

Intelligent visualization of alarm information

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Abstract

Modern industrial facilities are continuously looking for new ways to increase profit by reducing downtime and increasing productivity. This has led to a trend towards more sophisticated automation solutions, and a larger degree of complexity in the process design itself. At the same time, the digitalization of the industry has led to an exponential growth in data availability. Unless care is taken, these factors can aggravate already known problems with relation to high degrees of automation, complexity and information overload. To tackle this complexity and vast amount of information available, the alarm system remains an invaluable aid to the control room operators. Unfortunately, designing a good alarm system is very difficult and the way alarm information is normally presented does not aid the operator gain an overview of the complex dynamic interactions that occur during process upsets. This paper presents a novel intelligent visualization solution to support detection and handling of abnormal situations. The solution utilizes data analysis methods for detection of patterns and trends in the data, and interactive visualization to highlight critical factors. Based on the results from testing a fully working prototype, recommendations are given for further work in this area.

Introduction

The data availability in modern industrial control rooms is higher today than ever before. This enables the operator to access important information from all parts of the plant. However, as the amount of data available greatly exceeds what can possibly be supervised at any time, the operators are also faced with a major challenge in finding the relevant information for the current operational context. The alarm system therefore remains a crucial aid for the operators to detect faults and disturbances in the process.

Unfortunately, process complexity and the vast range of possible faults that may occur make the design of an effective alarm system very challenging. It is difficult to define in advance which events will be relevant in all possible situations, and the alarm system designers must take utmost care to avoid highlighting irrelevant events, or removing events of importance. The investigation of several accidents has pointed at problems with the alarm system and the human-system interface as major causal factors behind the incident. Famous examples of this include Texaco Pembroke (Health and Safety Executive, 1997) and the BP Texas City explosion