Quartile

Quartile is a useful concept in statistics and is conceptually similar to the median. The first quartile is the data point at the 25th percentile, and the third quartile is the data point at the 75th percentile. The 50th percentile is the median.

Median Revisited

To understand a quartile [1], let us revisit median [2]. To compute the median, we cut off the data into two groups with equal number of points. Thus the middle value that separates these groups is the median. In a similar fashion, if we divide the data into 4 equal groups now instead of 2, the first differentiating point is the first quartile, the second differentiating point is the second quartile which is the same as the median and the third such differentiating point is the third quartile.

To further see what quartiles do, the first quartile is at the 25th percentile. This means that 25% of the data is smaller than the first quartile and 75% of the data is larger than this. Similarly, in case of the third quartile, 25% of the data is larger than it while 75% of it is smaller. For the second quartile, which is nothing but the median, 50% or half of the data is smaller while half of the data is larger than this value.

Interpreting Quartiles

As you know, the median is a measure of the <u>central tendency</u> [3] of the data but says nothing about how the data is distributed in the two arms on either side of the median. Quartiles help us measure this.

Thus if the first quartile is far away from the median while the third quartile is closer to it, it means that the data points that are smaller than the median are spread far apart while the data points that are greater than the median are closely packed together.

An Alternative View

Another way of understanding quartiles is by thinking of those as medians of either of the two sets of data points differentiated by the median. In this case, the first quartile is the median of the data that is smaller than the full median while the third quartile is the median of the data that is larger than the full median. Here full median is used in the context of the median of the entire set of data.

It should be noted that a quartile is not limited to discrete variables but also applies equally well to continuous variables. In this case, you will need to know the data distribution to figure out the quartiles. If the distribution is symmetric, like <u>normal distribution</u> [4], then the first and third quartiles are equidistant from the median in either direction.

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Links
[1] http://en.wikipedia.org/wiki/Quartile
[2] https://explorable.com/calculate-median
[3] https://explorable.com/measures-of-central-tendency
[4] https://explorable.com/normal-probability-distribution