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The Coefficients of Statistical Corelation Between the Factors that Influence the Life of Ropes

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Abstract

The goal is to establish the coefficients of statistical correlation between the factors that influence the life of ropes.

Keywords: *life of ropes, statistical correlation, broken wires.*

The factors that affect the life of ropes. Coefficients of statistical correlation

Includes factors that have a significant impact on the life of ropes extraction, the comparable rate of increase in the number of broken wires:

x1 – the intensity of the operation of the extraction measured by the average number of races within 24 hours when increase the number of races of the plant extraction, duration of the rope decreases, ranging between 300 and 600 races/24 hours.

x2 – the percentage of corrosive agents in the air shaft, eg, SO2, CO2, CO, etc.. Their action causes corrosion which spreads quickly and substantially diminishes the resistance to fatigue, which is one of the predominant factors causing the breaking of ropes mining.

x3 – the hole humidity expressed as a percentage.

x4 – the amount of lubricant used in anointing ropes kg/m factor contributing to extend the duration of operation of the rope extraction.

x5 – channel wear on the body of involution.

x6 – the diameter of the body and involution diameter rope *D/d*, the report recommended more than 100 technical standards, to increase the duration of the ropes.

Correlation method consists of interdependence between research comparable number of broken wires outside, the speed of a comparable increase in the number of broken wires and any causative factors present, all being random.

We believe two phenomena are discrete random variables:

- A dependent *y* - comparable number of broken wires;

- An independent *xi* (*i = 1.2 ,..., 6*) - one of the causative factors listed above.

They take the following steps:

1. to determine empirical regression line – the series of statistical data collected from practice, it means the graph in a system of axes rectangular pairs of values x_i, y_i, resulting in a polygonal line called the regression of empirical variable y in relation to variable x_i.

Polygons graphical representations of these are done using frequencies are absolute or relative frequencies which are calculated by dividing the absolute size of frequencies selection.

2. estimation of variation - the determination of the curve

$$y = f(x_i) \tag{1}$$

or

$$\overline{y_x} = f(x_i) \tag{2}$$

The equation (1) represents the functional relationship between the two variables. The equation (2) represents the link between statistical variables, the subject of media and with respect to *x*. "*F*" function of a particular class, best empirical regression line, the most frequently encountered in practice are: linear, exponential, logarithmic. The choice of good line depend on the results of regression analysis and correlation value estimated dependent variable, estimated the dependent variable and change in relation to the changes observed xi independent variable in a somewhat pure making the abstract influence of other factors. Representing graph these functions get the theoretical regression line.

3. estimate degree of correlation intensity and determination of regression equation. Regression linear – indicator is the correlation coefficient of correlation which is calculated by the relationship:

$$r_{xy} = \frac{\sum_{i=1}^{n} x_i \cdot y_i - n \cdot \overline{x \cdot y}}{n \cdot \sigma_x \cdot \sigma_y} \tag{3}$$

where:

$$\sigma_x = \frac{\sum (x_i - \bar{x})^2 \cdot n_i}{\sum n_i},$$

$$\sigma_y = \frac{\sum (y_i - \bar{y})^2 \cdot n_i}{\sum n_i} \tag{4}$$

represents the average non squared variables *x* and *y*, n_i – the value of the same size.

The size of selection:

$$n = \sum_{i=1}^{n} n_i \tag{5}$$

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}; \quad \bar{y} = \frac{\sum_{i=1}^{n} y_i}{n} \tag{6}$$

represents the media selection.

Correlation coefficient is an abstract size, independent establishments variable extent of which varies with limits

$$-1 \le r_{xy} \le 1 \tag{7}$$

The more close to the extreme with both rectilinear correlations between the variations are more intense and estimates produced by the regression equation, have a greater precision.

If they are closer to zero, the two variables are not linear correlated, as may be correlated by other law than the linear or not to be correlated.

It can be positive or negative, as the correlation is positive or negative value is tested using its tabular values.

After linear correlation is proven, is moving to establish a selection based on the Right of regression equation which has the form:

$$y = a + b \cdot x \tag{8}$$

In determining the coefficients *a* and *b*, apply the method the smallest square, under which arriving at the following relationship:

$$a = \frac{\sum y_i - b\sum x_i}{n}, \quad b = \frac{\sum x_i \cdot y_i - \frac{\left(\sum x_i\right)\left(\sum y_i\right)}{n}}{\sum x_i^2 - \frac{\left(\sum x_i\right)^2}{n}} \tag{9}$$

It made the calculation verification right theoretical estimate of regression in relation to the established on the basis of selection, as it establishes the confidence to media y_0 resulting from the regression equation right selection at a value attributed x_0 to the variable x, setting limits values individual against the values $y_{0,}$ values resulting from the regression equation right values for data x_0.

Conclusions:

1. Relations and interpretations presented the case for a link between functional variables *x* and *y*, remain valid in the case of statistical link between them, so the correlation.

2.If for each value of x, p calculations are made for the y and recorded with S_y amount values and the amount for a certain x, the subject of media and, to the general media is represented by:

$$\bar{y}_x = \frac{S_y}{p}$$
$$\bar{y} = \frac{\sum \bar{y}_x}{n} = \frac{\sum S_y}{np} = \frac{\sum S_y}{N} \quad (10)$$

where:
n – the number of values x;
$N = np$ – the values of y.

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Coeficienți de corelație statistică dintre factorii care influențează durata de viață a cablurilor

Rezumat

Scopul lucrării este de a stabili coeficienții de corelație statistică între factorii care influențează durata de viața a cablului.