SUPERVISED LEARNING - TEST 1 (20 to 30 mins)

15-Question Test on Linear Regression, Gradient Descent, Bias & Variance

Topics:

- Linear Regression:
- Gradient Descent:
- Bias & Variance:

Section 1: Linear Regression

Q1. What is Linear Regression?

Answer: Linear Regression is a type of

supervised learning technique.which

learns from labelled data.

It is used to find the relationship

between dependent variable(label) and

independent variable(features) it will

find only linear relationship(straight

line).

Q2. Write the formula for simple linear regression.

Answer: y=mx+c

Y=predicted value, X=features , m= slop, c= y-intercept(where

x=0).

Q3. What is the purpose of the cost function in linear regression?

Answer: To find the error between predicted and actual(y_pred-y_actual). To

make the model learns and improves the model.

Q4. How do you interpret the coefficients in a multiple linear regression model?

Answer:

Q5. What are the assumptions of Linear Regression?

Answer: Linearity.independence, Normality

Section 2: Gradient Descent

Q6. What is Gradient Descent?

Answer: It is a optimization algorithm used to find the cost(or) Loss function.by changing the perameters it reduces error. And make the model to improve its performance.

Q7. Write the formula for parameter update in Gradient Descent. Answer:

$w = w - \alpha * (dl/dw)$

Q8. What is the role of the learning rate in Gradient Descent?

Answer: The learning rate in Gradient Descent determines the step size taken during each iteration to update the model's parameters. It controls how quickly the algorithm converges to the optimal solution, and a poorly chosen learning rate can lead to slow convergence.

Q9. What is the primary purpose of regularization in machine learning models?

A) To increase the complexity of the model to fit the training data better.
B) To minimize the training error without regard to generalization.
C) To prevent overfitting by penalizing large coefficients in the model.
D) To ensure that all features are included in the final model regardless of their importance.
Answer: C

Q10. What happens if the learning rate is too small or too large?

Answer: A learning rate that is too high can cause the model to overshoot the optimal solution and fail to converge, while a learning rate that is too low can lead to slow convergence and potentially getting stuck in local minima(where the slop is zero but actually it is not the less error)

Section 3: Bias & Variance

Q11. Define Bias and Variance in the context of machine learning models.

Answer: That affect a model's performance and generalization ability. Bias represents the error due to the model's assumptions, while variance represents how much the model's predictions change when trained on different datasets.

Q12. What is the Bias-Variance tradeoff?

Answer: Bias-variance tradeoff refers to a fundamental problem in machine learning and statistical modeling where there is a tradeoff between the ability of a model to fit the data well (i.e., low bias) and its ability to generalize to new data (low variance).

As we increase the models complexity the variance increases and Bias decreases. When the model complexity decreases the variance decreases and Bias increases.

Q13. How does increasing the complexity of a model affect bias and variance?

Answer: model bias decreases when the complexity increases and variance increases.

Q14. What is underfitting and overfitting in machine learning?

Answer: Underfitting happens when a model is too simple to learn the relationships in the training data, resulting in poor performance on both the training and test sets. Example: high bias, low variance.

Overfitting occurs when a model learns the training data too well, including its noise and specific details, rather than the underlying patterns. This leads to excellent performance on the training data but poor performance on new, unseen data. Example: low bias, high varience

Q15. How can you reduce overfitting in a model?

Answer: A model can be made simpler (e.g., fewer layers or parameters), more data can be used, and regularization techniques(L1,L2) can be applied. Additionally, techniques like early stopping, data augmentation, and ensemble methods can help