# CORRELATION AND REGRESSION

## PRBOLEM STATEMENT

Students are asked to visit in the different departmental store to collect the information about the demand of the electric items and their respective price.

Prepare a note on a correlation between the demand of electric items and the price. Present the report with conclusion on the class.

## INTRODUCTION

Correlation is a statistical measure that express the extent to which two variables are linearly related. It’s a common tool for describing simple relationship without making a statement about cause and effect.

There are three basic types of correlation:

1. Positive Correlation

It is a relationship between two variables in which the both variables are directly proportional to each other. The value of coefficient of correlation is always greater than one for Positive Correlation.

1. Negative Correlation

It is a relationship between two variables in which the two variables are inversely proportional to each other. The value of coefficient of correlation is always less than one for Negative correlation.

1. Zero Correlation

It is the correlation which exists when there is no relationship between two variables

## HISTORICAL BACKGROUDs

The concept of correlation was introduced by Francis Galton’s in 1888 A.D. He also created the statistical concept of correlation and widely promoted regression toward the mean. Sir Francis Galton pioneered correlation Galton, a cousin of Charles Darwin, did a lot: he studied medicine, he explored Africa, he published in psychology and anthropology, he developed graphic techniques to map the weather And, like others of his era, Galton strove to understand heredity

Karl Pearson, Galton’s colleague and friend and father of Egon Pearson, pursued the refinement of correlation with such vigor that the statistic *r*, a statistic Galton called the index of co-relation and Pearson called the Galton coefficient of reversion, is known today as Pearson’s *r.*

## OBJECTIVE

1. Collecting the information about the demand of the electric items and their respective price.
2. Finding the coefficient of correlation between the demand of electric items and their respective price.
3. Concluding the relation between the demand of electric items and their respective price

## KEY FEATURES

* The value of coefficient of correlation varies between -1 to +1.
* Correlation coefficient is a pure number. It has no unit.
* The correlation coefficient is independent of change of origin and unit of measurement
* The correlation coefficient is symmetrical with respect to X and Y
* The formula to find Spearman’s rank correlation coefficient, usually denoted by (Rho) or R is where, d is difference between the rank of two items, N is the number of pairs of observation.
* Correlation is confined only in linear relationship with the variables.
* It measures the direction and degree of liner relationship between two variables.
* If the correlation coefficient between two variables is 1, then the two least square lines of regression are coincident.

## COLLECTION OF INFORMATION

As per the given instruction, we collected the information about the demand of electrical items like bulb, SD card, battery etc. and their respective price.

For our convenience we take the information about bulb. We collect information about demand of bulb and their respective price per piece. The collected information is illustrate in given table:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 1 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| Y | 100 | 98 | 95 | 92 | 90 | 85 | 80 | 79 | 77 | 75 |

Where, X is the demand of bulb

And Y is the price of bulb per piece.

## NUMERICAL COMPUTATION

According to the collected information about the demand of bulb and their respective price per piece. The correlation coefficient between the demand of bulb and their respective price per piece is calculated in given table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | Y |  |  |  |
| 1 | 100 | 1 | 10000 | 100 |
| 5 | 98 | 25 | 9604 | 490 |
| 10 | 95 | 100 | 9025 | 950 |
| 15 | 92 | 225 | 8464 | 1380 |
| 20 | 90 | 400 | 8100 | 1800 |
| 25 | 85 | 625 | 7225 | 2125 |
| 30 | 80 | 900 | 6400 | 2400 |
| 35 | 79 | 1225 | 6241 | 2765 |
| 40 | 77 | 1600 | 5929 | 3080 |
| 45 | 75 | 2025 | 5625 | 3375 |
| 226 | 871 | 7126 | 76613 | 18465 |

N=10,

Here,

The formula to find the coefficient of correlation is given by:

∴

Or, r=

Or, r=

Hence, the value of correlation coefficient is negative 0.99198.. which is nearly perfect negative correlation.

Therefore, we can conclude that the demand of electrical items is inversely proportional to the price of bulb per piece. Hence, if we buy more bulb then price of bulb will be decreased.

## APPLICATION

* It is used for finding the relation between any two or more physical quantity whether the quantity are inversely or directly proportional to each other. Such as the relationship between force applied on the body and mass of that body to accelerate is directly proportional to each other.
* It is used for economists to study the relationship between variables like price and quantity demanded. Also for the businessman, it help to estimate costs, sales, price and other related variables.
* The correlation coefficient is a relative measure and we can compare the relationship between variables which are expressed in different units.
* It is used for financial interpretation and help for making decision in a company.

## REFERENCES

1. Nabaraj Adhikari, Amba Datt Joshi, Nabaraj Bhandari, Raghu Bir Bhatta, Hari Prapanna Kandel, *Principle of mathematics,* Kriti Publication Pvt.Ltd., Putalishadak, Kathmandu
2. N. Adhikari, H.N. Nath and et.al. *Pioneer Mathematics Grade XI and XII,* Dreamland Publication Pvt.Ltd.2014, Kathmandu, Nepal.
3. P.M. Bajracharya and G. Basnet, *Fundamental of Mathematics,*  class XI and XII, Buddha Academic, 2008, Nepal.