A parametric nonlinear programming method of matrix games with payoffs of intuitionistic fuzzy numbers

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The purpose of this paper is to develop an effective and efficient methodology for solving matrix games with payoffs of intuitionistic fuzzy numbers, which are special types of Atanassov's intuitionistic fuzzy sets defined on the set of real numbers. Firstly, we define the concepts of intuitionistic fuzzy numbers and the value-index and ambiguity-index. Secondly, we develop a difference-index based ranking method of intuitionistic fuzzy numbers, which is a total order and has some useful properties. Then, we construct a pair of auxiliary intuitionistic fuzzy mathematical programming models, which are transformed into the parametric nonlinear programming models through using the proposed ranking method. The solutions of matrix games with payoffs of intuitionistic fuzzy numbers are easily obtained through solving the parametric nonlinear programming models. Validity and applicability of the proposed models and method in this paper are illustrated with a practical example.