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# STATISTICS

Statistics is the study of data. It is the science of collecting, organizing, analyzing, and interpreting data.

## BASIC DEFINITIONS

**STATISTICS** is the study of data. It is the science of collecting, organizing, analyzing, and interpreting data.

**POPULATION** is the entire group of individuals being studied. It is the set of all possible values of a variable.

**SAMPLE** is a subset of the population. It is the group of individuals that are actually studied.

**PARAMETER** is a statistical measure that describes a population. It is a fixed value that does not change.

**STATISTIC** is a statistical measure that describes a sample. It is a value that can change from sample to sample.

**MEAN** is the average of a set of numbers. It is the sum of the numbers divided by the number of numbers.

**MEDIAN** is the middle number of a set of numbers. It is the number that separates the higher half from the lower half of a data set.

**MODE** is the number that appears most often in a set of numbers. It is the value that has the highest frequency.

**RANGE** is the difference between the highest and lowest values in a set of numbers. It is the spread of the data.

**VARIATION** is the difference between individual values in a set of numbers. It is the spread of the data.

**MEASURES OF CENTRAL TENDENCY** are statistical measures that describe the center of a distribution. They include the mean, median, and mode.

**MEASURES OF VARIATION** are statistical measures that describe the spread of a distribution. They include the range, standard deviation, and variance.

**MEASURES OF POSITION** are statistical measures that describe the location of a value in a distribution. They include the percentile, decile, and quartile.

**MEASURES OF SKWENESS** are statistical measures that describe the shape of a distribution. They include the skewness coefficient and the kurtosis coefficient.

**MEASURES OF ASSOCIATION** are statistical measures that describe the relationship between two variables. They include the correlation coefficient and the chi-square test.

**MEASURES OF INDEPENDENCE** are statistical measures that describe the relationship between two variables. They include the chi-square test and the Fisher's exact test.

## FREQUENCY DISTRIBUTION

**Frequency Distribution** is a table that shows the frequency of each value of a variable. It is a summary of the data.

**Class Interval** is the range of values in a frequency distribution. It is the difference between the upper and lower limits of a class.

**Class Mark** is the midpoint of a class interval. It is the average of the upper and lower limits of a class.

**Relative Frequency** is the ratio of the frequency of a class to the total frequency. It is the proportion of the total that belongs to a class.

**Cumulative Frequency** is the sum of the frequencies of all classes up to a given class. It is the total frequency of all values less than or equal to the upper limit of a class.

**Graphical Representation** is a visual representation of a frequency distribution. It includes bar graphs, line graphs, and pie charts.

**Normal Distribution** is a probability distribution that is symmetric and bell-shaped. It is the most common type of distribution.

**Standard Deviation** is a measure of the spread of a distribution. It is the square root of the variance.

**Variance** is a measure of the spread of a distribution. It is the square of the standard deviation.

**Correlation Coefficient** is a measure of the strength of the relationship between two variables. It ranges from -1 to 1.

**Chi-Square Test** is a statistical test that is used to determine if there is a significant difference between the observed and expected frequencies.

**Fisher's Exact Test** is a statistical test that is used to determine if there is a significant difference between the observed and expected frequencies.

**Logistic Regression** is a statistical model that is used to predict the probability of a binary outcome.

**Linear Regression** is a statistical model that is used to predict the value of a continuous variable.

**Multiple Regression** is a statistical model that is used to predict the value of a continuous variable.

**Nonlinear Regression** is a statistical model that is used to predict the value of a continuous variable.

## MEASURES OF DISPERSION

**Range** is the difference between the highest and lowest values in a set of numbers. It is the spread of the data.

**Standard Deviation** is a measure of the spread of a distribution. It is the square root of the variance.

**Variance** is a measure of the spread of a distribution. It is the square of the standard deviation.

**Coefficient of Variation** is a measure of the relative spread of a distribution. It is the standard deviation divided by the mean.

**Skewness Coefficient** is a measure of the asymmetry of a distribution. It is the third moment divided by the cube of the standard deviation.

**Kurtosis Coefficient** is a measure of the "tailedness" of a distribution. It is the fourth moment divided by the square of the variance.

**Normal Distribution** is a probability distribution that is symmetric and bell-shaped. It is the most common type of distribution.

**Standard Error** is a measure of the accuracy of a sample mean. It is the standard deviation divided by the square root of the sample size.

**Confidence Interval** is a range of values that is likely to contain the true value of a parameter. It is calculated from the sample mean and standard error.

**Hypothesis Testing** is a statistical test that is used to determine if there is a significant difference between the observed and expected frequencies.

**Significance Level** is the probability of rejecting the null hypothesis when it is true. It is denoted by the Greek letter alpha.

**Power of a Test** is the probability of rejecting the null hypothesis when it is false. It is denoted by the Greek letter beta.

**Effect Size** is a measure of the magnitude of a difference between two groups. It is denoted by the Greek letter f.

**Bayesian Statistics** is a statistical approach that uses Bayes' theorem to update the probability of a hypothesis as more evidence is gathered.

**Machine Learning** is a branch of artificial intelligence that focuses on the development of algorithms that can learn from data.

**Deep Learning** is a subset of machine learning that uses artificial neural networks to model complex patterns in data.

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