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Why we need to move to intelligent and experience based monitoring and diagnostic systems

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ABSTRACT

Monitoring, quality control and diagnosis is a large cost for production industry. Studies have estimated that the total cost of maintenance in Sweden is 20 billion Euros and the amount spent on maintenance in Europe is around 1500 billion Euros per year. The key to efficient maintenance is monitoring and quality control.

Much of this work is today still manual and based on experienced technicians. Today large amounts of data are collected in the production industry but only a fragment of this data is used. Much of the monitoring data from sensors are used for quality control and maintenance which is still interpreted manually or a system monitoring if a threshold value is passed in order to give an alert. More elaborate use of the data, information and experience is rare.

Using methods and techniques from artificial intelligence for experience reuse enables more informed actions based reducing accidents, mistakes and costs to mention some benefits. Building up and sharing experience is the key to "intelligent" monitoring and diagnostics acting as decision support. Intelligent Monitoring Agents are going beyond decision support since they also have communication skill and are able to make decisions on their own.

Keywords: diagnostic systems, monitoring, artificial intelligence, agent based architecture.

1. INTRODUCTION

2. ARTIFICIAL INTELLIGNCE AND ITS PRACTICAL USE

2.1. Decision support systems

3. ADDING INTELLIGNCE TO MONITORING AND DIAGNOSIS

3.1. Memory capacity

3.2. Learning from experience

4. DISCUSSIONS AND CONCLUSIONS

Preliminary version – full paper will be uploaded shortly

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In order to enable better decision support for monitoring and diagnosis we need to go beyond information presentation and move to solution suggestion. Suggesting a solution that is based on maybe thousands of cases, both with positive and negative outcome is an approach that enables powerful decision support. Since CBR is a methodology similarity and adaptation may be implemented with a large variety of techniques such as conceptual models, neural nets, fuzzy rules, Bayesian nets, mathematical algorithms etc. Using CBR will reduce repetition of mistakes if similar unsuccessful cases are presented for the user as “warning examples”. Explaining why two cases are similar is also important and transfers knowledge to the user. Cases may contain large volumes of sensor data. The data in the case may be used both for quality control, for maintenance actions, for improved design etc. and ultimately lead to large savings in industry. A number of research projects have been and are carried out around the world and many of them show promising results and also may projects aim at commercial products.

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