
Regression

# Regression Analysis

Regression analysis is a statistical technique used to model and analyze the relationship between a dependent variable (or target) and one or more independent variables (or predictors). Regression analysis is a mathematical approach that helps us to identify the variables that truly influence a situation.

It addresses essential questions:

- Which factors are the most significant?
- Which ones can be disregarded?
- How do these factors interrelate?
- Moreover, it allows us to determine the level of confidence associated with these variables

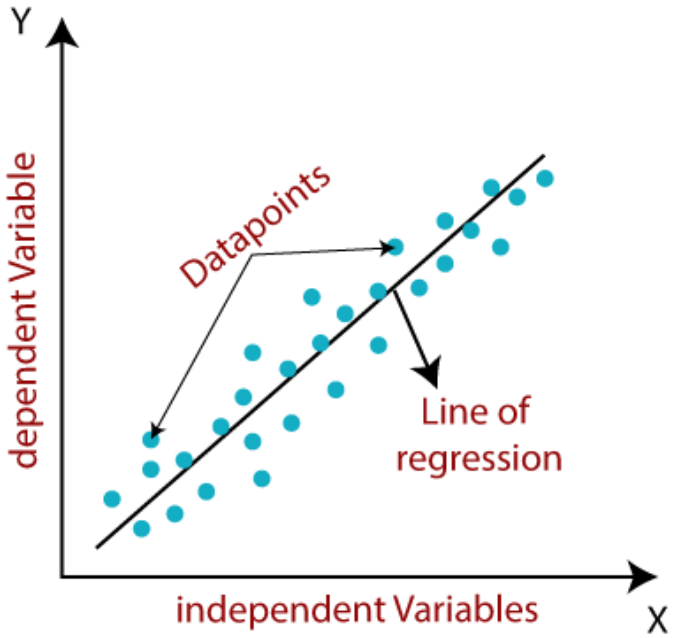
# Types of Regression Analysis

Here are some common types of regression analysis based on different types of relationships and modeling scenarios

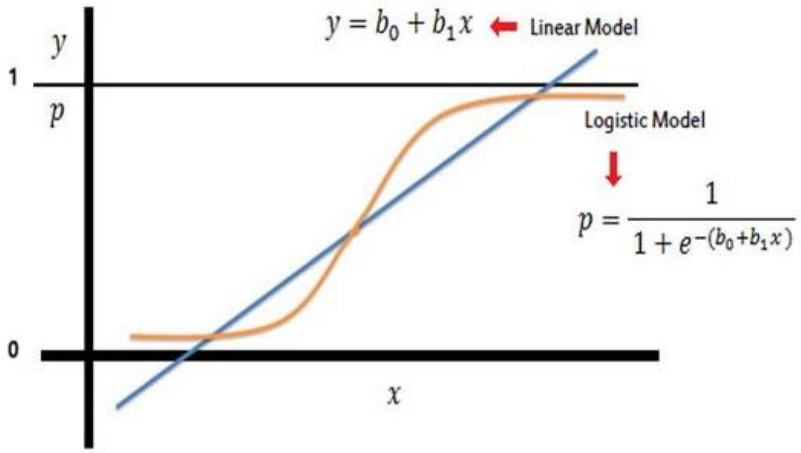
1. Linear Regression
2. Logistic Regression
3. Polynomial Regression
4. Ridge Regression
5. Lasso Regression
7. Ordinal Regression
8. Poisson Regression
9. Time Series Regression
10. Quantile Regression
11. Nonlinear Regression

# Linear Regression

**Linear regression** is used when the relationship between the dependent variable and the independent variables is linear. It's the most basic and widely used form of regression analysis.



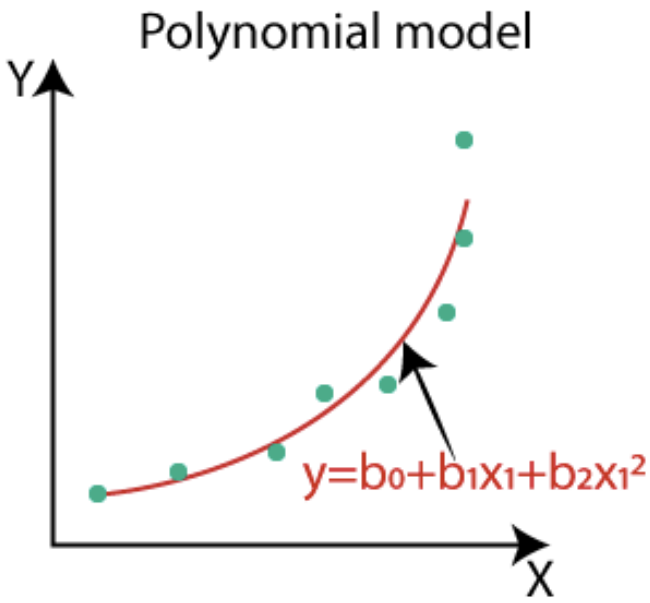
# Logistic Regression




**Logistic Regression:** Logistic regression is used when the dependent variable is binary or categorical, representing a probability of one of two outcomes. It's commonly used for classification tasks and estimating probabilities.

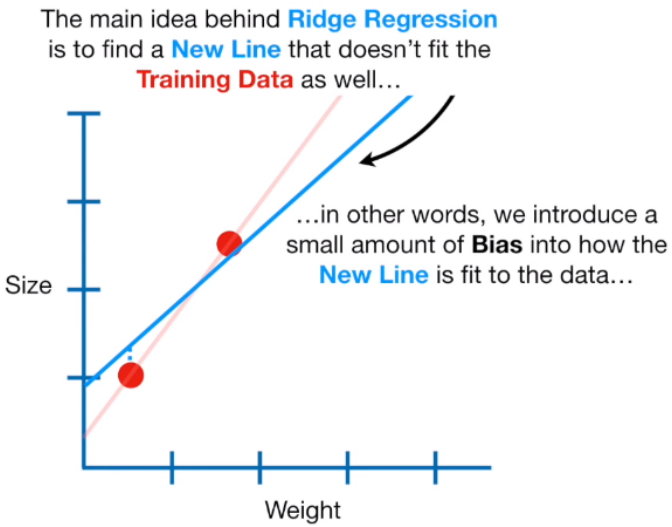
# Polynomial Regression

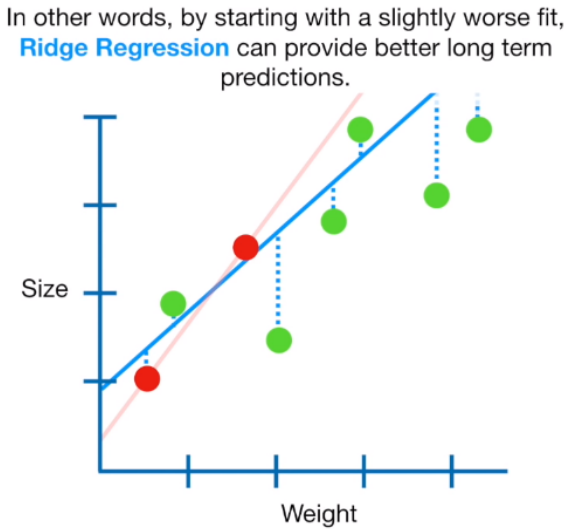
**Polynomial regression** is an extension of linear regression that models the relationship between variables as a polynomial equation. It's used when a linear relationship is not sufficient to capture the underlying patterns in the data.



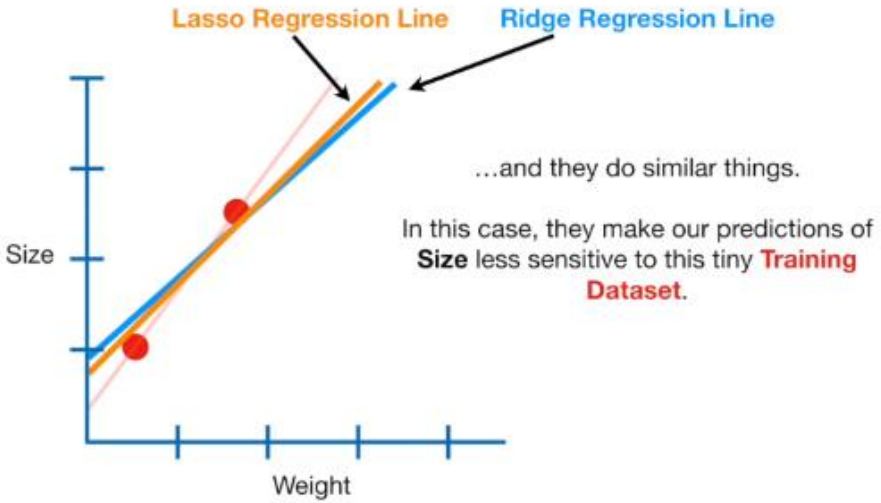
# Ridge Regression

**Ridge regression** is a form of linear regression that includes L2 regularization to prevent overfitting. It's used when multicollinearity (high correlation between independent variables) is present.



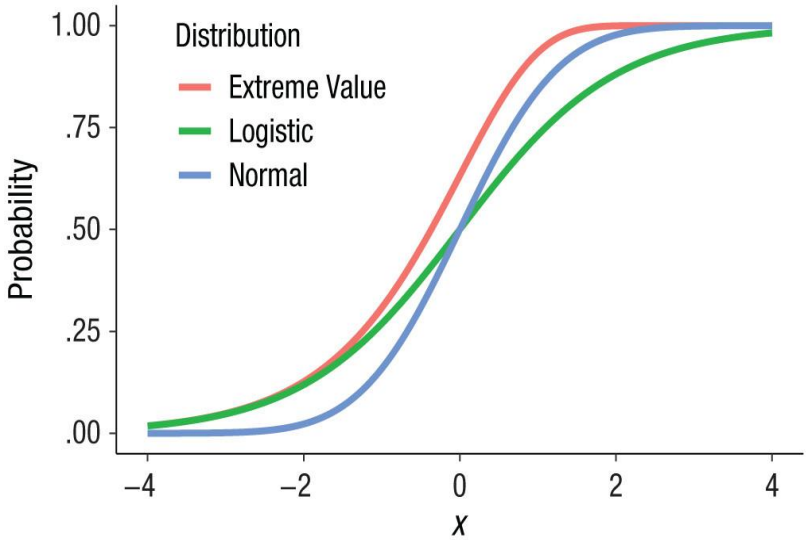
# Lasso Regression



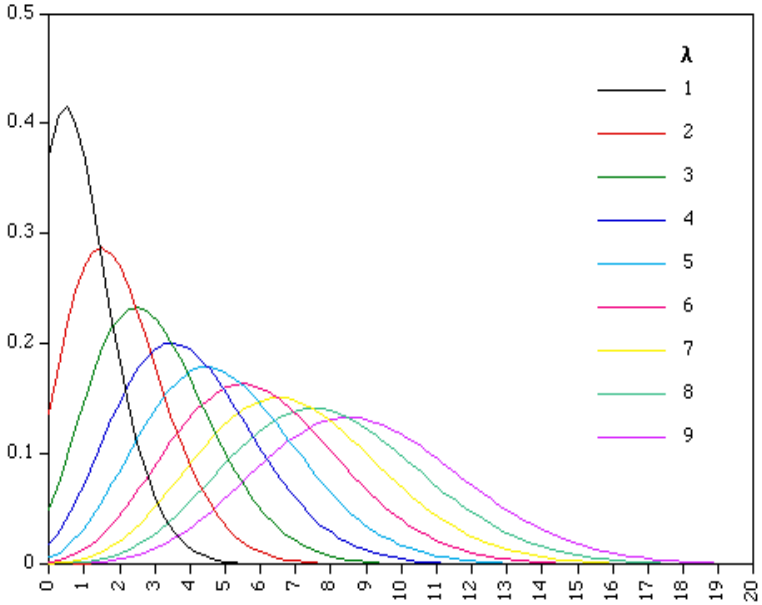

**Lasso regression** is similar to ridge regression but uses L1 regularization. It's often used for feature selection and can drive some regression coefficients to zero, effectively selecting a subset of important features.

# Ordinal Regression

**Ordinal regression** is used when the dependent variable is ordinal, meaning it has ordered categories but the exact numerical difference between the categories is not defined.



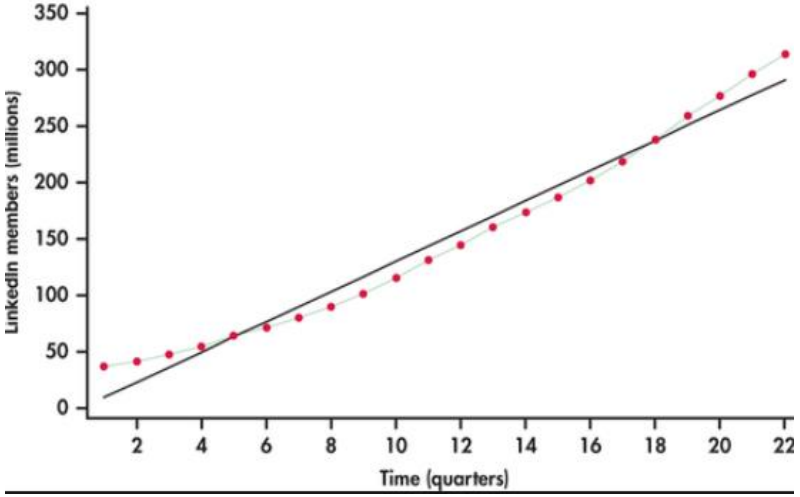
# Poisson Regression



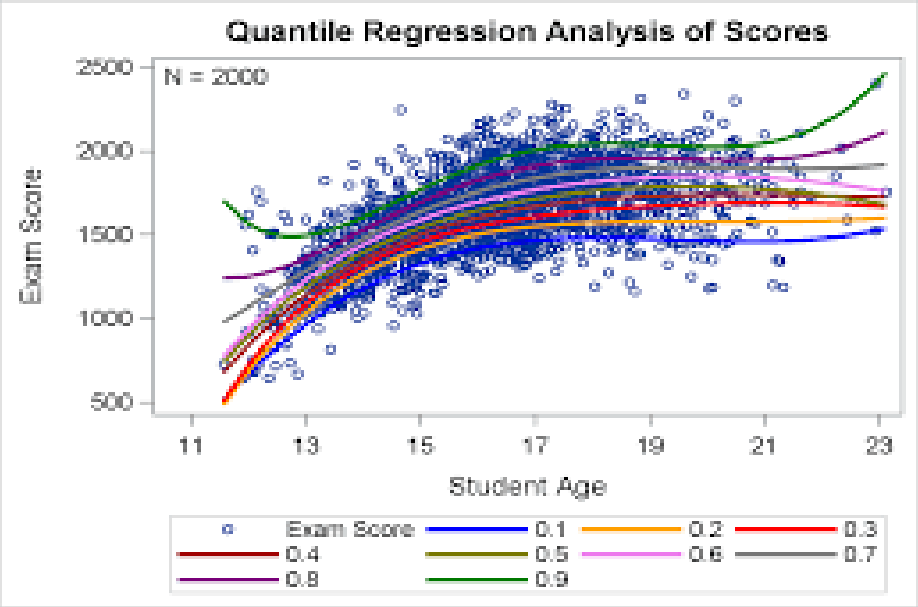

**Poisson regression** is used when the dependent variable represents count data and follows a Poisson distribution, such as the number of events or occurrences.

# Time Series Regression

**Time series regression** is used when the data is collected over time, and the goal is to model and forecast time-dependent patterns and trends.



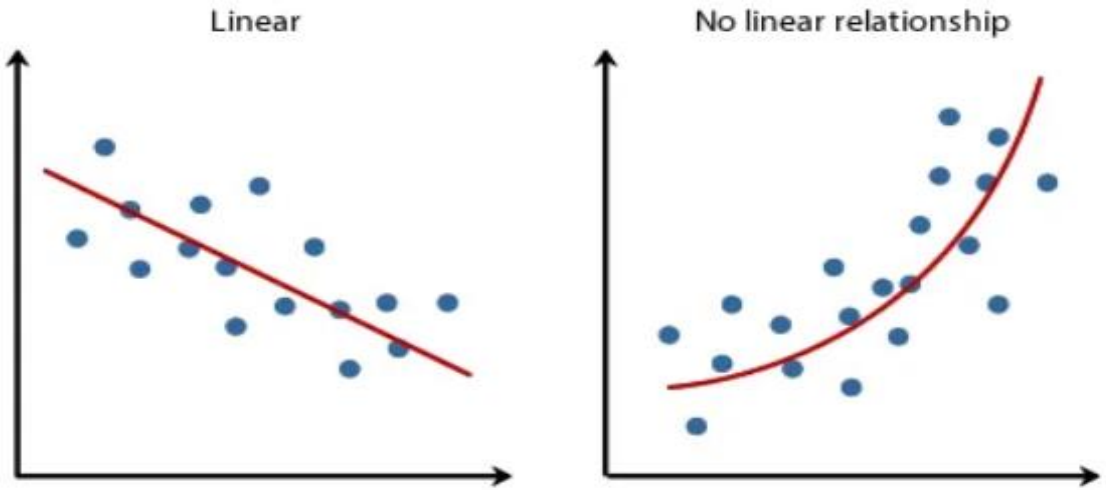
# Quantile Regression




**Quantile regression** allows you to estimate different quantiles of the dependent variable, not just the mean, making it useful for analyzing data with heteroscedasticity.

# Non-linear Regression

**Non-linear regression** is used when the relationship between variables is non-linear. It can involve various types of nonlinear functions and modeling techniques.



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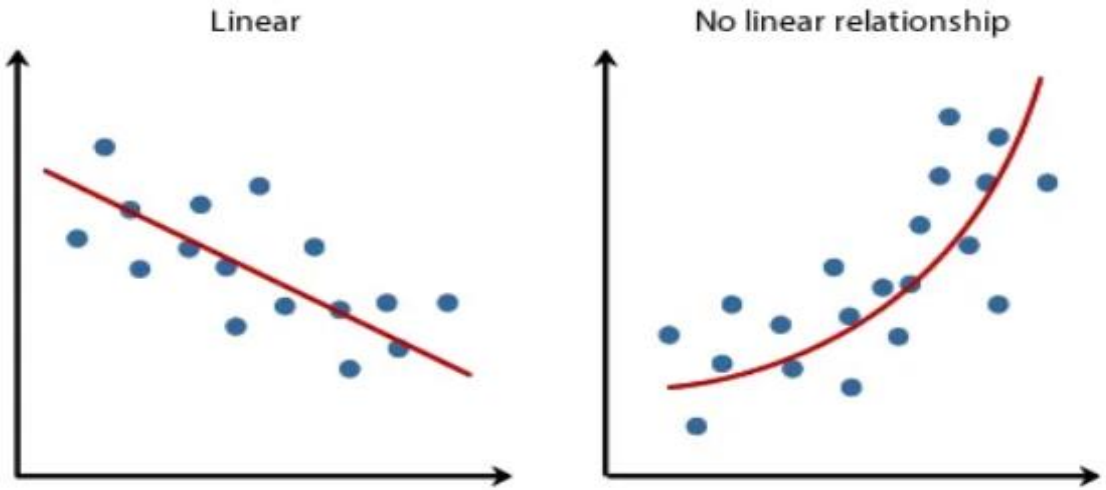

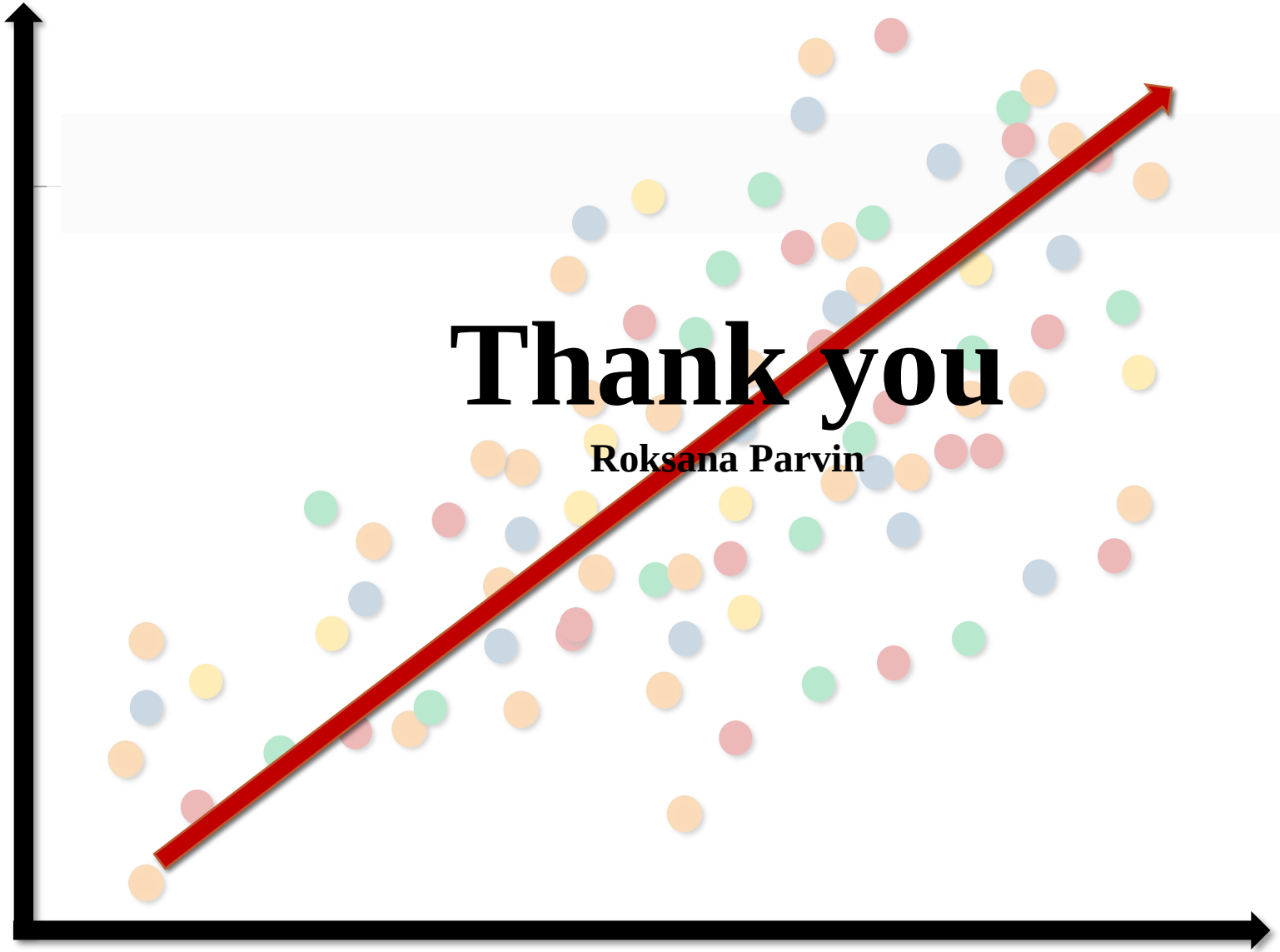

# Thank you

**Roksana Parvin**