

## Spark By {Examples} (https://sparkbyexamples.com/)

[Join for Ad Free \(https://sparkbyexamples.com/membership-account/membership-levels/\)](https://sparkbyexamples.com/membership-account/membership-levels/)

[Spark ▼ \(https://sparkbyexamples.com/\)](https://sparkbyexamples.com/) [PySpark \(https://sparkbyexamples.com/pyspark-tutorial/\)](https://sparkbyexamples.com/pyspark-tutorial/)

[Pandas \(https://sparkbyexamples.com/python-pandas-tutorial-for-beginners/\)](https://sparkbyexamples.com/python-pandas-tutorial-for-beginners/) [R ▼ \(https://sparkbyexamples.com/r-tutorial-with-examples/\)](https://sparkbyexamples.com/r-tutorial-with-examples/)

[Hive \(https://sparkbyexamples.com/apache-hive-tutorial/\)](https://sparkbyexamples.com/apache-hive-tutorial/)

[Snowflake \(https://sparkbyexamples.com/snowflake-data-warehouse-database-tutorials/\)](https://sparkbyexamples.com/snowflake-data-warehouse-database-tutorials/)

[FAQ ▼ \(https://sparkbyexamples.com/spark/apache-spark-interview-questions/\)](https://sparkbyexamples.com/spark/apache-spark-interview-questions/) [Tutorials ▼ \(https://sparkbyexamples.com/\)](https://sparkbyexamples.com/)

[Log In \(https://sparkbyexamples.com/login/\)](https://sparkbyexamples.com/login/)  [\(https://sparkbyexamples.com/#\)](https://sparkbyexamples.com/#)

# Difference Between Linear Regression and Polynomial Regression

 Narender Kumar

(<https://sparkbyexamples.com/author/narenderbeniwal1234gmail-com/>). -

 Machine Learning.

(<https://sparkbyexamples.com/category/machine-learning/>). -

 November 15, 2023 -  8 mins read

## Difference Between Linear Regression and Polynomial Regression

---

Explain the difference between linear regression and polynomial regression. Regression analysis is a statistical tool that is used to examine the relationship between a dependent variable and one or more independent variables. Linear regression is one of the most widely used regression techniques that assumes a linear relationship between the dependent and independent variables. However, when the relationship between the variables is not linear, polynomial regression is used. In this article, we will discuss the key differences between polynomial regression and linear regression.

## 1. Polynomial Regression:

[Polynomial regression \(https://sparkbyexamples.com/machine-learning/polynomial-regression-with-examples/\)](https://sparkbyexamples.com/machine-learning/polynomial-regression-with-examples/) is a type of regression analysis that is used when the relationship between the dependent and independent variables is not linear. It involves fitting a polynomial function to the data points to obtain a curve that represents the relationship between the variables.

The equation for a polynomial regression model can be written as:

$$Y = a + b_1X + b_2X^2 + \dots + b_nX^n$$

The goal of polynomial regression is to find the best fit curve that represents the relationship between the variables. This curve is obtained by minimizing the sum of the squared residuals between the predicted values and the actual values.

## 2. Linear Regression:

[Linear regression \(https://sparkbyexamples.com/machine-learning/linear-regression-with-examples/\)](https://sparkbyexamples.com/machine-learning/linear-regression-with-examples/) is a statistical technique used to find the linear relationship between a dependent variable and one or more independent variables. It is based on the assumption that there exists a linear relationship between the variables, and it uses a straight line to represent this relationship. The equation for a simple linear regression model can be written as:

$$Y = a + bX$$

Where Y is the dependent variable, X is the independent variable, a is the intercept and b is the slope of the line.

The goal of linear regression is to find the best fit line that represents the relationship between the variables. This line is obtained by minimizing the sum of the squared residuals

between the predicted values and the actual values.

### 3. Difference between Linear Regression and Polynomial Regression

Here are the 15 key differences between Linear Regression and Polynomial Regression:

FEATURE	LINEAR REGRESSION	POLYNOMIAL REGRESSION
Linearity	Assumes linear relationship between dependent and independent variables	Does not assume linear relationship
Equation	Uses a straight line equation to represent the relationship between variables	Uses a polynomial equation to represent the relationship



FEATURE	LINEAR REGRESSION	POLYNOMIAL REGRESSION
Complexity	Simple, only involves fitting a straight line	More complex, involves fitting a polynomial function
Degree of polynomial	N/A	The degree of polynomial determines the complexity of the curve
Overfitting	Less prone to overfitting	Prone to overfitting
Assumptions	Assumes residuals are normally distributed	Assumes residuals are randomly distributed
Interpretability	Easy to interpret	Difficult to interpret due to meaningless coefficients
Data Points	Suitable for few data points	Suitable for many data points
Extrapolation	Suitable for extrapolation	Not suitable for extrapolation
Computation	Quick computation	Requires more computation power
Accuracy	Less accurate in modeling non-linear relationships	More accurate in modeling non-linear relationships
Non-linear relationships	Not suitable for modeling non-linear relationships	Suitable for modeling non-linear relationships

FEATURE	LINEAR REGRESSION	POLYNOMIAL REGRESSION
Goodness of Fit	Provides a good fit for linear relationships	Provides a better fit for non-linear relationships
Sensitivity to outliers	Less sensitive to outliers	More sensitive to outliers
Application	Used for continuous dependent variables with linear relationships	Used for non-linear relationships between variables

Difference between Linear Regression and Polynomial Regression

## 4. Conclusion:

Linear regression and polynomial regression are both important regression techniques used in data analysis. While linear regression is appropriate for modeling linear relationships between variables, polynomial regression is used for modeling non-linear relationships. Choosing the appropriate regression model depends on the nature of the data and the research question being investigated. It is important to choose the correct model to ensure accurate results and effective decision-making.

## Related Articles

- [Data science vs Data Analysis Explained](https://sparkbyexamples.com/machine-learning/data-science-vs-data-analysis-explained/)
- [Data Science Vs Machine Learning](https://sparkbyexamples.com/machine-learning/data-science-vs-data-analysis-explained/)

[science-vs-machine-learning/](#)

- [Classification in Machine Learning](#)  
(<https://sparkbyexamples.com/machine-learning/classification-in-machine-learning/>)
- [Exploring Machine Learning Datasets](#)  
(<https://sparkbyexamples.com/machine-learning/exploring-machine-learning-datasets/>)
- [Machine Learning Applications](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-applications/>)
- [Machine Learning Features](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-features/>)
- [Natural Language Processing\(NLP\) with Machine Learning](#)  
(<https://sparkbyexamples.com/machine-learning/natural-language-processingnlp-with-machine-learning/>)
- [Machine Learning in Healthcare](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-in-healthcare/>)
- [Machine Learning Tools](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-tools/>)
- [Machine Learning in Finance](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-in-finance/>)
- [Machine Learning Pipeline](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-pipeline/>)
- [Machine Learning Frameworks](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-frameworks/>)
- [Difference Between Linear Regression and Logistic Regression](#) (<https://sparkbyexamples.com/machine-learning/difference-between-linear-regression-and-logistic-regression/>)
- [Entropy In Machine Learning](#)  
(<https://sparkbyexamples.com/machine-learning/entropy-in->



[machine-learning/](#)

- [Gradient Descent In Machine Learning](#)  
(<https://sparkbyexamples.com/machine-learning/gradient-descent-in-machine-learning/>)
- [Hyperparameter Tuning In Machine Learning](#)  
(<https://sparkbyexamples.com/machine-learning/hyperparameter-tuning-in-machine-learning/>)
- [Machine Learning Introduction](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-introduction/>)
- [Machine Learning Life Cycle](#)  
(<https://sparkbyexamples.com/machine-learning/machine-learning-life-cycle/>)
- [Artificial Intelligence vs Machine Learning vs Deep Learning](#)  
(<https://sparkbyexamples.com/machine-learning/the-difference-between-artificial-intelligence-machine-learning-and-deep-learning/>)

## Leave a Reply

Your comment here...

Name (required)

Email (required)

☐

Save my name, email, and website in this browser for the next time I comment.

POST COMMENT

### ■ Top Tutorials

Apache Spark Tutorial  
(<https://sparkbyexamples.com/>)

PySpark Tutorial  
(<https://sparkbyexamples.com/pyspark-tutorial/>)

Python Pandas Tutorial  
(<https://sparkbyexamples.com/python-pandas-tutorial-for-beginners/>)

R Programming Tutorial  
(<https://sparkbyexamples.com/r-tutorial-with-examples/>)

Python NumPy Tutorial  
(<https://sparkbyexamples.com/python-numpy-tutorial-for-beginners/>)

Apache Hive Tutorial  
(<https://sparkbyexamples.com/apache-hive->

### ■ Categories

Apache Spark  
(<https://sparkbyexamples.com/category/spark/>)

PySpark  
(<https://sparkbyexamples.com/category/pyspark/>)

Pandas  
(<https://sparkbyexamples.com/category/pandas/>)

R Programming  
(<https://sparkbyexamples.com/category/r-programming/>)

Snowflake Database  
(<https://sparkbyexamples.com/category/snowflake/>)

NumPy  
(<https://sparkbyexamples.com/category/nu>

### ■ Legal

Privacy Policy  
(<https://sparkbyexamples.com/privacy-policy/>)

Refund Policy  
(<https://sparkbyexamples.com/refund-policy/>)

Terms of Use  
(<https://sparkbyexamples.com/terms-of-use/>)

### ■ About SparkByExamples.Com

SparkByExamples is made for learning and training in Big Data, Machine learning and Artificial Intelligence. Our tutorials are written and curated by experts with simple examples to help you understand better.

When you use SparkByExamples, you agree to have read and accepted our terms of use (<https://sparkbyexamples.com/terms-of-use/>), and privacy policy (<https://sparkbyexamples.com/privacy-policy/>).



tutorial/)

## Apache HBase Tutorial

(<https://sparkbyexamples.com/apache-hbase-tutorial/>)

## Apache Cassandra Tutorial

(<https://sparkbyexamples.com/apache-cassandra-tutorials-with-examples/>)

# Apache Kafka Tutorial

(<https://sparkbyexamples.com/apache-kafka-tutorials-with-examples/>)

# Snowflake Data Warehouse Tutorial

(<https://sparkbyexamples.com/snowflake-data-warehouse-database-tutorials/>)

## H2O Sparkling Water Tutorial

(<https://sparkbyexamples.com/h2o-sparkling-water-tutorial-beginners/>)

mpy/)

## Apache Hive

(<https://sparkbyexamples.com/category/apache-hive/>)

## Apache HBase

(<https://sparkbyexamples.com/category/hbase/>)

## Apache Kafka

(<https://sparkbyexamples.com/category/kafka/>)

## Apache Cassandra

(<https://sparkbyexamples.com/category/cassandra/>)

H2O Sparkling Water

(<https://sparkbyexamples.com/category/h2o-sparkling-water/>)



(https



://ww

(https  w.link 

://ww (https edin. (https 

w.fac ://inst com/ ://pint (https

eboo agra comp erest. ://twit

k.co m.co any/s com/ ter.co

m/sp m/sp parkb spark m/sp

arkby arkby yexa byex arkby

exam exam mple ampl exam

ples) ples) s/) es) ples)



info@sparkbyexamples.com

(mailto:info@sparkbyexamples.com)

+1 (949) 345-0676 (tel:+19493450676)

## Desert Bloom

Irvine, CA 92618

USA

