

# Linear Regression

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# Agenda

What is Regression?

Uses of Regression

Linear vs Logistic Regression

Linear Regression

The Bibliography

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# What is Regression?

- Regression analysis is a form of predictive modelling technique which investigates the relationship between a dependent and independent variable

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# Uses of Regression

Three major uses for regression analysis are

- 1 Determining the strength of predictors
- 2 Forecasting an effect, and
- 3 Trend forecasting

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# Linear vs Logistic Regression

	Basis	Linear Regression	Logistic Regression
<b>Core Concept</b>		The data is modelled using a straight line	The probability of some obtained event is represented as a linear function of a combination of predictor variables
<b>Used with</b>		Continuous Variables	Categorical Variable
<b>Output/Prediction</b>		Value of the variable	Probability of occurrence of event
<b>Accuracy and Goodness of fit</b>	Measured by loss, R squared, Adjusted R squared etc.	Accuracy, Precision, Recall, F1 score, ROC curve, Confusion Matrix, etc.	



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# Linear Regression

It is the basic and used type for predictive analysis. It is a statistical approach to modeling the relationship between a **dependent** variable and a give set of **independent** variables.

## Example: Whine Quality

$$\begin{aligned} \text{quality} = & m_1 \times \text{fixedAcidity} + m_2 \times \text{VolatileAcidity} + m_3 \times \\ & \text{CitricAcid} + m_4 \times \text{ResidualSugar} + m_5 \times \text{Chlorides} + m_6 \times \\ & \text{FreeSulfurDioxide} + m_7 \times \text{TotalSulfurDioxide} + m_8 \times \text{Density} + \\ & m_9 \times \text{pH} + m_{10} \times \text{Sulphates} + m_{10} \times \text{Alcohol} \end{aligned}$$

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National Institute of Standards and Technology

*NIST* Available from World Wide Web: <https://www.nist.gov/>.



David Clifte da Silva Vieira e Renata Passos Machado

Abordagem a um classificador de dígitos manuscritos baseado em redes neurais.

*VIICONNEPI* - Congresso Norte Nordeste de Pesquisa e Inovação.



Patrick J. Grother, Visual Image Processing Group, Advanced Systems Division.

Handprinted Forms and Characters Database

*NIST* - National Institute of Standards and Technology.



MNIST data base.

Sample Images from MNIST test dataset.

*MNIST* Available from World Wide Web:

[https://en.wikipedia.org/wiki/MNIST\\_database](https://en.wikipedia.org/wiki/MNIST_database).