AIML Assignment - 2

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Set - III

Q1) What are different ways to assess the performance of learning algorithm.

→ ① Accuracy -

This is the most common metric, calculated as the total number of correct predictions divided by the total number of predictions. However, it can be misleading if the classes are imbalanced.

② Precision -

This metric measures the proportion of positive predictions that are actually correct. It is useful for identifying false positives.

$$\text{Precision} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}}$$

③ Recall -

This metric measures the proportion of actual positives that are correctly predicted. It is useful for identifying false negatives.

④ F1 - score -

This metric is the harmonic mean of precision and recall, providing a balanced view of both metrices.

⑤ Confusion matrix -

This is a table that visualizes the performance of the model by showing the number of correct and incorrect predictions for each class

⑥ R - Squared: -

This metric measures the proportion of variance in the target variable that is explained by the model.

Q2) Explain with example different operations on fuzzy sets.

→ * Fuzzy sets -

Fuzzy sets are a generalization of classical sets that allow elements to belong to the set with a degree of membership between 0 and 1. This allows for a more nuanced representation of concepts.

① Union -

The union of two fuzzy sets A and B represents the elements that belong to either A or B, or both. It is calculated as the maximum of the membership degrees of each element in A and B.

Eg- Let A be the fuzzy set of "tall people" and B be the fuzzy set of "people who play basketball".

- A person who is 6 feet tall has a membership degree of 0.8 in A & 0.5 in B
- A person who is 5 feet 10 inches tall has a membership degree of 0.5 in A and 0.4 in B

The union of A & B would be a fuzzy set where the first person has a membership degree of 0.3 & the second person has a membership degree of 0.5

② Intersection.

The intersection of two fuzzy sets A and B represents the elements that belong to both A and B. It is calculated as the minimum of the membership degrees of each element in A and B.

Example -

In previous example, the intersection of A & B would be the set of "tall people who play basket ball".

- The first person would have a membership degree of 0.5 in the intersection.
- The second person would have a membership degree of 0.4 in the intersection.

Q3) write short note on FIS.

→ Fuzzy Inference system (FIS):

Fuzzy Inference Systems are a type of artificial intelligence algorithm that utilizes fuzzy logic to model and control complex systems with uncertainty and vagueness

- Fuzzy sets -

Representing linguistic variables and membership functions to capture the degree of membership of an element to a set.

- Fuzzy Rules -

Defining relationships between input and output variables using linguistic rules

- Fuzzy Inference -

Combining fuzzy rules to make decisions or predictions in the presence of uncertainty.

- Defuzzification -

converting fuzzy output into a crisp value.