

A Framework for Belief-based Programs and Their Verification (Abstract Reprint)

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Abstract

Belief-based programming is a probabilistic extension of the GOLOG program family where every action and sensing result can be noisy and every test condition refers to the agents subjective beliefs. Inherited from GOLOG programs, the action-centered feature makes belief programs fairly suitable for high-level robot control under uncertainty. An important step before deploying such a program is to verify whether it satisfies certain properties. At least two problems exist in verifying such programs: how to formally specify program properties and what is the complexity of the verification problem.

In this paper, we propose a formalism for belief programs based on a modal logic of actions and beliefs which allows us to conveniently express PCTL-like temporal properties. We also investigate the decidability and undecidability of the verification problem.

References

Liu, D.; and Lakemeyer, G. 2025. A Framework for Belief-based Programs and Their Verification. *Journal of Artificial Intelligence Research*, 82: 1205–1242.