SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT 2 –DATA ANALYTICS

LINEAR & LOGISTIC REGRESSION

LINEAR & LOGISTIC REGRESSION

Linear regression and logistic regression are two fundamental statistical techniques used in data analysis and machine learning. They are both used for modeling relationships between variables, but they serve different purposes and are applied to different types of problems. Here's an overview of linear regression and logistic regression:

Linear Regression:

Purpose:

1. Linear regression is used for predicting a continuous dependent variable based on one or more independent variables.

Objective:

1. The objective is to find the coefficients that minimize the sum of squared differences between the observed and predicted values (Ordinary Least Squares method).

Assumptions:

1. Linearity: The relationship between variables is linear.
2. Independence: The residuals (the differences between observed and predicted values) are independent.
3. Homoscedasticity: The variance of residuals is constant across all levels of the independent variable(s).
4. Normality: The residuals are normally distributed.

Evaluation:

•Performance is often evaluated using metrics such as Mean Squared Error (MSE) or R-squared.

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Logistic Regression:

1.Purpose:

1. Logistic regression is used for binary classification problems, predicting the probability that an instance belongs to a particular class.

2.Objective:

1. The objective is to find the coefficients that maximize the likelihood of observing the given set of outcomes.

3.Assumptions:

1. The log-odds of the dependent variable is a linear combination of the independent variables.
2. The relationship between the independent variables and the log-odds is linear.

4.Evaluation:

1. Performance is often evaluated using metrics such as accuracy, precision, recall, and the area under the Receiver Operating Characteristic (ROC) curve.

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Key Differences:

1.Output:

1. Linear regression predicts a continuous output (e.g., price, temperature).
2. Logistic regression predicts the probability of an event occurring (binary outcome: 0 or 1).

2.Equation Form:

1. Linear regression has a simple linear equation.
2. Logistic regression uses a logistic function to model probabilities.

3.Nature of Dependent Variable:

1. Linear regression deals with a continuous dependent variable.
2. Logistic regression deals with a binary or categorical dependent variable.

4.Evaluation Metrics:

1. Linear regression uses metrics like Mean Squared Error (MSE) or R-squared.
2. Logistic regression uses classification metrics like accuracy, precision, recall, and the ROC curve.

5.Application:

1. Linear regression is used for regression problems (predicting a numerical value).
2. Logistic regression is used for binary classification problems.