Machine Learning MCQ Answer

1.ans: D

2.ans: A

3.ans: B

4.ans: C

5.ans: C

6.ans: B

7.ans: D

8.ans: D

9.ans: A

10.ans: B

11.ans: B

12.ans: A & B Are Correct

13.ans:-Regularization is a technique used in machine learning and statistical modeling to prevent over fitting and improve the generalization performance of models. Overfitting occurs when a model fits to training data too closely, capturing noise and random fluctuation that might not generalize well to new, unseen data.

In L1 Regularization, a penalty proportional to the absolute value of the model coefficient is added to the objective function, it tends to produce sparse models by driving some coefficients exactly to zero, effective performing feature selection.

In L2 regularization adds a penalty proportional to the squared values of the model coefficients to the objective function It doesn't drive coefficients exactly to zero like L1, but it tends to shrink the coefficients towards zero, reducing the impact of less important features.

Elastic Net is a combination of L1 and L2 regularization. It balances the strengths of both L1 and L2 penalties, and it can handle situations where there are highly correlated features.

Regularization helps to control the trade-off between fitting the training data closely (low bias) and preventing overfitting (high variance). By finding the right balance through regularization, models become more robust and capable of generalizing well to new, unseen data.

14.ans: Several algorithms and techniques can be used for regularization in machine learning.

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Ridge Regression: Also known as L2 regularization, it adds the sum of the squared coefficients as a penalty term to the linear regression's cost function. This prevents coefficients from becoming too large and helps to control overfitting.

Lasso Regression: Also known as L1 regularization, it adds the sum of the absolute values of coefficients as a penalty term. Lasso not only helps with preventing overfitting but also performs feature selection by driving some coefficients to exactly zero.

Elastic Net: Elastic Net is a combination of both L1 and L2 regularization. It combines the penalties of Ridge and Lasso and is useful when dealing with highly correlated features.

Logistic Regression with L1 Regularization: Similar to linear regression, logistic regression can also be regularized using L1 penalty, promoting sparsity in the model

Support Vector Machine (SVM) with Regularization: SVMs can incorporate regularization through the C parameter in its formulation. A smaller C value increases regularization, and a larger C value reduces it.

Neural Network with Dropout: In neural networks, dropout is a regularization technique where randomly selected neurons are ignored during training. This helps prevent overfitting by ensuring that no single neuron becomes overly reliant on specific features.

Decision Tree with pruning: In decision trees, pruning is a technique to remove branches that do not provide significant improvement in model performance. Pruning prevents trees from becoming overly complex and reduces overfitting.

Regularization Regression Model: Beyond linear regression, various regression models can be regularized, such as Ridge Regression, Lasso Regression, and Elastic Net, to control overfitting

15.ans: In the context of linear regression, the term "error" refers to the difference between the actual observed values of the dependent variable (or target variable) and the values predicted by the linear regression model. This difference is also known as the residual.

Mathematically, the linear regression equation represents the relationship between the independent variable(s) and the dependent variable as follows:

$y=\beta0+\beta1x1+\beta2x2+\ldots+\beta nxn+$

y is the predicted value of the dependent variable.

β0 is the intercept of the regression line.

β1,$\beta 2$,…,βn are the coefficients of the independent variables x1,x2,…,xn

- $x_1, x_2, \ldots, x_n$ are the values of the independent variables.

  ε represents the error term.

  The error term ε accounts for the difference between the actual values of the dependent variable and the predicted values based on the regression equation. It captures the inherent variability and noise present in real-world data that cannot be explained by the linear relationship with the independent variables.

  The goal of linear regression is to find the values of the coefficients $\beta_0, \beta_1, \ldots, \beta_n$ that minimize the sum of squared errors or residuals. In other words, the model aims to find the line that best fits the data by minimizing the discrepancies between the observed values and the values predicted by the regression equation

  Minimizing the errors or residuals leads to a regression line that provides the best possible linear approximation of the relationship between the variables, allowing us to make predictions and understand the underlying trends in the data.