

Ilić Stepić, Angelina; Ognjanović, Zoran

Logics for reasoning about processes of thinking with information coded by p -adic numbers.

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Summary: In this paper we present two types of logics (denoted $L_{Q_p}^D$ and $L_{Z_p}^{\text{thinking}}$) where certain p -adic functions are associated to propositional formulas. Logics of the former type are p -adic valued probability logics. In each of these logics we use probability formulas $K_{r,\rho}\alpha$ and $D_\rho\alpha, \beta$ which enable us to make sentences of the form “the probability of α belongs to the p -adic ball with the center r and the radius ρ ”, and “the p -adic distance between the probabilities of α and β is less than or equal to ρ ”, respectively. Logics of the later type formalize processes of thinking where information are coded by p -adic numbers. We use the same operators as above, but in this formalism $K_{r,\rho}\alpha$ means “the p -adic code of the information α belongs to the p -adic ball with the center r and the radius ρ ”, while $D_\rho\alpha, \beta$ means “the p -adic distance between codes of α and β are less than or equal to ρ ”. The corresponding strongly complete axiom systems are presented and decidability of the satisfiability problem for each logic is proved.

MSC:

- 03B48 Probability and inductive logic
- 03B25 Decidability of theories and sets of sentences
- 03B42 Logics of knowledge and belief (including belief change)
- 68T27 Logic in artificial intelligence

Cited in **3** Documents

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