# Covariance

## Purpose of covariance

Covariance is used to measuring the relationship with pairs of data. It can capture the correlation that individual data can not tell us.

* Relationship with positive trends

Chart, scatter chart

Description automatically generated

* Relationship with negative trends

Chart, scatter chart

Description automatically generated

* No relationship

Chart

Description automatically generated

## Formular of covariance

You could imagine, it is like, move the origin to the point , and calculate the product of points’ new coordinates, which indicates what quadrant they are located.

Chart, box and whisker chart

Description automatically generated

The value of co-variance do not indicate the slop is steeper or not, it only tell us whether the relationship is positive or negative.

The covariance is hard to interpret, so we consider it as the computational steppingstone to more interesting things.

The reason why covariance is hard to interpret, is because it comes from variance. The value of variance depends on the gratitude of original inputs. Image we multiply 2 to each input, the value of variance would enlarge to 4 times, but the slop would not be changed.

Chart, scatter chart

Description automatically generated

So, we come up the concept of correlation.

# Correlation

## Purpose of correlation

Chart, scatter chart

Description automatically generated

A picture containing diagram

Description automatically generated

Although the value of correlation does not depend on the gratitude of inputs, but the number of observations would impact the confidence of correlation.

Chart

Description automatically generated with medium confidence

## Formular of correlation

Chart

Description automatically generated