A.2.4 Dispersion characteristics:

et écart-type, coefficient de variation.

A.2.4.1 The range:

to find range of the data, we need to take the difference between the highest and lowest value of the data set.

Range (E) = Highest value - Lowest value=X_{max} -X_{min}.

A.2.4.2 The mean:

❖ **The arithmetic mean:**

Soi, x_1 , x_2, x_3, ……x_n, finite sequence of numbers. The arithmetic mean is:

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

Example 28:

Let us consider the following series (20, 18, 19, 12, 14, 13, 18). The **arithmetic mean** of this series is calculated as follows:

$$\overline{X} = \frac{20 + 18 + 19 + 12 + 14 + 13 + 18}{7} = 16.28$$

❖ **The weighted arithmetic mean:**

If each value x_i, appears n_i times in the series; We can write:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{n} n_i x_i = \sum_{i=1}^{n} f_i x_i,$$

Remark: In the case of a continuous quantitative variable, we replace x_i by the class center C_i.

A.2.4.3 The variance:

The variance is an average of squared differences from the mean. The formula for finding the variance of a data set is given below:

$$V(x) = \sigma^2 = \frac{1}{N}\sum_{i=1}^{k} ni\ (xi - \overline{X})^2 = \sum_{i=1}^{k} fi\ xi^2 - \overline{X}.^2$$

$\overline{X}$ **:** It's the weighted arithmetic mean.

A.2.4.4 The standard deviation:

Standard deviation is the positive square root of the variance. $\sigma = \sqrt{V(x)}$

Remark: The parameter Vx measures the average distance between x and the values of X (see Figure 2.20). It is used to measure the dispersion of a statistical series around its mean.

– The smaller it is, the more the characters are concentrated around the average (we say that the series is homogeneous).

– The larger it is, the more the characters are dispersed around the average (we can say that the series is heterogeneous).

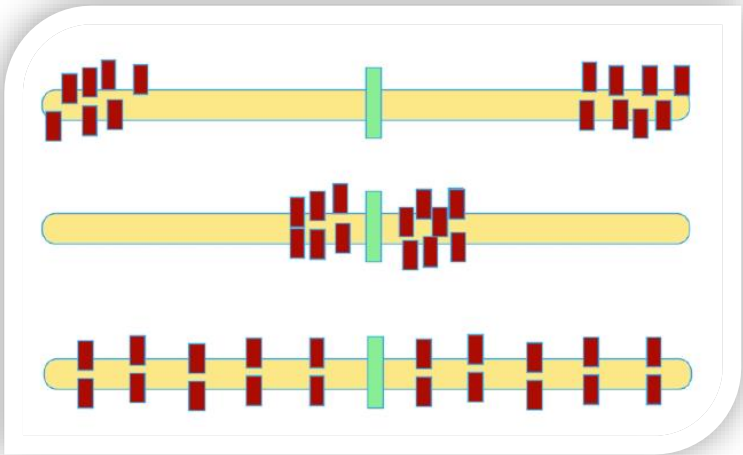

Figure. 2.20: The dispersion of a statistical series around its average.

A.2.4.5 The coefficient of variation:

$$CV(x) = \frac{\sigma x}{\overline{X}}$$

Le coefficient de variation est calculé en % (CV.100%)

- If CV → 0%, we say that the dispersion around the mean is very homogeneous.
- If CV → 100%, we say that the dispersion around the mean is very heterogeneous.