How to Find Mean & Standard Deviation of Grouped Data

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Often we may want to calculate the mean and standard deviation of data that is grouped in some way. For example, suppose we have the following grouped data:

Range	Frequency
1-10	2
11-20	7
21-30	10
31-40	3
41-50	1

While it's not possible to calculate the exact mean and standard deviation since we don't know the , it is possible to estimate the mean and standard deviation.

The following steps explain how to do so.

Calculate the Mean of Grouped Data

We can use the following formula to estimate the mean of grouped data:

Mean: Σmini / N

where:

mi: The midpoint of the ith group
ni: The frequency of the ith group
N: The total sample size

Here's how we would apply this formula to our dataset from earlier:

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Range	Frequency (n_i)	Midpoint (m_i)	$m_i * n_i$
1-10	2	5.5	11
11-20	7	15.5	108.5
21-30	10	25.5	255
31-40	3	35.5	106.5
41-50	1	45.5	45.5

Mean = (11 + 108.5 + 255 + 106.5 + 45.5) / 23 = **22.89**

The mean of the dataset turns out to be **22.89**.

Note: The for each group can be found by taking the average of the lower and upper value in the range. For example, the midpoint for the first group is calculated as: (1+10) / 2 = 5.5.

Calculate the Standard Deviation of Grouped Data

We can use the following formula to estimate the standard deviation of grouped data:

Standard Deviation: $\sqrt{\Sigma ni(mi-\mu)2 / (N-1)}$

ni: The frequency of the ith group
mi: The midpoint of the ith group
μ: The mean
N: The total sample size

Here's how we would apply this formula to our dataset:

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Range	Frequency (n_i)	Midpoint (m_i)	$m_i * n_i$	μ	$m_i - \mu$	$(m_i - \mu)^2$	$n_i(m_i - \mu)^2$
1-10	2	5.5	11	22.89	-17.39	302.41	604.82
11-20	7	15.5	108.5	22.89	-7.39	54.61	382.28
21-30	10	25.5	255	22.89	2.61	6.81	68.12
31-40	3	35.5	106.5	22.89	12.61	159.01	477.04
41-50	1	45.5	45.5	22.89	22.61	511.21	511.21

Standard Deviation = √((604.82 + 382.28 + 68.12 + 477.04 + 511.21) / 22) = **9.6377**

The standard deviation of the dataset turns out to be **9.6377**.

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