ayesh test

Q)What is linear regression?

A)Linear regression is a statistical method used to model the relationship between a dependent variable(label) and one or more independent variables(features).

Q)write the formula for simple linear regression?

A)The equation for a simple linear regression model is:

y=mx+b

Where:

* y is the predicted value(label)
* M is the slope of the line(coefficient for the features),
* x is the independent variable(feature).
* b is the y-intercept (constant team).

Q)What is the purpose of the cost function in linear regression?

A)The primary objective of the cost function is to minimize the error in predictions.

* By calculating the difference between the predicted output and the actual output, the cost function provides a single numerical value that reflects the model's accuracy.

Q)How do you interpret the coefficients in a multiple linear regression model?

A)In multiple linear regression, the coefficient of a predictor variable represents the expected

Change in the response variable for a one-unit increase in that predictor constant.

Interpretation:for one-unit increase in x2 the expected value of y increases )or decreases, if negative ) by beta units, assuming all other variables remain constant.

Q)What is the assumption of linear regression?

A)Five main assumption of classical linear regression :

* Linearity
* Independent of errors
* Homoscedasticity(constant variance of Errors)
* Normality of Errors
* No multicollinearity

Q)What is Gradient Descent?

A)Gradient descent is an optimization algorithm used to minimize a function by iteratively moving toward the minimum of that function. It's commonly used to find the optimal parameters (like coefficients ) in machine learning models, including linear regression, logistic regression, and neural networks.

Q)Write the formula for parameter updates in gradient descent:

A)for each parameter 0 j (where j indexes the parameters:

0j = 0j -alpha . dj0

d0j

0j the j-th parameter(e.g coefficient in linear regression

Alpha is learning rate

j(0): cost function (e.g mean squared error).

dj(0): partial derivation of the cost with respect to 0j (i.e ,the gradient).

Q)What is the role of learning rate in Gradient descent?

A)The learning rate alpha is critical:

* If alpha is too small, convergence will be slow.
* If al[ha is too large, the algorithm may overshoot the minimum ,falling to converge.

Q)What is the primary purpose of regulation in machine learning models:

A) To prevent overfitting by penalizing model complexity.

Q)What happens if the learning rate is too short or too large?

A)Too short:

* Very slow convergence.
* Wasted time and computation.

If the learning rate is too large:

* Overshoot
* Oscillate

Q)Defined Bias and variance in the context of machine learning?

A)BIAS is the error due to overly simplistic assumption in the learning algorithm

High bias: the model is too simple to capture the underlying patterns in the data.

Variance is the error due to sensitivity to small fluctuation in the training set.

High variance :the model fits the training data too closely.

Q)What is the bias -variance tradeoff?

A)It is the fundamental concept in machine learning that describes the tension between two sources of error -bias and variance -and how they affect a models generalization performance on unseen data.

Q)How does increasing the complexity of a model affect bias and variance?

A)Effect of increasing model complexity:

Complexity level bias variance Generalization:

A)low high low underfits

High low high overfit

Q)What is underfitting and overfitting in machine learning:

A)These are two common problems that arise when a model fail to generalize wel to unseen data.

Underfitting:occurs when a model is too simple to capture the underlying structure of the data.

Overfitting:occurs when a model is too complex and learns noise or irrelevant patterns in the training data.

Q)How can you reduce overfitting in a model?

A)Simplify the model

Regularization

Q)use more Trainnig data

. Overfitting often happenes when the model is complex but the dataset is smal