

Approach to Formulate Intuitionistic Fuzzy Regression Models

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Abstract : This study aims to develop approaches to formulate intuitionistic fuzzy regression (IFR) models for many decision-making applications in the fuzzy environments using intuitionistic fuzzy observations. Intuitionistic fuzzy numbers (IFNs) are used to characterize the fuzzy input and output variables in the IFR formulation processes. A mathematical programming problem (MPP) is built up to optimally determine the IFR parameters. Each parameter in the MPP is defined as a couple of alternative numerical variables with opposite signs, and an intuitionistic fuzzy error term is added to the MPP to characterize the uncertainty of the model. The IFR model is formulated based on the distance measure to minimize the total distance errors between estimated and observed intuitionistic fuzzy responses in the MPP resolution processes. The proposed approaches are simple/efficient in the formulation/resolution processes, in which the sign of parameters can be determined so that the problem to predetermine the sign of parameters is avoided. Furthermore, the proposed approach has the advantage that the spread of the predicted IFN response will not be over-increased, since the parameters in the established IFR model are crisp. The performance of the obtained models is evaluated and compared with the existing approaches.

Keywords : fuzzy sets, intuitionistic fuzzy number, intuitionistic fuzzy regression, mathematical programming method

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