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:

It is the statistical model used to the relationship between a dependent variable and one or more independent variables

Q2. Write the formula for simple linear regression. Answer: y = mx +c

m – slope of the line c – is the y intercept

y – is the predicted value x – is the independent variable

Q3. What is the purpose of the cost function in linear regression? Answer: It helps to estimate the error made by the model it is between the actual value mand predicted value . The objective is to minimize the errors in the prediction

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

Answer: Each coefficient represents the change in the independent variable for one unit change in the corresponding independent variable holding all other variables constant.

Q5. What are the assumptions of Linear Regression? Answer: Linearity, Independence, Normality , No Multicollinearity



Section 2: Gradient Descent

Q6. What is Gradient Descent?

Answer: It is used to minimize the cost function by iteratively updating model parameters when ever the old m value is equal to new m value then we can say that it was the value where the error is minimum.

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

Q8. What is the role of the learning rate in Gradient Descent? Answer: The learning rate controls the size of the steps taken towards the minimum of the cost function . A small rate leads to slow convergence ,while a large rate may overshoot the minimum or cause divergence



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

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.

Q10. What happens if the learning rate is too small or too large? Answer: Too small : Slow convergence ,longer training time.

Too Large : Risk of overshooting the minimum or not converging at all.



Section 3: Bias & Variance

Q11. Define Bias and Variance in the context of machine learning models. Answer: Bias: Error due to overly simplistic assumptions in the model. High bias can cause underfitting

Variance : Error due to model complexity and sensitivity to small fluctuations in the training data. High variance can cause overfitting

Q12. What is the Bias-Variance tradeoff?

Answer: It’s the balance between bias and variance to minimize total error . A model with high bias has low variance and vice versa . The goal is to find a model with low total error

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

Answer: Increasing complexity typically decreases bias but increases variance ,potentially leading to overfitting.

Q14. What is underfitting and overfitting in machine learning? Answer: Underfitting : When a model is too simple to capture the data patterns that is high bias.

Overfitting : When a model captures noise in the training data as if it were part of the pattern that is high variance

Q15. How can you reduce overfitting in a model? Answer:

- Use regularization techniques

- Use simpler models

- Gather more training data

- Apply cross validation