KYBERNETIKA — VOLUME *42* (2006), NUMBER 4, PAGES 423-440

Interval Linear Regression Analysis Based on Minkowski Difference – a Bridge Between Traditional and Interval Linear Regression Models

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Abstract: In this paper, we extend the traditional linear regression methods to the (numerical input)-(interval output) data case assuming both the observation/measurement error and the indeterminacy of the input-output relationship. We propose three different models based on three different assumptions of interval output data. In each model, the errors are defined as intervals by solving the interval equation representing the relationship among the interval output, the interval function and the interval error. We formalize the estimation problem of parameters of the interval function so as to minimize the sum of square/absolute interval errors. Introducing suitable interpretation of minimization of an interval function, each estimation problem is well-formulated as a quadratic or linear programming problem. It is shown that the proposed methods have close relation to both traditional and interval linear regression methods which are formulated in different manners.

Keywords: interval linear regression analysis; least squares method; minimum;

AMS Subject Classification: 65G40; 62J05; 26E25;