

Fedel, Martina; Flaminio, Tommaso

Non-reversible betting games on fuzzy events: complexity and algebra. (English)

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Summary: A bad bet is a bet for which we can find an alternative system of bets over the same class of events ensuring to the bettor a strictly better payoff, independently on the truth values of the events involved. In this paper we study the computational complexity for the problem of deciding whether a book arranged on fuzzy events avoids bad bets or not. Call admissible a book that avoids bad bets. Following the approach initiated by Mundici and pursued by Flaminio and Bova for reversible betting situations, we settle the complexity of the admissibility-problem to be NP-complete. We also present a variety of algebras, and an algebraizable modal logic, that allow us to characterize admissible books in terms of 1-satisfiability of suitable defined theories. Studying the computational complexity for the 1-satisfiability problem of a formula in this variety, we provide a second, algebraic-based, NP algorithm to check admissible books.

MSC:

91A60 Probabilistic games; gambling
68Q25 Analysis of algorithms and problem complexity
60A86 Fuzzy probability

Cited in 1 Document

Keywords:

computational complexity; non-reversible bookmakers; fuzzy events; NP-completeness

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