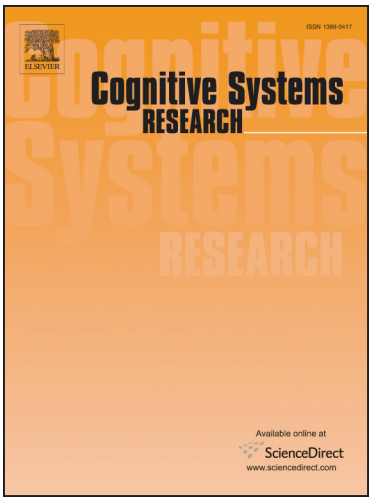

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A working memory model improves cognitive control in agents and robots

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Abstract

Cognition entails those mental processes enabling understanding the current situation through senses, experience, and thought, and supporting the acquisition of new knowledge. A fundamental contribution in cognition is offered by the working memory, that is a small, short-term memory containing and protecting from interference goal-relevant pieces of information. Grounding our work on biological and neuroscientific studies, we modeled and implemented working memory processes in a software model, IDRA-WM, that can simultaneously act as short-term memory and actions generator, thanks to the use of a reinforcement-driven mechanism for chunk selection. Moreover our system integrates the functions of the working memory with a basic action planner. We tested the model with robot relevant tasks to assess whether the proposed solution can learn to solve a problem on the basis of a delayed reward. The experimental results indicate that IDRA-WM is able to solve even those tasks that do not provide immediate reward after an action.

Keywords: Cognitive agents, Working Memory, Perception, Action selection

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