent robots
3. AlphaGO Zero (The latest version of Deepmind's AI System playing GO)

∴ There is NO Further classification of Reinforcement learning.

= The Model has to do classification - It will get rewarded if the classification is correct, else get punished.