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Stochastic Metalevel Markov Decision Processes: Proposal and Validation through Ecologically Valid Experiments

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Abstract

In daily life, humans selectively search for information about options to make decisions. The metalevel MDP framework, proposed to understand this information search process, has so far been evaluated only for its predictive performance regarding group differences in summary measures under unrealistic scenarios. This study examined whether metalevel MDP can explain information search processes in more realistic decision-making situations. We proposed a chatbot-based experiment that enables diverse information search actions, as well as a novel analysis method that extends metalevel MDP as a probabilistic model, allowing for the estimation of latent variables and more rigorous evaluation of statistical model fit. The experimental results showed that the model partially explains the information search process, and we discussed potential directions for model improvement.