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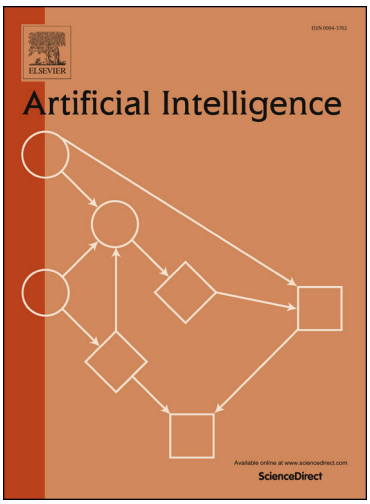

How many diagnoses do we need?

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How Many Diagnoses Do We Need?

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Abstract

A known limitation of many diagnosis algorithms is that the number of diagnoses they return can be very large. This is both time consuming and not very helpful from the perspective of a human operator: presenting hundreds of diagnoses to a human operator (charged with repairing the system) is meaningless. In various settings, including decision support for a human operator and automated troubleshooting processes, it is sufficient to be able to answer a basic diagnostic question: is a given component faulty? We propose a way to aggregate an arbitrarily large set of diagnoses to return an estimate of the likelihood of a given component to be faulty. The resulting mapping of components to their likelihood of being faulty is called the system's *health state*. We propose two metrics for evaluating the accuracy of a health state and show that an accurate health state can be found without finding all diagnoses. An empirical study explores the question of how many diagnoses are needed to obtain an accurate enough health state, and an online stopping criteria is proposed.

Keywords: Artificial Intelligence, Model-based Diagnosis

1. Introduction

A diagnosis problem arises when a system does not behave as expected. A solution to a diagnosis problem is a *diagnosis*, which is a set of components assumed to have caused the system's abnormal behavior. One of the fundamental approaches to automated diagnosis is Model-Based Diagnosis (MBD) [1, 2].