

What are the statistics behind quartiles and percentiles?

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Quartiles and percentiles are statistical measures that divide a dataset into groups or sections based on their position or rank within the dataset. Quartiles divide the dataset into four equal parts, while percentiles divide it into 100 equal parts. These measures are commonly used in data analysis to understand the distribution and variability of data. By calculating quartiles and percentiles, we can determine the range, spread, and central tendency of a dataset, making it easier to compare and interpret data. They are especially useful in identifying outliers and understanding the overall shape of a dataset. These statistical measures are widely used in various fields, such as finance, economics, and social sciences, to analyze and interpret data accurately.

Statistics - Quartiles and Percentiles

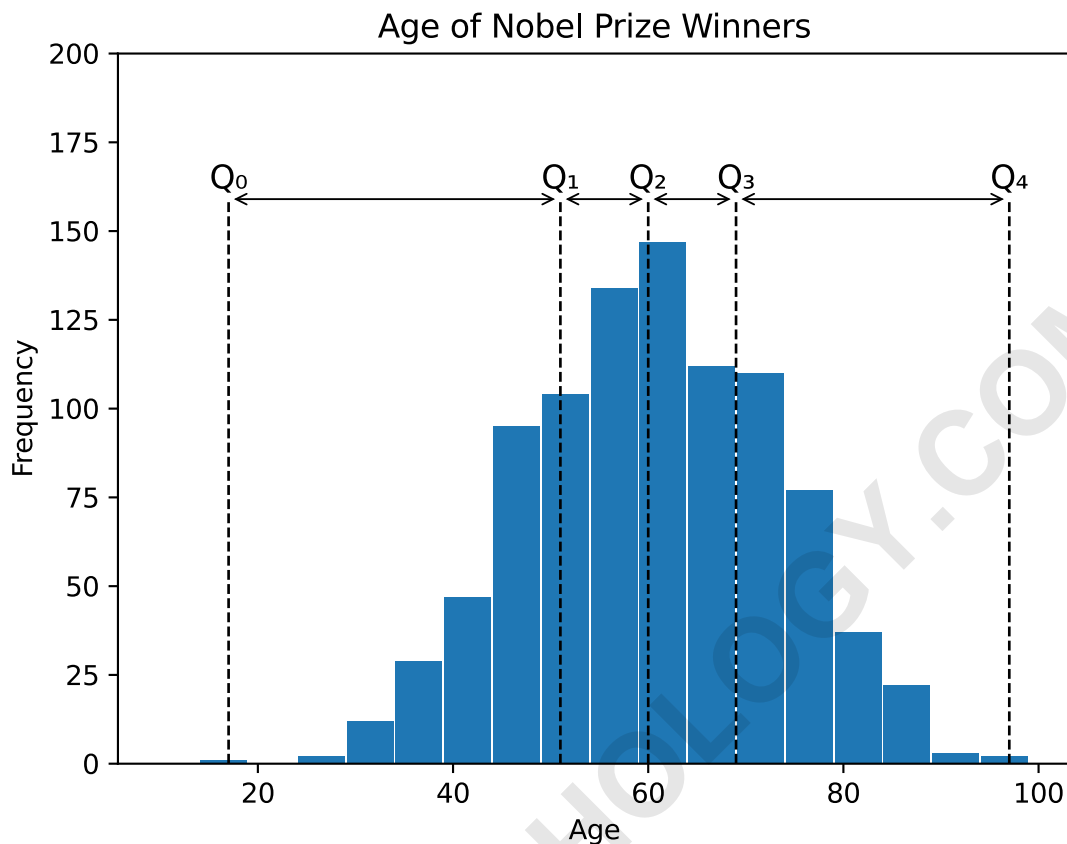
Quartiles and percentiles are measures of variation, which describes how spread out the data is.

Quartiles and percentiles are both types of **quantiles**.

Quartiles

Quartiles are values that separate the data into four equal parts.

Here is a histogram of the age of all 934 Nobel Prize winners up to the year 2020, showing the **quartiles**:



The quartiles (Q_0, Q_1, Q_2, Q_3, Q_4) are the values that separate each quarter.

Between Q_0 and Q_1 are the 25% lowest values in the data. Between Q_1 and Q_2 are the next 25%. And so on.

Q_0 is the smallest value in the data. Q_1 is the value separating the first quarter from the second quarter of the data. Q_2 is the middle value (median), separating the bottom from the top half. Q_3 is the value separating the third quarter from the fourth quarter. Q_4 is the largest value in the data.

Calculating Quartiles with Programming

Quartiles can easily be found with many programming languages.

Using software and programming to calculate statistics is more common for bigger sets of data, as finding it manually becomes difficult.

Example

With Python use the NumPy library `quantile()` method to find the quartiles of the values 13, 21,

21, 40, 42, 48, 55, 72:

```
import numpy
```

```
values =
```

```
x = numpy.quantile(values, )
```

```
print(x)
```

Example

Use the R `quantile()` function to find the quantiles of the values 13, 21, 21, 40, 42, 48, 55, 72:

```
values <- c(13,21,21,40,42,48,55,72)
```

```
quantile(values)
```

Percentiles

Percentiles are values that separate the data into 100 equal parts.

For example, The 95th percentile separates the lowest 95% of the values from the top 5%

The 25th percentile (P25%) is the same as the first quartile (Q1).

The 50th percentile (P50%) is the same as the second quartile (Q2) and the median.

The 75th percentile (P75%) is the same as the third quartile (Q3)

Calculating Percentiles with Programming

Percentiles can easily be found with many programming languages.

Using software and programming to calculate statistics is more common for bigger sets of data, as finding it manually becomes difficult.

Example

With Python use the NumPy library `percentile()` method to find the 65th percentile of the values 13, 21, 21, 40, 42, 48, 55, 72:

```
import numpy
```

```
values =
```

```
x = numpy.percentile(values, 65)
```

```
print(x)
```

Example

Use the R `quantile()` function to find the 65th percentile (0.65) of the values 13, 21, 21, 40, 42, 48, 55, 72:

```
values <- c(13,21,21,40,42,48,55,72)
```

```
quantile(values, 0.65)
```

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