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Rapid specification and automated generation of prompting systems to assist people with dementia

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Abstract

Activity recognition in intelligent environments could play a key role for supporting people in their activities of daily life. Partially observable Markov decision process (POMDP) models have been used successfully, for example, to assist people with dementia when carrying out small multistep tasks such as hand washing. POMDP models are a powerful, yet flexible framework for modeling assistance that can deal with uncertainty and utility in a theoretically well-justified manner. Unfortunately, POMDPs usually require a very labor-intensive, manual set-up procedure. This paper describes a knowledge-driven method for automatically generating POMDP activity recognition and context-sensitive prompting systems for complex tasks. It starts with a psychologically justified description of the task and the particular environment in which it is to be carried out that can be generated from empirical data. This is then combined with a specification

of the available sensors and effectors to build a working prompting system. The method is illustrated by building a system that prompts through the task of making a cup of tea in a real-world kitchen. The case is made that, with further development and tool support, the method could feasibly be used in a clinical or industrial setting.



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Keywords

Behavior analysis; Dementia; Activity recognition; Prompting systems; POMDP

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¹ This work was done while the first author was with the School of Computing, University of Dundee, DD1 4HN, UK.

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