MACHINE LEARNING

InQ1toQ11,onlyoneoptioniscorrect,choosethecorrectoption:

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
   B) Can't say D)none of these
3. A line falls from left to right if a slopes _____?
   A) Positive B)Negative
   B) Zero D)Undefined
4. Which of the following will have symmetric relation between dependent variable and independent variable?
   A) Regression B) Correlation
   B) Both of them D) None of these
5. Which of the following is there a son for over fitting condition?
   A) High bias and high variance B)Low bias and low variance
   B) 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
   B) Reinforcement learning D) All of the above
7. Lasso and Ridge regression techniques belong to_____?
   A) Cross validation B)Removing outliers
   B) SMOTE D)Regularization
8. To overcome with imbalance dataset which technique can be used?
   A) Cross validation B)Regularization
   B) 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
   B) 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

InQ12,morethanoneoptionsarecorrect,chooseallthecorrectoptions:

12. WhichofthefollowingistrueaboutNormalEquationusedtocomputethecoefficientoftheLinear 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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Q13andQ15aresubjectiveanswertypequestions,Answerthembriefly.

13. Explain the term regularization?

Regularization is a technique used in machine learning to prevent overfitting and improve the generalization of a model. Overfitting occurs when a model learns the training data too well, capturing noise and fluctuations in the data that do not represent the underlying patterns. Regularization introduces a penalty term to the model's objective function, discouraging overly complex models with excessively large coefficients.

There are two common types of regularization: L1 regularization (Lasso) and L2 regularization (Ridge).

1. **L1 Regularization (Lasso):**
   - Adds the absolute values of the coefficients to the cost function.
   - Encourages sparsity by driving some coefficients to exactly zero.
   - Useful for feature selection, as it tends to eliminate less important features.
2. **L2 Regularization (Ridge):**
   - Adds the squared values of the coefficients to the cost function.
   - Encourages small but non-zero coefficients for all features.
   - Helps prevent multicollinearity (correlation between features) by spreading the impact of correlated features across all features.

14. Which particular algorithms are used for regularization?

Regularization can be applied to a variety of machine learning algorithms to prevent overfitting and improve generalization. Some of the commonly used algorithms that incorporate regularization include:

1. **Linear Regression with L1 and L2 Regularization:**
   - Lasso Regression (L1 regularization)
   - Ridge Regression (L2 regularization)
2. **Logistic Regression with L1 and L2 Regularization:**
   - L1 regularization is often referred to as Lasso regularization in the context of logistic regression.
   - L2 regularization is applied similarly to logistic regression.
3. **Support Vector Machines (SVM):**
   - SVM can be regularized using L2 regularization.
4. **Neural Networks:**
   - Artificial neural networks can use various forms of regularization, including L1 and L2 regularization on weights, as well as dropout regularization, which randomly drops out some neurons during training.
5. **Elastic Net Regression:**
   - Combines both L1 and L2 regularization, providing a balance between feature selection (L1) and regularization (L2).
6. **Decision Trees:**
   - Pruning is a form of regularization applied to decision trees, where branches that do not contribute significantly to predictive accuracy are pruned.
7. **Elastic Net Regression:**
   - Combines both L1 and L2 regularization, providing a balance between feature selection (L1) and regularization (L2).

These algorithms may provide hyper parameters that allow you to control the strength of regularization, often denoted as alpha or lambda. The choice of the regularization technique and the tuning of hyper parameters depend on the specific characteristics of the data and the desired properties of the model.

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

In the context of linear regression, the term "error" refers to the difference between the predicted values produced by the regression model and the actual observed values in the dataset. This difference is also known as the residual or the prediction error.

The linear regression equation is typically represented as:

$$y=\beta_0+\beta_1x_1+\beta_2x_2+\ldots+\beta_nx_n+\epsilon$$

Here:

- y is the dependent variable (the variable we are trying to predict).
- β_0 is the intercept.
- $\beta_1,\beta_2,\ldots,\beta_n$ are the coefficients associated with the independent variables $x_1,x_2,\ldots,x_n$.
- ϵ represents the error term, which captures the variability in y that is not explained by the linear relationship with the independent variables.