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# CONTEXT-BASED KNOWLEDGE SUPPORT FOR PROBLEM-SOLVING BY RULE-INFERENCE AND CASE-BASED REASONING

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Abstract. *Problem-solving is an important process that enables corporations to create competitive business advantages. Traditionally, case-based reasoning techniques have been widely used to help workers solve problems. However, conventional approaches focus on identifying similar problems without exploring relevant context of problem situations. Situation features are generally occurred according to the context characteristics of problems. Moreover, situation features collected are usually partial or incomplete. Workers need to use knowledge inferred from relevant context information and previous problem-solving experience to clarify the causes and take appropriate action effectively. In this paper, we propose to use rule inference to infer possible situation features based on context information. Association rule mining is used to discover context-based inference rules from historical problem-solving logs. The discovered patterns identify frequent associations between context information and situation features, and therefore, can be used to infer more situation features. By considering the inferred situation features, case-based reasoning can then be employed to identify similar situations effectively. Moreover, we employ information retrieval techniques to extract context-based situation profiles to model workers' information needs when handling problem situations in certain context. Effective knowledge support can thus be facilitated by providing workers with situation-relevant information based on the profiles. We develop a prototype system to demonstrate the effectiveness of providing context-based relevant information and decision-making knowledge to help workers solve problems.*

**Keywords:** Case-based reasoning, Data mining, Rule inference, Context-based knowledge support, Problem-solving process

1. **Introduction.** Problem-solving is an important process that enables corporations to create competitive advantages, especially in the manufacturing industry. Case-based reasoning (CBR) techniques [1-4] have been widely used to help workers solve problems. For example, based on these techniques, a decision support system was developed to facilitate problem-solving in a complex production process [1,5]. CBR techniques have also been used to implement a self-improvement helpdesk service system [2], and integrated with Neural Network to have optimal design of high-tech products [3] or enhance fault diagnosis in electric motors [4].

Conventional CBR approaches focus on identifying similar problems without exploring relevant context of problem situations during the problem-solving process. Problem-solving is a complex process that includes a series of uncertain situations and operational