# Covariance.

Let $(x_1, x_i); i = 1, 2, \ldots, n$ be a bivariate distribution, where $x_1, x_2, \ldots, x_n$ are the values of variable x and $y_1, y_2, \ldots, y_n$ those of y. Then the covariance Cov (x, y) between x and y is given by

$$Cov\,(x,y) = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) \text{ or } Cov\,(x,y) = \frac{1}{n}\sum_{i=1}^{n}(x_i y_i - \bar{x}\,\bar{y}) \text{ where, } \bar{x} = \frac{1}{n}\sum_{i=1}^{n}x_i \text{ and}$$

$\bar{y} = \frac{1}{n}\sum_{i=1}^{n}y_i$ are means of variables x and y respectively.

Covariance is not affected by the change of origin, but it is affected by the change of scale.