Calculating standart deviation (std) step by step

$$\sqrt{\frac{\sum|x-\mu|^2}{N}}$$

1. First, let's pick up a little small sequence so that we can calculate standart deviation much more easily:

[6, 2, 3, 1]

2. Secondly, we split the whole calculation into a few stages. Initially, let's figure out the mean value of the numbers we have choosen that means μ in that formulae:

$$\mu = \frac{6+2+3+1}{4} = \frac{12}{4} = 3$$

3. Up next is to find the distance from each data point to the mean and square each of those distances:

x	$\lvert x-\mu\rvert^2$
6	$\lvert 6-3\rvert^2 = 9$
2	$\lvert 2-3\rvert^2 = 1$
3	$\lvert 3-3\rvert^2 = 0$
1	$\lvert 1-3\rvert^2 = 4$

$$\sum |x-\mu|^2 = 9+1+0+4 = 14$$

4. In this step, we divide our result from Step 3 by the variabel N, which is the length of the data points.

$$N = 4, \quad \frac{\sum |x-\mu|^2}{N} = \frac{14}{4} = 3.5$$

5. Almost done! We can now find the final result of the calculation and which is pretty simple:

$$\sqrt{\frac{\sum |x-\mu|^2}{N}} = \sqrt{3.5} \approx 1.87$$

Yes! We did it! We successfully calculated the standard deviation of a small data set.