

Correlation

Overview

Correlation is a statistical measure that describes the relationship between two variables, indicating how strongly they are associated and in what direction. A positive correlation means variables move together, while a negative correlation means they move in opposite directions. Correlation is expressed by a coefficient between -1 and +1, where 0 indicates no relationship, and ± 1 signifies a perfect relationship.

The generalised correlation coefficient Γ is defined as $\Sigma xy / \sqrt{\{\Sigma x^2 \Sigma y^2\}}$

Pearson

Pearson's **product-moment correlation coefficient** (PMCC) is a statistical measure, denoted by 'r', that quantifies the strength and direction of a **linear** relationship between two **normally distributed** continuous variables.

Spearman

Spearman's **correlation coefficient** ρ is a nonparametric (*makes no assumptions about the distribution of the data*) statistical measure that assesses the strength and direction of a monotonic (*either continuously increasing or decreasing*) relationship between two variables. Spearman's correlation works with ordinal data or continuous data.

The Spearman correlation between two variables is equal to the Pearson correlation between the rank values of those two variables;

Kendall (not in Intermediate syllabus)

Kendall's correlation coefficient, τ , is another non-parametric measure and can be used to explore correlation between two ordinal variables including categorical data where the categories have a meaningful ranking. It splits the data into concordant and discordant pairs. Kendall showed that τ and ρ are particular cases of the general correlation coefficient.

Coefficient of Determination (not in Intermediate syllabus)

The coefficient, denoted r^2 , is the proportion of the variation in the dependent variable that is predictable from the independent variable. For **linear cases only** it is the square of the correlation coefficient. $\propto rg$

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