Assignment 1 -

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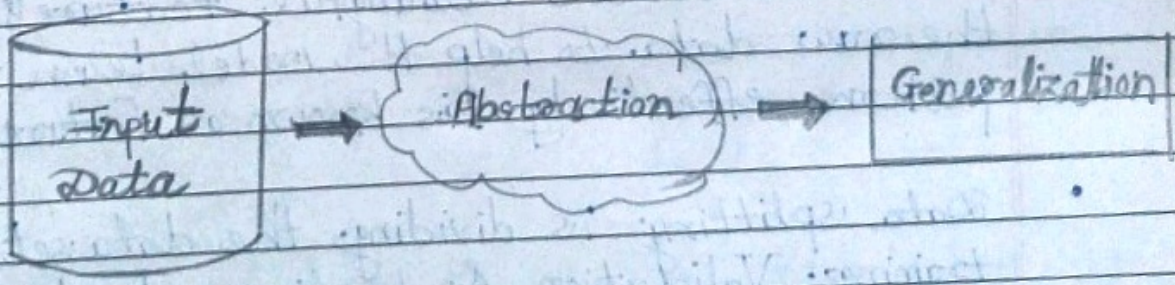
1. Define Machine Learning & describe the key steps in the machine learning process.

Machine Learning? -

- Machine learning is a branch of artificial intelligence [AI] & computer science which focuses on the use of data & algorithms to imitate the way that human learn, gradually with improving its accuracy.
- Just like human learns, means that a machine can be considered to learn, if it is able to gather experiance by doing a certain task & improve it's performance in doing the similar task in the future.

The basic Machine learning process can be divided into three parts -

i. Data input
ii. Abstraction
iii. Generalization



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The key steps in Machine learning process -

1. Problem defination.
2. Data Collection
3. Data Processing
4. Feature Engineering
5. Data splitting
6. Model selection
7. Model training
8. Model Evaluation.

- Problem defination is to clearly define the problem you want to solve using machine learning, such as classification, regression or clustering.
- Gathering relevant data that will be used to train & test the machine learning model is Data collection.
- Data processing involves cleaning, transform & pre-process the data to handle missing values, outliers & ensure it's in suitable format.
- Select or create meaningful features from the raw data to help the model learn the pattern effectively, is known as Feature Engineering
- Data splitting is dividing the dataset into training, Validation & testing subsets to train & evaluate the model performance.

- Choose an appropriate machine learning algorithm based on the problem & data of the characteristics is a Model selection.
- Train the selected model using the training data, adjusting its parameters to optimize the performance.
- Model Evaluation is assessing the model's performance using the validation dataset, employing metrics like accuracy, precision & recall.

2. Explain Supervised machine learning with an example.

i) In the supervised machine learning, the algorithm learns a mapping between the input & output data.

ii) This mapping is learned from a labeled data set, which consists of pairs of inputs & outputs.

iii) The labeled dataset used in supervised learning consist of input features & the corresponding output labels.

iv) The input features are the attributes or characteristics of the data that used to

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make predictions, while the output labels are the desired outcomes that the algorithm tries to predict.

v) One of the primary advantages of supervised learning is that it allows for the creation of complex models that can make accurate predictions on new data.

vi) However, Supervised Learning requires large amount of labled training data to be effective

e.g. - House prices -
- first we need data about the houses. Square footage, No. of rooms, features. where a house has a garden or not.
- We then need to know the prices of theise houses i.e. the corresponing lables.

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3. Explain unsupervised machine learning with ex

- Unsupervised Machine Learning -
It is the training of a machine using information that is neither classified nor labled & allowing the algorithm to act on that information without guidance.

Here,
The task of the machine is to group unsorted information according to similarities, patterns & differences without any prior training of data.

- Unsupervised learning is classified into two categories of algorithms -

A. Clustering -
A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behaviour.

B. Association -
An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

Example -
Find a face in an image.

4. List different types of machine learning & briefly compare supervised learning vs. unsupervised

Parameters	Supervised Machine learning	Unsupervised Machine learning
1. Input data	Algorithm are trained using labeled data.	Algorithms are used against data that is not labeled.
2. Computational Complexity	simpler method	Computationally complex.
3. Accuracy	Higher accuracy	Less accurate.
4. No. of classes.	Known no. of classes.	No. of classes is Unknown.
5. Data Analysis	Uses offline analysis	Uses real-time analysis of data.
6. Algorithm used	Linear & Logistics regression, Random forest, Support vector Machine, Neural network.	K-Means clustering. Hierarchical clustering, Apriori Algorithm.

7. Training data	Use training data to infer model.	No training data is used.
8. Complex model	It is not possible to learn large & more complex models than with Supervised Learning.	It is possible to learn the larger & more complese models with unsuper-vised learning.
9. Example	Optical character recognization	Finding a face in image? [image process-ing]

- There are different types of Machine Learnings - such as ;
  i. Supervised
  ii. UnSupervised.
  iii. SemiSupervised.
  iv. Reinforcement.

iii. Semi-Supervised type of ML algorithm are lies betⁿ. supervised & unsupervised ML.

iv. Reinforcement works on a feedback-based process, in which an AI agent ~~auth~~ automati-cally explore, it's surrounding by hitting & trail, taking action, learning from experie-nce & improving its performance.