

Statistics for Data Analytics Guide PDF Page

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Meta Description (145 chars):

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Quick Answer

This page offers Uncodemy's statistics for data analytics guide as a PDF download. Analysts rely on a small set of ideas: measures of centre and spread, distributions, correlation, sampling, confidence and hypothesis testing. The guide explains each in plain language with simple examples and warns about common misreadings.

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Why analysts need statistics

Statistics is the discipline of drawing sensible conclusions from data that is incomplete, noisy and variable. Every real dataset has these qualities. A company sees sales for a few months, not for all time. A survey asks a few hundred customers, not every customer. Statistics gives analysts tools to describe what they see, to judge how much it might change if the data were collected again and to avoid telling stories from random noise. You do not need advanced mathematics to start, but you do need to understand a core set of ideas and to use them carefully.

Descriptive statistics: summarising data

Measure	What it tells you	Watch out for
Mean	The average value	Pulled by extreme values
Median	The middle value when sorted	Better for skewed data such as salaries or order values
Mode	The most common value	Useful for categories
Range	Maximum minus minimum	Depends only on two values
Variance and standard deviation	How spread out values are around the mean	Standard deviation is in the same units as the data
Quartiles and IQR	Spread of the middle half of the data	Used for box plots and outlier rules
Percentiles	The value below which a given share of data falls	Handy for service-level targets

Distributions and the normal curve

A distribution describes how often different values occur. Many natural measurements, such as heights, cluster around a centre and thin out symmetrically, forming the familiar bell-shaped normal distribution. In a normal distribution about 68 percent of values lie within one standard deviation of the mean and about 95 percent within two. But many business measures are not normal. Order values and incomes are usually right-skewed, with a long tail of large values. Always plot the data before assuming a shape, because many statistical methods behave differently when the data is strongly skewed.

Descriptive statistics in Python

A few lines that give the main summaries for a list of order values. The numbers are illustrative.

```
import statistics as st

orders = [450, 520, 480, 510, 495, 5200, 530, 470] # one very large order

print("mean  :", round(st.mean(orders), 1))
print("median :", st.median(orders))
print("stdev  :", round(st.stdev(orders), 1))
```

Correlation is not causation

Correlation measures how strongly two variables move together, from minus one for a perfect opposite relationship to plus one for a perfect same-direction relationship, with values near zero meaning no straight-line relationship. A high correlation can arise because one variable really affects the other, because both are affected by a third factor, or purely by chance. Ice cream sales and swimming accidents both rise in summer, but one does not cause the other. To claim causation you need evidence from a well-designed experiment or a careful causal argument, not just a correlation coefficient.

Sampling and why it matters

A sample is a subset of a population used to learn about the whole. A good sample is representative, which most reliably comes from random selection. A sample that systematically leaves out groups is biased, and no amount of extra data fixes bias. For example, an online feedback form reaches only people who choose to respond, who may differ from typical customers. The larger the random sample, the smaller the sampling error, but the improvement slows down: quadrupling a sample size only halves the typical error.

Hypothesis testing in plain language

A hypothesis test asks whether an observed difference is large enough that chance alone is an unlikely explanation. You begin with a null hypothesis, usually that there is no difference, and calculate how surprising your data would be if the null hypothesis were true. That surprise is the p-value. A small p-value, commonly below 0.05, suggests the data is hard to explain by chance alone, but it does not measure the size or importance of the effect and it is not the probability that the hypothesis is true. Always report the effect size and a confidence interval as well as the p-value.

Choosing a basic test

Situation	Common test
Compare the means of two groups	Two-sample t-test
Compare means of three or more groups	ANOVA
Test association between two categorical variables	Chi-square test
Measure relationship between two numeric variables	Correlation and regression

Common statistical mistakes in analytics

- **Using the mean on skewed data** when the median is more representative.
- **Reading a p-value as the chance the result is true.**
- **Testing many things and reporting only the significant ones**, which produces false discoveries.
- **Ignoring sample size**: a large percentage change from a tiny sample may mean nothing.
- **Confusing statistical significance with business importance.**

How to practise

Take a real dataset, compute its summaries by hand and with code, and write one paragraph describing what they say. Then run one simple test, such as comparing two groups, and explain the result without jargon to a non-technical colleague. Explaining clearly is the best sign you have understood.

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Frequently Asked Questions

What statistics should a data analyst know?

Key topics are mean, median and spread, distributions, correlation, sampling, confidence intervals and basic hypothesis tests such as t-tests and chi-square.

What is the difference between mean and median?

The mean is the arithmetic average and is affected by extreme values. The median is the middle value and is more representative for skewed data.

What does a p-value mean?

A p-value shows how surprising the data would be if the null hypothesis were true. It is not the probability that the hypothesis is true and does not measure effect size.

Does correlation mean causation?

No. Two variables can move together because of a third factor or by chance. Causation needs experimental or carefully argued evidence.

How much maths do I need for data analytics?

Basic arithmetic, percentages and the statistical ideas in this guide are enough to begin. More advanced topics can be added as your work requires them.

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