THEORETICAL ASSIGNMENT
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MODULE 6 : SUPERVISED MACHINE LEARNING

Q-1. Explain Supervised vs. Unsupervised Learning.

Supervised Learning is the machine learning algorithm defined by its use of labeled data set to train algorithms to classify data and predict outcomes. The labeled data-set has output label corresponding to input data for the machine to understand what to search for in the unseen data.

Unsupervised Learning is a type of machine learning in which the algorithms are provided with data that does not contain any labels or explicit instructions on what to do with it. The goal is for the learning algorithm to find structure in the input data on its own. To put it simply—Unsupervised Learning is a kind of self-learning where the algorithm can find previously hidden patterns in the unlabeled data set and give the required output without any interference.

Parameters	Supervised Machine Learning	Unsupervised Machine Learning
Goal	The goal is to predict outcomes for new data. You know up front the type of results to expect.	The goal is to get insights from large volumes of new data. The machine learning itself determines what is different or interesting from the data set.
Applications	Supervised learning models are ideal for spam detection, sentiment analysis, weather forecasting and pricing predictions, among other things.	Unsupervised learning is a great fit for anomaly detection, recommendation engines, customer personas and medical imaging.
Complexity	Supervised learning is a simple method for machine learning.	Unsupervised learning models are computationally complex because they need a large training set to produce intended outcomes.
Drawbacks	Supervised learning models can be time-consuming to train, and the labels for input and output variables require expertise	Unsupervised learning methods can have wildly inaccurate results unless you have human intervention to validate the output variables.

Q-2. How Regression Models are Used in Business?

Regression models are valuable in business because they help predict outcomes and understand relationships between variables. Here's how they are used across different business areas:

1. Predictive Analytic :

This type of analysis uses historical data, finds patterns, looks out for trends and uses that information to build predictions about future trends. Regression models can go far beyond forecasting impact on immediate revenue. For example, you can forecast the number of customers who will purchase a service and use that data to estimate the amount of workforce needed to run that service.

- Reduce Costs
- Reduce the amount of tools needed
- Provide faster results
- Improve operational efficiency
- Help in fraud detection
- Risk management
- Optimize marketing campaigns

2. Efficiency :

Regression models can also help optimize business processes. A factory director, for example, can build a regression model to understand the impact of the premises temperature on the overall productivity of all employees. In an ER hospital, we can analyze the relationship between the wait times of patients and the outcomes.

3. Decision Making :

Because the loads of data gathered on finances, operations and purchases, companies are now learning how to make use of data analytic to make data-driven decisions and not intuitive decisions. Linear and logistic regression, provides a more accurate analysis which can then be used to test hypotheses of situations prior to sending it to production.

4. New Insights :

Over time businesses have gathered a large volume of cluttered data that can provide invaluable amounts of new insights. Unfortunately, this data is of no use without the appropriate analysis. Regression models can find a relationship between several variables by uncovering patterns that were not taken into account.