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

____Answer(A)[Least Square Error]

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]

3. A line falls from left to right if a slope is_____?
   A) Positive
   B) Negative
   C) Zero
   D) Undefined

____Answer(B)[Negative Number]

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

____Answer(B)[Correlation]

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]

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]

7. Lasso and Ridge regression techniques belong to_____?
   A) Cross validation
   B) Removing outliers
   C) SMOTE
   D) Regularization

____Answer(D)[Regularization]

8. To overcome with imbalance dataset which technique can be used?
   A) Cross validation
   B) Regularization
   C) Kernel
   D) SMOTE

____Answer(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

____Answer(A)[TPR and FPR]

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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]

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(A,B,C)

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.

____Answer(A,B,C)

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

13. Explain the term regularization?

Ans: Regularization is a technique used to reduce the errors by fitting the function appropriately on the given training set and avoid overfitting. Overfitting is a phenomenon that occurs when a Machine Learning model is constraint to training set and not able to perform well on unseen data. The commonly used regularization techniques are :

1. L1 Regularization (LASSO CV)
2. L2 Regularization (RIDGE CV)
3. ELASTICNET

Least Absolute Shrinkage and Selection Operation(L1 form) Regression:

It penalizes based on sum of magnitude of the coefficients and regularization term is given by:

L1= λ* Σ| βj | λ-Shrinkage factor

RIDGE Regression:

It penalizes based on sum of squares of magnitude of coefficients and regularization term is given by:

L1= λ* Σ| βj ^2| λ-Shrinkage factor

14. Which particular algorithms are used for regularization?

Ans: Algorithms Used for Regularization:

1)L1 Regularization (LASSO CV)
2)L2 Regularization (RIDGE CV)
3)ELASTICNET

LASSO is a regression analysis method that performs both feature selection and regularization in order to enhance the prediction accuracy of the model.
LASSO regression adds a penalty ***(L1 penalty)*** to the loss function that is equivalent to the magnitude of the coefficients.

L1= λ* Σ| βj | λ-Shrinkage factor

Ridge regression is a method for analyzing data that suffer from multi-collinearity. Ridge regression adds a penalty ***(L2 penalty)*** to the loss function that is equivalent to the square of the magnitude of the coefficients.

L1= λ* Σ| βj ^2| λ-Shrinkage factor

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

Ans: An error term is a residual variable produced by a statistical or mathematical model, which is created when the model does not fully represent the actual relationship between the independent variables and the dependent variables. As a result of this incomplete relationship, the error term is the amount at which the equation may differ during empirical analysis.
An error term essentially means that the model is not completely accurate and results in differing results during real-world applications. For example, assume there is a multiple linear regression function that takes the following form:

$$Y = a + bx + e$$

where a = intercept,
b=slop of the line,
e=Error term,
x=Independent data(feature),y=dependent data(label).

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