

# FEATURE SCALING



Scaling

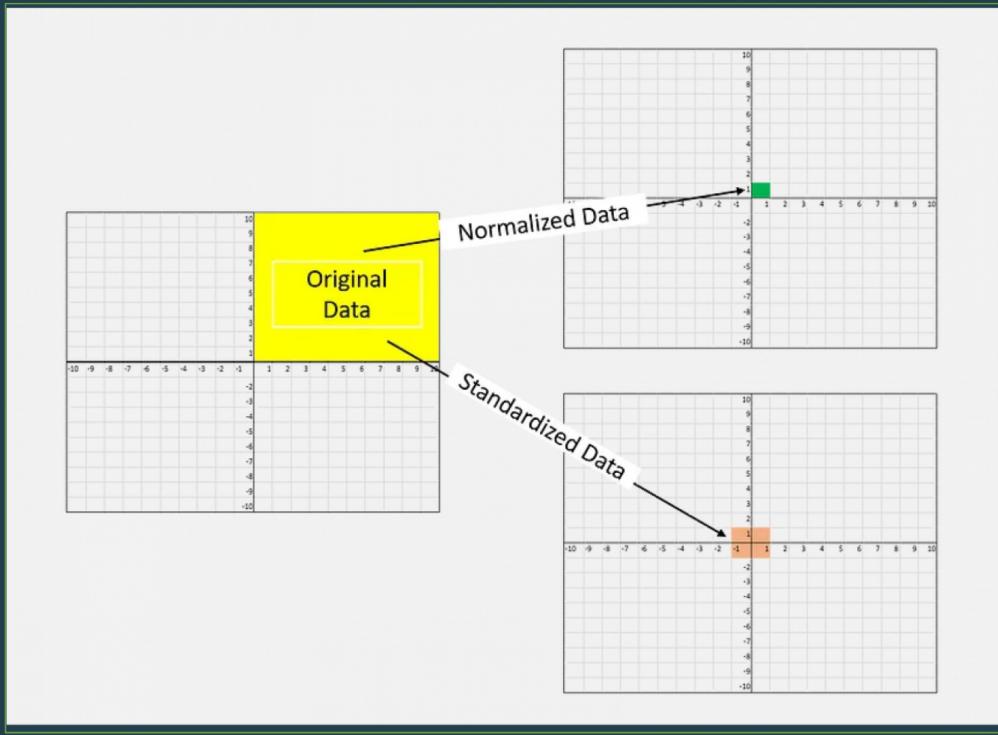


# Feature Scaling

Feature scaling is a technique used in Machine Learning to standardize or normalise the range of features in a dataset.

It is essential when working with algorithms that are sensitive to the scale of input features.

it helps to bring all features to a similar range and prevents certain features from dominating the others



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# Methods Of Feature Scaling

- 1) Standardisation  
(Z-score  
normalisation)
- 2) Min-max scaling  
(Normalisation)
- 3) Max Abs Scaling
- 4) Robust Scaling

# Standardisation

Also called as Z-score normalisation, scales the features to have mean of 0 and standard deviation of 1

Calculated by the formula

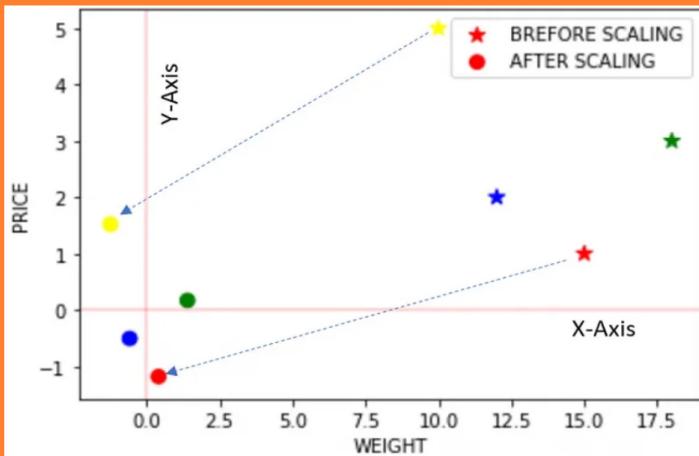
$$x_{scaled} = \frac{x - \mu}{\sigma}$$

$\sigma$  - Standard Deviation

$\mu$  - Mean

This suitable when distribution of features is approx Gaussian or when algorithm assumes zero-centered features

## Before and after scaling



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# Min-max scaling

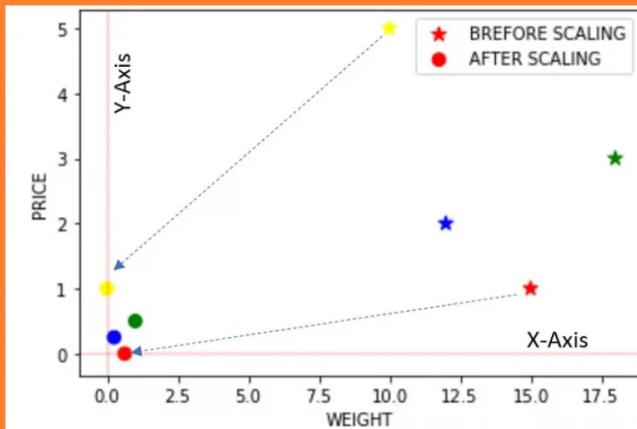
Also called as normalisation, scales the features to a fixed range usually between 0 and 1

Calculated by the formula

$$x_{scaled} = \frac{x}{\max(\text{abs}(x))}$$

This scaling preserves original distribution and is suitable when distribution is not Gaussian

## Before and after scaling



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# Max Abs Scaling

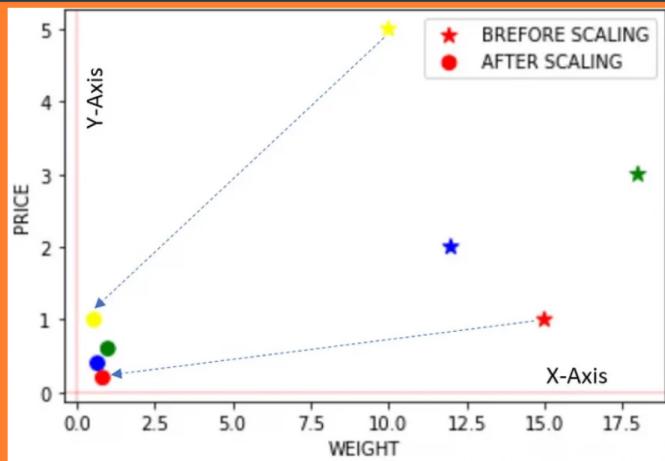
This scales features to the range [-1,1] by dividing each value by max absolute value in feature.

Calculated by the formula

$$x_{scaled} = \frac{x - \min(x)}{\max(x) - \min(x)}$$

This scaling is useful when features have a mix of both positive and negative values and you want to preserve sign.

## Before and after scaling



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# Robust Scaling

Scales features using statistics that are robust to outliers.

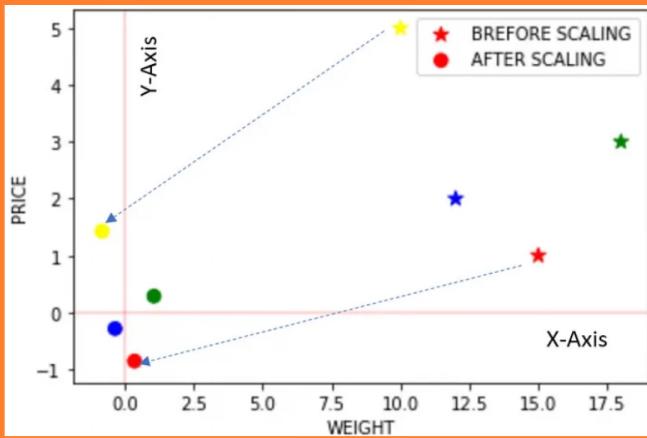
Calculated by the formula

$$x_{scaled} = \frac{x - median(x)}{IQR(x)}$$

IQR - Inter Quartile Range

This scaling is suitable when dataset contains outliers and when distribution of features is skewed.

## Before and after scaling



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