

Qualitative Case-Based Reasoning for Humanoid Robot Soccer*

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Abstract. This work proposes a new Case-Based Reasoning (CBR) approach, named Q-CBR, that uses a Qualitative Spatial Reasoning (QSR) theory to model, retrieve and reuse cases by means of spatial relations. We used the EOPRA formalism to model the qualitative relations between the objects in a case and two algorithms were proposed: a new retrieval algorithm, that uses the Conceptual Neighborhood Diagram to compute the similarity measure between a new problem and the cases in the case base; and a reuse algorithm, that selects the most similar case and shares it with other agents, based on their qualitative position. The robot positioned closest to the ball takes over as coordinator, retrieves the most similar case, calculates the adapted position of the teammates, and wirelessly shares the position and actions that each robot must perform. The proposed approach was evaluated on simulation and on real humanoid robots. Preliminary results suggest that the proposed approach is faster than using a quantitative model and other similarity measure such as the Euclidean distance. As a result of running Q-CBR, the robots obtained a higher average number of goals than those obtained when running a metric CBR approach.

Keywords: Case-Based Reasoning, Qualitative Spatial Reasoning, Humanoid Robots

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