

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?

Regularization is one of the most important concepts of machine learning. It is a technique to prevent the model from overfitting by adding extra information to it. Sometimes the machine learning model performs well with the training data but does not perform well with the test data. It mainly regularizes or reduces the coefficient of features toward zero. It will allow to maintain all variables or features in the model by reducing the magnitude of the variables.

14. Which particular algorithms are used for regularization?

- Ridge Regression
- LASSO (Least Absolute Shrinkage and Selection Operator) Regression
- Elastic-Net Regression
 - Ridge Regression
 - Ridge regression is a method for analyzing data that suffer from multi-collinearity.

$$Loss = \sum_{i=1}^n (y_i - (w_i x_i + c))^2 + \lambda \sum_{i=1}^n w_i^2$$

- Loss Function for Ridge Regression
- Ridge regression adds a penalty (*L2 penalty*) to the loss function that is equivalent to the square of the magnitude of the coefficients.
- The regularization parameter (λ) regularizes the coefficients such that if the coefficients take large values, the loss function is penalized.
- LASSO Regression
- LASSO is a regression analysis method that performs both feature selection and regularization in order to enhance the prediction accuracy of the model.

$$Loss = \sum_{i=1}^n (y_i - (w_i x_i + c))^2 + \lambda \sum_{i=1}^n |w_i|$$

- Loss Function for LASSO Regression
 - LASSO regression adds a penalty (*L1 penalty*) to the loss function that is equivalent to the magnitude of the coefficients.
 - In LASSO regression, the penalty has the effect of forcing some of the coefficient estimates to be exactly equal to zero when the regularization parameter λ is sufficiently large.
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- Elastic-Net Regression
- Elastic-Net is a regularized regression method that linearly combines the L1 and L2 penalties of the LASSO and Ridge methods respectively.

$$Loss = \sum_{i=0}^n (y_i - (w_i x_i + c))^2 + \lambda_1 \sum_{i=0}^n |w_i| + \lambda_2 \sum_{i=0}^n w_i^2$$

- Loss Function for Elastic-Net Regression

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

The error term is the difference between what the model is predicting and the actual value. This can range from being relatively small to huge, even within one model, across the observed data points. An error term appears in a regression model, is used to indicate the uncertainty in the model. An error term essentially means that the model is not completely accurate and results in differing results during real-world applications. In stock's price over time, the error term is the difference between the expected price at a particular time and the price that was actually observed.