**Machine Learning Notes**

https://www.upgrad.com/blog/machine-learning-interview-questions-answers-ii/

**What is Machine Learning?**

Machine learning (ML) is a subset of artificial intelligence (AI) that focuses on developing algorithms and models that enable computers to learn from data and improve their performance over time without being explicitly programmed. In other words, ML algorithms allow computers to recognize patterns in data and make predictions or decisions based on those patterns.

ML technology is increasingly being used in various applications in daily life, including:

1. Personalized Recommmendations
2. Virtual Assistants
3. Fraud Detection
4. Medical Diagonsis
5. Image Recognition

What is supervised and Unsupervised learning?

**Supervised learning:** Supervised learning is a type of machine learning where the algorithm learns to map input data to output labels based on example input-output pairs provided in the training data. The algorithm aims to generalize from the training data to make predictions or decisions about unseen data, guided by the supervision of known outcomes.

Ex: Classification of emails as spam or ham.

Explanation:

* Supervised learning in email classification involves training an algorithm with labeled data, where input features like keywords, sender's email address, and subject line are used to predict the output labels of "spam" or "non-spam."
* The trained algorithm learns patterns from the labeled data to accurately classify new, unseen emails as either spam or non-spam, providing users with an effective tool for filtering unwanted emails from their inbox.

**Types of Supervised learning:**

Supervised learning is classified into two categories of algorithms:

1. Regression
2. Classification

**Unsupervised learning:** Unsupervised learning is a type of machine learning that learns from unlabeled data. This means that the data does not have any pre-existing labels or categories. The goal of unsupervised learning is to discover patterns and relationships in the data without any explicit guidance.

Ex: In customer segmentation for marketing purposes, unsupervised learning can identify clusters of customers with similar purchasing behavior or demographics, enabling businesses to tailor their marketing strategies more effectively.

**Types of Unsupervised learning:**

1. Clustering
2. Association

What is Regression and types of Regression?

Regression is a type of supervised ml algorithm used for predicting the continuous output based on the input features.

Ex: Prediction of house prices, temperature and sales forecasts.

**Types of Regression:**

1. Linear Regression
   1. Simple linear regression
   2. Multi linear regression
2. Polynomial Regression
3. Non-linear Regression

**Simple linear regression**: This type of regression analysis is used to determine the relationship between a single independent variable and a single dependent variable.

**Multiple linear regression**: This type of regression analysis is used to determine the relationship between multiple independent variables and a single dependent variable.

**Polynomial regression**: This type of regression analysis is used to determine the relationship between an independent variable and a dependent variable that follows a non-linear pattern.

**Non-linear regression**: This type of regression analysis is used to determine the relationship between an independent variable and a dependent variable that follows a non-linear pattern, but the relationship is not represented by a polynomial equation.