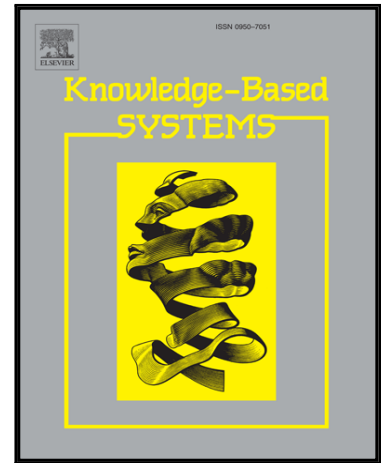


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Fuzzy SOM-based Case-Based Reasoning for individualized situation recognition applied to supervision of human operators

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Abstract

Situation recognition is a process used to support actions and forthcoming predictions for actual situation as well as decision making in cognitive systems. This process may improve human operator supervision systems through reasoning in unplanned, imprecise, and uncertain situations. In this contribution, a new framework for individualized situation recognition by applying new knowledge representation and reasoning approaches is presented. The main idea of this work is improving the situation recognition in dynamical environments by learning and reusing exclusive definitions of different event-discrete situations by human operators. Case-Based Reasoning (CBR) approach is applied to realize situation recognition by remembering human operator experiences for supervision. The proposed CBR is combined with Situation-Operator Modeling (SOM) and fuzzy logic (FL) approaches for modeling and representation of experienced knowledge. The presented fuzzy SOM-based CBR is applied for experimentally-realized lane-change situation recognition to supervise human drivers. Finally, the fuzzy SOM-based CBR is evaluated for different drivers as well as groups of drivers. The results show the effectiveness of the proposed approach in improving the individualized situation recognition performance.

Keywords: Situation recognition, Individualization, Learning, Case-Based Reasoning, Knowledge Representation, Fuzzy Logic

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