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M.A. 1st Sem

CORRELATION: TYPES

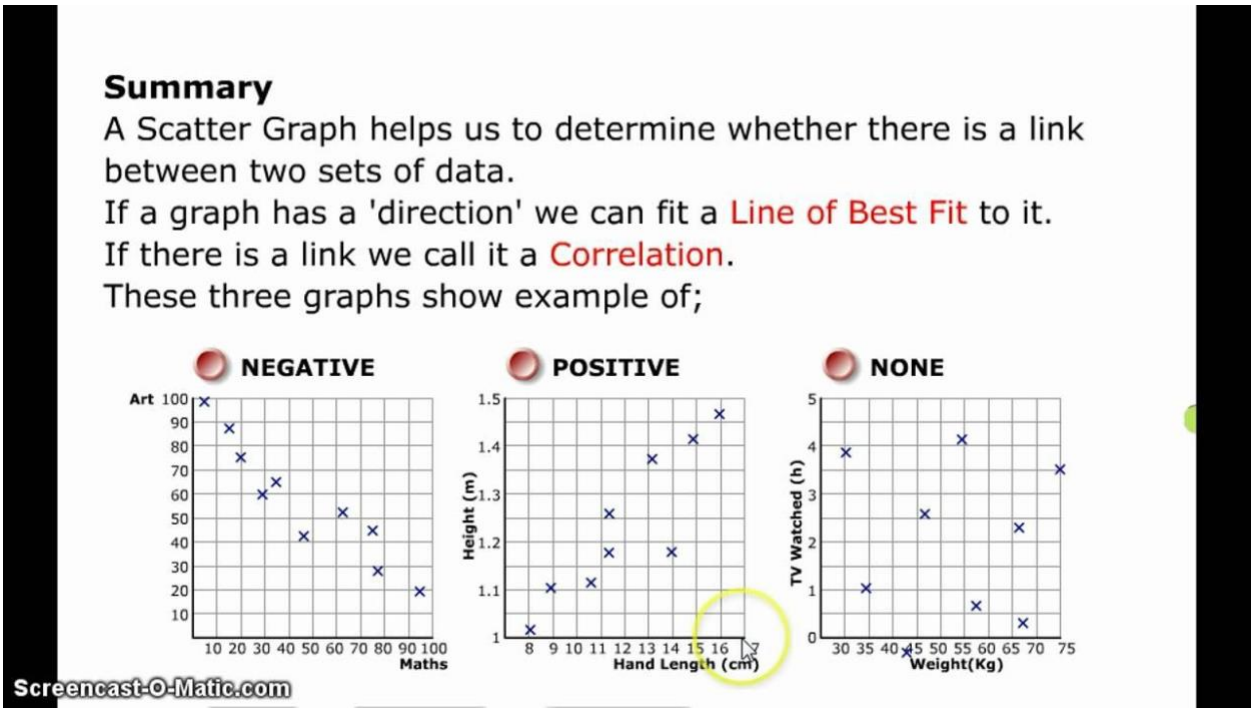
Before going through the types of correlation let's learn about scatter diagram.

Scatter Diagram

A scatter diagram is a diagram that shows the values of two variables X and Y , along with the way in which these two variables relate to each other. The values of variable X are given along the horizontal axis, with the values of the variable Y given on the vertical axis. For purposes of drawing a scatter diagram, and determining the correlation coefficient, it does not matter which of the two variables is the X variable, and which is Y.

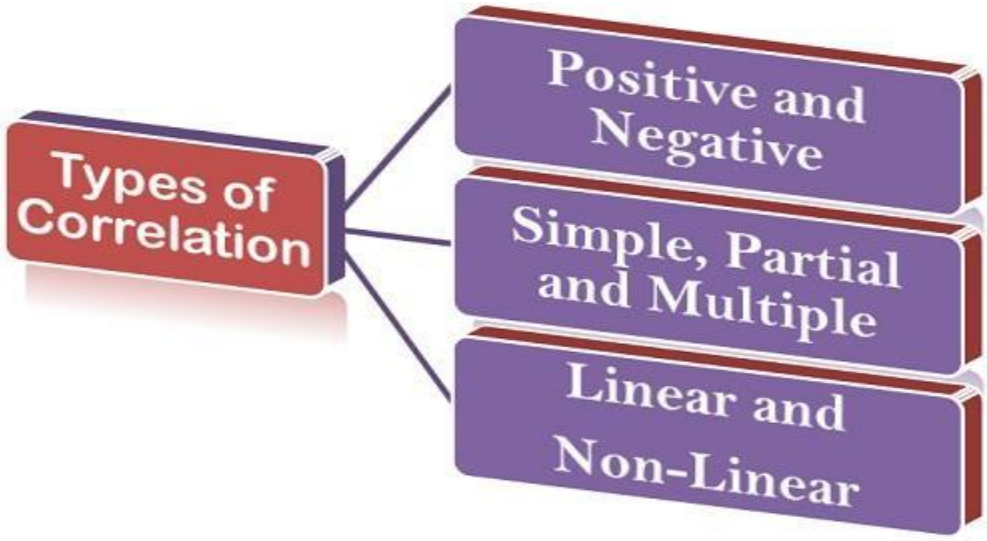
Later, when the regression model is used, one of the variables is defined as an independent variable, and the other is defined as a dependent variable. In regression, the independent variable X is considered to have some effect or influence on the dependent variable Y. Correlation

methods are symmetric with respect to the two variables, with no indication of causation or direction of influence being part of the statistical consideration. A scatter diagram is given in the following example. The same example is later used to determine the correlation coefficient.



Types of Correlation

The scatter plot explains the correlation between the two attributes or variables. It represents how closely the two variables are connected.



1.Positive and Negative Correlation: Whether the correlation between the variables is positive or negative depends on its **direction of change**. The correlation is positive when both the variables **move in the same direction**, i.e. when one variable increases the other on an average also increases and if one variable decreases the other also decreases.The correlation is said to be negative when both the variables **move in the opposite direction**, i.e. when one variable increases the other decreases and vice versa.

2.Simple, Partial and Multiple Correlation: Whether the correlation is simple, partial or multiple depends on the **number of variables studied**. The correlation is said to be simple when **only two variables** are studied.The correlation is either multiple or partial when three or more variables are studied. The correlation is said to be Multiple when **three variables are studied simultaneously**. Such as, if we want to study the relationship between the yield of wheat per acre and the amount of fertilizers and rainfall used, then it is a problem of multiple correlations.

Whereas, in the case of a partial correlation we study more than two variables, **but consider only two among them that would be influencing each** other such that the effect of the other influencing variable is kept constant. Such as, in the above example, if we study the relationship between the yield and fertilizers used during the periods

when certain average temperature existed, then it is a problem of partial correlation.

3.Linear and Non-Linear (Curvilinear) Correlation: Whether the correlation between the variables is linear or non-linear depends on the **constancy of ratio of change between the variables**. The correlation is said to be linear when the amount of change in one variable to the amount of change in another variable tends to **bear a constant ratio**. For example, from the values of two variables given below, it is clear that the ratio of change between the variables is the same:

X: 10 20 30 40 50
Y: 20 40 60 80 100

The correlation is called as non-linear or curvilinear when the amount of change in one variable **does not bear a constant ratio** to the amount of change in the other variable. For example, if the amount of fertilizers is doubled the yield of wheat would not be necessarily be doubled.

Thus, these are three most important types of correlation classified on the basis of movement, number and the ratio of change between the variables.