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A Probabilistic-Logical Extension of the WOOP/MCII Method

Seminar 2

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This paper proposes a probabilistic-logical formalization of MCII/WOOP. The formalization is based on the logic L_Z , which we previously introduced and developed as a logical system that, in addition to unconditional and conditional probability, allows the formal representation of the normalized change in probability after an additional condition is taken into account. For the logic L_Z , we constructed an appropriate axiomatic system and showed that it satisfies the main desirable properties: soundness, completeness, and decidability.

In the proposed formalization, a wish is represented by a propositional formula α , while its subjective probability of realization is described by the operator P . The formula φ represents an aspect of present reality that is considered as a potential obstacle, while the operator Z is used to express how taking this obstacle into account changes the initial subjective estimate of realizing the wish. Based on the value of the operator Z , we distinguish cases in which φ is not an obstacle, represents a maximal obstacle, or has a negative but not maximal effect on the realization of the wish.

For the case of a real but potentially surmountable obstacle, we propose a new axiom (W), which introduces plans $\pi_1, \dots, \pi_n$ into the formal system and relates their inclusion to a new probability threshold for realizing the wish. In this way, within a single logical-probabilistic system, we formally connect the main elements of the WOOP process: the wish, the subjective expectation of its realization, the obstacle, and the corresponding plans. The proposed formalization is illustrated by syntactic and semantic examples.