The Multivariate Regression in Mathcad

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ABSTRACT

This article discusses the construction of linear multifactorial models that determine for specific examples using the MathCAD software product, which makes it possible to make a decision

Keywords: linearity, multivariate model, dependency vector, "built-in" functions, yield determination, MathCAD.

Introduction

Economic production phenomena are evaluated by a large number of simultaneously acting factors [1-4]; it is considered depending on one dependent variable Y from several explanatory variables $x_1, x_2, ..., x_n$. Let Y - dependency vector, X - vector of explanatory installation [5-9].

The relationship between Y and X will be sought in the

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n$$

There $\beta_0, \beta_1, \beta_2, ...\beta_n$ are unknown parameters.

To find unknown parameters in MathCAD, there are "built-in" functions [10-17].

To build a multifactorial model, consider the dependence of the equation on the number of tractors of mineral fertilizers and chemical protection means.

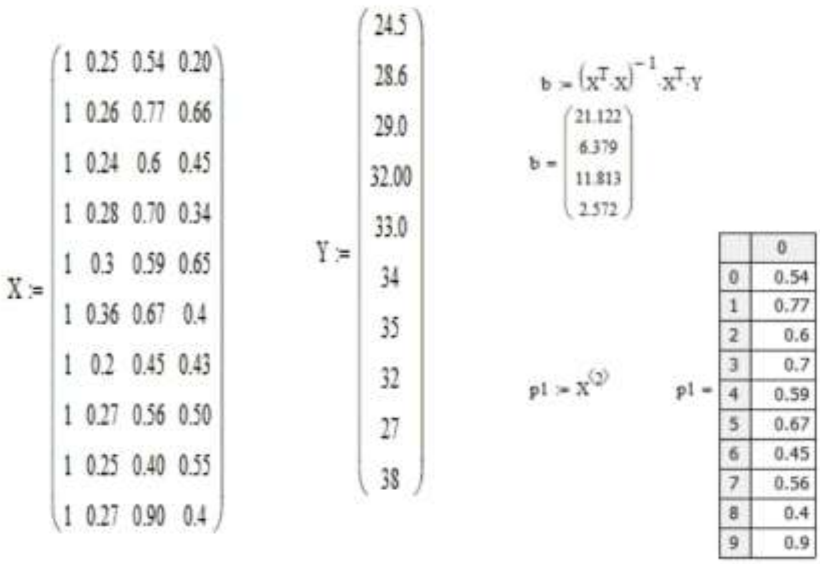
To build, we take 10 farms [18-27].

Table 1. The data are given in the table

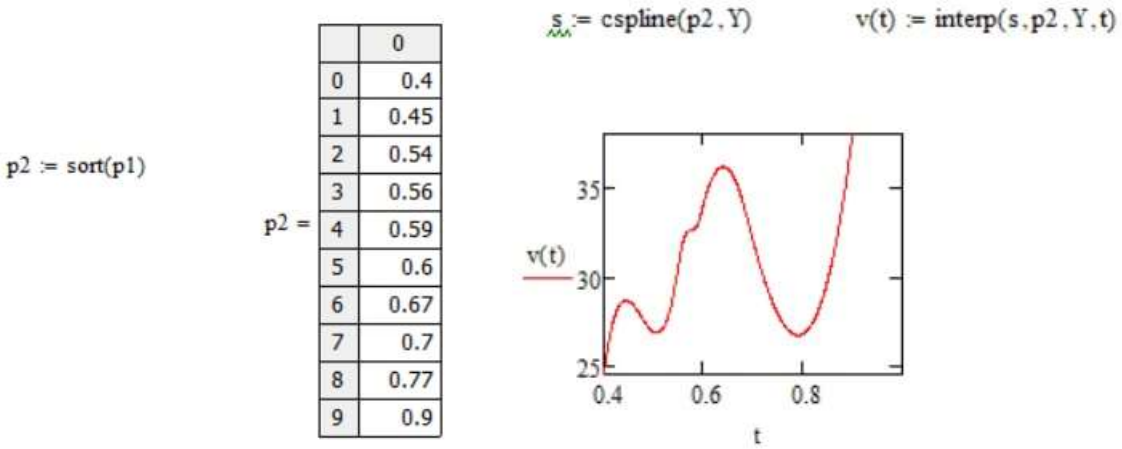
№	Cotton yield c./g Y	Number of tractors in terms of power per 100 g.	Amount of fertilizer for ton/ha	Quantity of chemicals protection c/g.
1	24.5	0.25	0.54	0.20
2	28.6	0.26	0.77	0.66
3	29.0	0.24	0.6	0.45
4	32.00	0.28	0.70	0.34
5	33.0	0.3	0.59	0.65
6	34	0.36	0.67	0.4
7	35	0.2	0.45	0.43

8	32	0.27	0.56	0.50
9	27	0.25	0.40	0.55
10	38	0.27	0.90	0.4

To build a model on MathCAD, we compose a matrix



Then the model will look like $Y = 21.122 + 6.379x_1 + 11.313x_2 + 2.572x_3$ The construction of the regression equation shows the relationship between cotton yields, the number of tractors, the amount of fertilizer, the amount of chemical protection [28-36]. It can be seen from the equation that with an increase in the number of tractors, the reduced power per 100 ha per 1 unit, the yield of cotton will increase by 6.35 centners, an increase in mineral fertilizers by 1 centner/g leads to an increase in yield by 11.813 centners/g, and an increase in chemical protection by 1 centner/g increases productivity by 2.572 centners/g. We find the dependence Y on X_2 in MathCAD [37-51].



The article considers the construction of a linear multifactorial model that results obtained in MathCAD make it possible to make a decision.

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