MACHINE LEARNING

In Q1 to Q11, only one option is correct, choose the correct option:

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
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
3. A line falls from left to right if a slope is _____?
   A) Positive B) Negative C) Zero D) Undefined
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
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
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
7. Lasso and Ridge regression techniques belong to _____?
   A) Cross validation B) Removing outliers
   C) SMOTE D) Regularization
8. To overcome with imbalance dataset which technique can be used?
   A) Cross validation B) Regularization
   C) Kernel D) SMOTE
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
10. In AUC Receiver Operator Characteristic (AUCROC) curve for the better model area under the curve should be less.
    A) True B) False
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

In Q12, more than one options are correct, choose all the correct options:

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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Q13 and Q15 are subjective answer type questions, Answer them briefly.

13. Explain the term regularization?

Regularisation is the name given to a set of machine learning approaches designed to avoid overfitting and enhance a model's ability. When a model performs well on training data but fails to generalise to new data, it is said to be overfit. Regularisation encourages the model to have fewer parameter values or more straightforward representations by including a penalty term to the objective function. Complex or severe parameter values that could result in overfitting are discouraged by this penalty. During training, the regularisation term is often added to the loss function as a function of the model's parameters.

14. Which particular algorithms are used for regularization?

Different machine learning algorithms can use regularisation to avoid overfitting. The following are a few examples of frequently used regularisation techniques-based algorithms:

1. Ridge Regression (Linear Regression with L2 Regularization):
   The OLS objective function of linear regression is modified by the L2 penalty factor introduced by ridge regr ession. It promotes small model coefficients, which minimises overfitting.

2. Lasso Regression (Linear Regression with L1 Regularisation): Lasso regression modifies the OLS objective f unction by include an L1 penalty component.By bringing some of the coefficients to absolutely zero, it promo tes sparsity by performing feature selection.

3. Elastic Net Regression : In linear regression, elastic net combines L1 and L2 regularisation penalties. It strikes a balance between L1 regularization's capacity to increase sparsity and L2 regularization's capacity to reduce parameter sizes.

4. Logistic Regression with L1 or L2 Regularisation: To avoid overfitting in binary classification situations, logi stic regression can also include L1 or L2 regularisation.
   In order to get the best coefficients, regularised logistic regression penalises high parameter values.

5. Regularised Support Vector Machines (SVM): Regularisation can be incorporated into SVM algorithms by us ing the C parameter.The tradeoff between increasing the margin and reducing the classification error is contro lled by the C parameter. A higher C value decreases regularisation and raises the possibility of overfitting.

6. Neural Networks with Regularization Techniques : To avoid overfitting, regularisation techniques can be used with neural networks. L1 and L2 regularisation (weight decay), dropout regularisation, and early stopping are frequently used regularisation techniques for neural networks.

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

The difference between the actual observed values and the anticipated values derived from the linear regression equation is referred to as the "error" in linear regression. The linear regression equation is used to model the relationship between a dependent variable and one or more independent variables.