

1. R-squared or Residual Sum of Squares (RSS) which one of these two is a better measure of goodness of fit model in regression and why?

Ans- R-squared is the absolute amount of variation as a proportion of total variation.

The residual sum of squares (RSS) is the absolute amount of explained variation.

Residual sum of squares (RSS), the better the model's ability to accurately predict data points, implying that the model is a good fit for the data.

2. What are TSS (Total Sum of Squares), ESS (Explained Sum of Squares) and RSS (Residual Sum of Squares) in regression. Also mention the equation relating these three metrics with each other.

Ans - TSS is the sum of squared deviations of each data point from the mean of the data.

(ESS) is the sum of the differences between the predicted value and the mean of the dependent variable.

(RSS) measures the level of variance in the error term, or residuals, of a regression model.

3. What is the need of regularization in machine learning?

Ans - To minimize the adjusted loss function and prevent overfitting or underfitting.

4. What is Gini-impurity index?

Ans - A measurement used to build Decision Trees to determine how the features of a dataset should split nodes to form the tree.

4. Are unregularized decision-trees prone to overfitting? If yes, why.

Ans - Yes, unregularized decision trees are prone to overfitting. Decision trees tend to overfit when the available training data is limited, as they attempt to extract patterns even from noise. Decision trees can grow to a considerable depth, resulting in intricate decision boundaries. As the tree becomes deeper, it becomes more susceptible to overfitting.

6. What is an ensemble technique in machine learning?

Ans - Techniques that aim at improving the accuracy of results in models by combining multiple models instead of using a single model.

7. What is the difference between Bagging and Boosting techniques?

Ans - The bagging technique combines multiple models trained on different subsets of data, whereas boosting trains the model sequentially, focusing on the error made by the previous model.

8. What is out-of-bag error in random forests?

Ans - A method of measuring the prediction error of random forests, boosted decision trees, and other machine learning models utilizing bootstrap aggregating (bagging).

9. What is K-fold cross-validation?

Ans - A technique for evaluating predictive models. The dataset is divided into k subsets or folds.

10. What is hyper parameter tuning in machine learning and why it is done

Ans - Hyperparameter tuning allows data scientists to tweak model performance for optimal results. This process is an essential part of machine learning, and choosing appropriate hyperparameter values is crucial for success, It is done to perform optimal result.

11. What issues can occur if we have a large learning rate in Gradient Descent?

Ans - If the learning rate is too high, the algorithm may overshoot the minimum.

12. Can we use Logistic Regression for classification of Non-Linear Data? If not, why?

Ans - Logistic regression is simple and easy to implement, but it also has some drawbacks. One of them is that it assumes a linear relationship between the input features and the output, It is not why because it cannot capture the complexity and non-linearity of the data.

13. Differentiate between Adaboost and Gradient Boosting.

Ans - Adaboost is computed with a specific loss function and becomes more rigid when comes to few iterations. But in gradient boosting, it assists in finding the proper solution to additional iteration modeling problem as it is built with some generic features. From this, it is noted that gradient boosting is more flexible when compared to AdaBoost because of its fixed loss function values.

14. What is bias-variance trade off in machine learning

Ans - Describes the relationship between a model's complexity, the accuracy of its predictions, and how well it can make predictions on previously unseen data that were not used to train the model.

15. Give short description each of Linear, RBF Polynomial kernels used in SVM.

Ans - SVM algorithms use a set of mathematical functions that are defined as the kernel. The function of kernel is to take data as input and transform it into the required form. Different SVM algorithms use different types of kernel functions. These functions can be different types. For example linear, nonlinear, polynomial, radial basis function (RBF), and sigmoid.

RBF - It is a general-purpose kernel; used when there is no prior knowledge about the data.

Polynomial- It is popular in image processing.