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The Use of Context in Diagnostic Systems

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The Use of Context in Diagnostic Systems

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Summary

The use of context is essential in acquiring and representing knowledge as well as in justifying or explaining knowledge-based systems behaviour especially in diagnosis. RATIONALE is a workstation diagnosis system that establishes context in reasoning so that it may explain [Abu-Hakima 88]. JETA assists a technician in troubleshooting an aircraft engine and uses context to guide the technician in fault diagnosis and in generating contextual help using hypermedia [Halasz et al. 92; Abu-Hakima et al. 93]. This position paper argues that fault-based or failure-driven diagnosis is by its nature a contextual task and can more easily be used to support user interaction through explanation than other diagnostic approaches such as model-based reasoning. This position paper will elaborate on the diagnostic strategies used in RATIONALE and JETA and how they facilitate the use of contextual reasoning. Some of the issues and approaches needed to achieve contextual diagnosis in model-based reasoning versus fault-based reasoning conclude the paper.

Introduction

Classificatory problem solving is contextual in nature. Diagnosis is often referred to as classification. Chandrasekaran and his colleagues developed MDX, a system that diagnosis a form of liver disease, cholestasis [Chandrasekaran et al. 79]. MDX has a diagnostic hierarchy which is referred to as a conceptual hierarchy since it guides the reasoner in the global sense through diagnoses clustered as concepts that establish local contexts. Local uncertainties and knowledge are used to guide the diagnosis [Chandrasekaran and Tanner 86]. MDX has served as a model for many well-structured diagnostic systems including RATIONALE and JETA. RATIONALE is a workstation diagnosis system that establishes context in reasoning so that it may support the user with sophisticated explanations of diagnoses that help justify system behaviour and clarify reasoning [Abu-Hakima 88]. The Jet Engine Troubleshooting Assistant (JETA) provides a technician with electronic manuals organized using hypermedia techniques as well as diagnostic hierarchies that represent the failure, test and repair actions of the diagnostic cycle [Halasz et al. 92]. This position paper argues that fault-based or failure-driven diagnosis is by its nature a contextual task and can more easily be used to support user interaction through explanation than other diagnostic approaches such as model-based reason-