

Measures of Variation

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WHAT'S COVERED

This tutorial will explain different measures of variation and why they are necessary. Our discussion breaks down as follows:

1. Spread
2. Types of Variation

1. Spread

Different data sets will have different **measures of variation**; therefore, it is important to understand this **spread** when examining data.

Sometimes it's not sufficient to report simply an average, or a measure of center, when you're talking about a data set.

⇒ **EXAMPLE** Suppose you were going to compare and contrast the high, low, and average temperatures in the month of January, for Buffalo Grove, Illinois versus Valdez, Alaska.

	Low	High	Average
Buffalo Grove	12°	28°	21°
Valdez	15°	25°	21°

The average for both of these cities is 21 degrees in January. However, if you look at the typical high temperature in Buffalo Grove, it's a little higher than the typical high temperature in Valdez. In addition, the low temperature in Buffalo Grove is a little bit lower than the low temperature in Valdez.

Buffalo Grove's temperatures, although they average the same as Valdez, are a bit more variable, which means that the data is spread out a bit more. It gets a little colder at night and a little warmer in the day. Valdez's temperatures seem a little bit more consistent. The data is not as spread.



BIG IDEA

Because the different data sets have such different spreads, it would be inappropriate to simply compare them based on their averages.



TERM TO KNOW

Measures of Variation/Spread

Statistical measures that indicate how close values are to the center of the distribution. For every measure of variation, a large number indicates the data are very spread out, and a small number indicates the values are very close together.

2. Types of Variation

It is important to understand how variable the values around the measure of center (whichever you are using) are. Just like measures of center, there are several measures of spread:

- Range
- Standard deviation
- Interquartile range

All of these are covered in more detail in other tutorials.

Whatever measure of variation you use, high and low values are indicative of different things:

- A high value means that the data set is not consistent, that it's more spread out.
- A low value indicates that the values are not very spread out, that they're tightly clustered together. When the data does deviate from the center, it's not by a significant amount.

You can have measures of spread or measures of variation that are zero, which would indicate that all the data values are, in fact, the same.



SUMMARY

Variation indicates the extent to which the data set values are close together. There are many ways to measure variation, and all of those methods have a simple rule: a high value means that the data are more varied and a smaller value means that the data are less varied. Variation and spread are synonyms that will be used fairly extensively throughout these tutorials.

Good luck!



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