# Study of Correlation Theory with Different Views and Methodsamong Variables in Mathematics

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**ABSTRACT:***Correlation among two numbers is an important concept and this relationship among two variables may be direct or indirect/inverse. Generally, correlation of two numbers is studyin statistics .The different types of correlation among numbers may be positively correlated, negatively correlated and perfectly correlated in statistics. Generally theserelationship is direct or indirect/inverse.So,in this paper it is tried to explore correlation among numbers/variables inunitary methods, ratio and proportion, variation methods.*
**Keyword:** *Correlation, Unitary, Ratio, Variation, Variables;*

## I. INTRODUCTION

In statistics, the correlation coefficient is a measure that determines the degree to which two variables' movements are associated. While the correlation coefficient measures a degree to which two variables are related, it only measures the linear relationship between the variables. Nonlinear relationships between two variables cannot be captured or expressed by the correlation coefficient.

$$\rho_{xy} = \frac{Cov(r_x, r_y)}{\sigma_x \sigma_y}$$

The range of values for the correlation coefficient is -1.0 to 1.0. If a calculated correlation is greater than 1.0 or less than -1.0, a mistake has been made.A correlation of -1.0 indicates a perfect negative correlation, while a correlation of 1.0 indicates a perfect positive correlation.A perfect positive relationship between the two variables states that for a positive increase in one variable, there is also a positive increase in the second variable.

While perfect negative relation between two variables show the variables move in opposite directions; for a positive increase in one variable, there is a decrease in the second variable.

If the correlation is 0, this simply means there is no relationship between the two variables.[1],[9],[10].
This can be represented in the following way[13]:



Positive Correlation  Negative Correlation  No Correlation
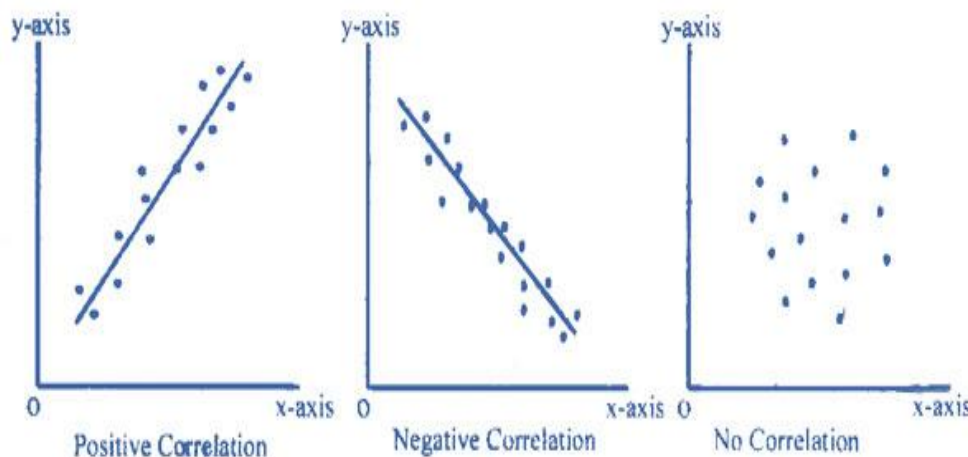
Unitary methods, Ratio and Proportion of numbers, Variation methods have different approach to study the relationship among numbers.But these methods also use the concepts of direct relationship or inverse relationship among variables. In this paper it is tried to study how the concept of positive and negative relationship is working inunitary method, ratio and proportion ofnumbers and variation methods.

## II.  COMPARATIVE STUDY OF CORRELATION THEORY IN UNITARY METHODS, RATIO AND PROPORTION OF NUMBERS AND VARIATION METHODS

*2.1 Unitary methods*: In unitary method we will learn how to find the value of a unit from the value of a multiple and the value of a multiple from the value of a unit.[6]

When we go to the market to buy any article, we ask the shopkeeper to tell the price of the article. This is called unit price. We calculate the price of number of articles; we want to buy, with the help of this unit price. Sometimes, we calculate unit price when the price of a multiple is given. The method to calculate the price of the required articles is called unitary method.

(i)Example: 2 balls cost $ 8. Find the cost of 3 balls.

Cost of 2 balls = $ 8

Cost of 1 ball = $ 8 ÷ 2 = $ 4

Cost of 3 balls = $ 4 × 3 = $ 12

(ii)Example:  12 oranges cost $ 72. Find the cost of 4 oranges.

Cost of 12 oranges = $ 72

Cost of 1 orange = $ 72 ÷ 12 = $ 6

Cost of 4 oranges = $ 6 × 4 = $ 24

Generally, first we find the value of one article from the value of a multiple and then we find the value of the desired number of articles from the value of one. Usually this method involves the operations of multiplication and division both.

| Positive relationship | Negative relationship |
|---|---|
| (a*b)/c , here product operation is used to develop the positive relationship with help of three variable a ,b ,c. | a/(b*c) ,here division operation is used to develop the negative relationship with help of three variable a ,b ,c. |

### 2.2 Ratio and proportion of Numbers

**(a)Ratio:**The ratio of one quantity to another is a fraction and the number of times one quantity is contained in another quantity of the same kind. The ratio between two quantities is the quotient obtained by dividing the first quantity by the second.[8].

Example - The ratio between *3* and *6* can be expressed as

*3 / 6 = 1 / 2 = 0.5*

Ratio can also be indicated by the sign *":"* - like *3 : 6* or *1 : 2*.

**(b)Reciprocal or Inverse Ratio: The** reciprocal or inverse ratio is the opposite of the original ratio.

Example -The inverse ratio between *6* and *3* can be expressed as

*6 : 3  = 2 : 1 = 2*

**(c)Proportion: Proportion** is the equality of ratios.

Example

*1 : 2 = 3 : 6*

| Positive relationship | Negative relationship |
|---|---|
| Two values are said to be in direct proportion when increase in one results then there is also exist  an increase in the other. Two variables may be in direct relationship if there exist somecondition or there is need to generate some condition so that variables may become direct. | Two values are said to be in indirect proportion when the increase in one results in a decrease in the other. There may exist some Conditions or some condition may be required for making variables to be in indirect |

### 2.3 Variation Methods

Correlation theory in variation methods may occur in the following way[7]:

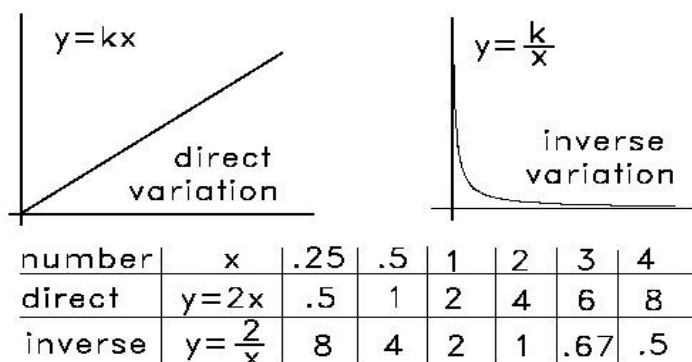| Positive relationship | Negative relationship |
|---|---|
| The phrase " *y* varies directly as *x*" or " *y* is directly proportional to *x*" means that as *x* gets bigger, so does *y*, and as *x* gets smaller, so does *y*. That concept can be translated in two ways. $\frac{y}{x} = k$ For some constant *k*. The *k* is called the constant of proportionality. This translation is used when the constant is the desired result. | The phrase  " *y* **varies inversely** as *x*"  or  " *y* is inversely proportional to *x*"  means  that  as *x* gets bigger, *y* gets smaller, or vice versa. This concept is translated in two ways. $yx = k$ for some  constant *k*, called the constant of proportionality. Use this translation if the constant is desired. |

## III. ADVANTAGE

While studying two variables at the same time, it is found that change in one variable is reciprocated by corresponding change in the other variable either directly or inversely, then the two variables are known to be associated or correlated .Otherwise, the two variables are known to be dissociated or uncorrelated or

independent. Study of correlation theory in Unitary methods, ratio and proportion methods and in Variation methods will helpus ------

**(a)To understand the basic concept of functionin mathematics:**

Correlation theory will help to study about existence of function .For example, from the correlation theory, a function f: X →Y can be defined as f(x) =Kx   or a function g : X →Y can be defined as g(x) =k/x, x≠0; where X and Y are set of real numbers and k is constant.In the following example[12]



| number | x | .25 | .5 | 1 | 2 | 3 | 4 |
|--------|------|-----|----|---|---|---|---|
| direct | $y=2x$ | .5 | 1 | 2 | 4 | 6 | 8 |
| inverse | $y=\frac{2}{x}$ | 8 | 4 | 2 | 1 | .67 | .5 |

**(b)Use of appropriate method to solve a correlated or comparative problem:**

 Unitary methods or ratio and proportion methods or variation methods may be used to solve or represent a correlated problem in mathematics.

**(c) To study correlation theory with different methods in mathematics**

## IV. CONCLUSION AND FUTURE SCOPE

Relationship among two variables may be of different types and there exists some collection of variables which will establish either direct relationship or indirect relationship. There is a scope to develop function f: X → Y in which in which if a function y=f(x) is defined in such a way that

| Value of x | Value of y |
|------------|------------|
| Increase | Increase |
| Increase | Decrease |
| Decrease | Increase |
| Decrease | Decrease |

So, the functional approaches to study about variables in mathematics exist from very beginning.

## REFERENCE

[1].    S.C.Gupta, V.K.Kapoor,Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2001
[2].    A P Baisnab, M JAS, Elements of Probability and Statistics, Tata McGraw-Hill Publishing Company Limited. 2004
[3].    Sadhan Kumar Mapa, Higher Algebra, AsokePrakasan, 1998
[4].    B V Ramana, Higher Engineering Mathematics, B V Ramana, 2006
[5].    Dr. R.D.Sharma, Mathematics (XI-XII) Dhanpat Rai publication (P) Ltd. 2010
[6].    http://www.math-only-math.com/unitary-method.html
[7].    https://www.khanacademy.org/math/in-eighth-grade-math/direct-inverse-proportions
[8].    https://www.cliffsnotes.com/study-guides/algebra/algebra-ii/rational-expressions/proportion-direct-variation-inverse-variation-joint-variation
[9].    https://mathbits.com/MathBits/TISection/Statistics2/correlation.htm
[10].    http://www.investopedia.com/terms/c/correlationcoefficient.asp#ixzz4V5pyqkes
[11].    West Bengal board books (class 5 to 10).
[12].    http://www.mathnstuff.com/math/spoken/here/1words/v/v3.gif
[13].    http://www.dhsbpsychology.co.uk/wp-content/uploads/2013/05/Correlation.jpg

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