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Question 1. Which of the following methods do we use to find the best fit line for data in Linear Regression?

A) Least Square Error

B) Maximum Likelihood

C) Logarithmic Loss

D) Both A and B

Answer. D) Both A and B

Question. 2. Which of the following statement is true about outliers in linear regression?

A) Linear regression is sensitive to outliers

B) linear regression is not sensitive to outliers

C) Can't say

D) none of these

Answer A) Linear regression is sensitive to outliers.

Question. 3. A line falls from left to right if a slope is ______?

A) Positive

B) Negative

C) Zero

D) Undefined

Answer B) Negative

Question. 4. Which of the following will have symmetric relation between dependent variable and independent variable?

A) Regression

B) Correlation

C) Both of them

D) None of these

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Answer D) None of these.

Question. 5.Which of the following is the reason for over fitting condition?

A) High bias and high variance

B) Low bias and low variance

C) Low bias and high variance

D) none of these

Answer C) Low bias and high variance.

Question 6. If output involves label then that model is called as:

A) Descriptive model

B) Predictive modal

C) Reinforcement learning

D) All of the above

Answer B) Predictive model.

Question.7. Lasso and Ridge regression techniques belong to _________?

A) Cross validation

B) Removing outliers

C) SMOTE

D) Regularization

Answer D) Regularization.

Question.8. To overcome with imbalance dataset which technique can be used?

A) Cross validation

B) Regularization

C) Kernel

D) SMOTE

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Answer D) SMOTE.

Question .9. The AUC Receiver Operator Characteristic (AUCROC) curve is an evaluation metric for binary classification problems. It uses _____ to make graph?

A) TPR and FPR

B) Sensitivity and precision

C) Sensitivity and Specificity

D) Recall and precision

Answer A) TPR (True Positive Rate) and FPR (False Positive Rate).

Question 10. In AUC Receiver Operator Characteristic (AUCROC) curve for the better model area under the curve should be less.

A) True

B) False

Answer B) False

Question 11. Pick the feature extraction from below:

A) Construction bag of words from a email

B) Apply PCA to project high dimensional data

C) Removing stop words

D) Forward selection

Answer B) Apply PCA to project high-dimensional data.

Question .12. Which of the following is true about Normal Equation used to compute the coefficient of the Linear Regression?

A) We don’t have to choose the learning rate.

B) It becomes slow when number of features is very large.

C) We need to iterate.

D) It does not make use of dependent variable

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Answer B) It becomes slow when the number of features is very large.

Question 13. Explain the term regularization?

Answer .- Regularization is a technique used in machine learning and statistics to prevent overfitting and improve the generalization performance of models.

In the context of machine learning models, overfitting occurs when a model learns to capture noise and fluctuations in the training data rather than the underlying patterns or trends. As a result, the model performs well on the training data but fails to generalize well to unseen data.

Regularization addresses this issue by adding a penalty term to the loss function, which penalizes the model for complexity. The goal is to discourage the model from fitting the noise in the training data and encourage it to learn simpler patterns that generalize better to new data.

There are different types of regularization techniques, including:

1. L1 regularization (Lasso regularization): Adds a penalty term proportional to the absolute value of the coefficients. It tends to produce sparse solutions by shrinking some coefficients to zero.

2. L2 regularization (Ridge regularization): Adds a penalty term proportional to the square of the coefficients. It tends to produce smaller but non-zero coefficients.

3. Elastic Net regularization: Combines L1 and L2 regularization to leverage the benefits of both approaches.

Regularization helps to control the trade-off between bias and variance in the model. By penalizing overly complex models, regularization can lead to improved generalization performance and better model interpretability.

Question 14. Which particular algorithms are used for regularization?

Answer. - Several machine learning algorithms can incorporate regularization techniques to prevent overfitting. Some common algorithms that can be regularized include:

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1. Linear Regression: Regularized versions of linear regression include Ridge Regression (L2 regularization) and Lasso Regression (L1 regularization).

2. Logistic Regression: Similar to linear regression, logistic regression can be regularized using Ridge (L2) or Lasso (L1) regularization.

3. Support Vector Machines (SVM): SVMs can be regularized by tuning the regularization parameter (C) to control the trade-off between maximizing the margin and minimizing the classification error.

4. Neural Networks: Regularization techniques such as L1 or L2 regularization, dropout, and early stopping can be applied to neural networks to prevent overfitting.

5. Decision Trees: Although decision trees themselves are not typically regularized, ensemble methods like Random Forests and Gradient Boosting Machines (GBMs) can use techniques like limiting the tree depth, pruning, and using regularization parameters to control model complexity.

6. K-Nearest Neighbors (KNN): While KNN is a non-parametric algorithm and does not have parameters to tune like regularization, techniques like feature scaling can indirectly influence regularization by reducing the influence of noisy features.

Regularization is a versatile concept that can be applied to a wide range of machine learning algorithms to improve model performance and generalization ability.

Question 15. Explain the term error present in linear regression equation?

Answer -: The linear regression, in the term "error" refers to the difference between the observed value of the dependent variable and the value predicted by the linear regression model. It represents the discrepancy between the actual data points and the line of best fit generated by the model.

Mathematically, for each data point i, the error (often denoted as e_i) is calculated as:

$$e_i = y_i - \hat{y}_i$$

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Where:

- y_i is the observed value of the dependent variable for data point i,
- $\hat{y}_i$ is the predicted value of the dependent variable for data point i obtained from the linear regression model.

The error term captures the variability or noise in the data that is not explained by the linear relationship between the independent variables and the dependent variable. In an ideal scenario, the goal of linear regression is to minimize these errors, ensuring that the line of best fit closely matches the observed data points.

Commonly used techniques in linear regression, such as the method of least squares, aim to minimize the sum of squared errors (SSE) across all data points. By minimizing the errors, the linear regression model can accurately capture the underlying relationship between the independent and dependent variables and make reliable predictions for new data.