REAL-TIME PROCESS CONTROL BASED ON ARTIFICIAL INTELLIGENCE

Shuxrat Baxtiyorovich Tursunov
Muhammad al-Xorazmiy nomidagi TATU, ATDT kafedrasi assistenti
tursunov_shuhrat_86@mail.ru

ABSTRACT

Artificial intelligence (AL), which is used to control processes in real time, helps them make these processes work more efficiently. Typically, IT can be used to manage and control complex processes and provide relevant advice to the operator.

Keywords. Artificial intelligence, Control engineering computer applications, Diagnosis, Process control, Rule—based control .

INTRODUCTION.

The practical application of artificial intelligence includes Expert Systems and Rule-Based Systems. These are emerging areas of computer science that will have a significant impact on Will's management engineering.

Part of the impact will be in the area of designing and customizing management systems. However, this article deals with the application of such systems to real-time management.

In these applications, the expert system monitors the status of the plant or process through a process management system. Based on this, the SYS system makes decisions and makes diagnoses and recommends actions that are fast enough to affect the performance of the plant or process (either directly or through an operator).

This article discusses some of the goals and projects of using such systems that BP has started in this field.

OBJECTIVES

BP SYS experts have identified two key areas that can be useful in process management;

CONTROLLING DIFFICULT PROCESSES

Some processes are difficult to manage automation due to long delays, nonlinear connections, or multi-variable interactions. While operators can perform manual control, it is usually not possible to provide reliable and robust automatic control. Also, although

performance optimization is known, it is not practical to trust the operator to continuously adjust the process. This is especially true if its tent ion is focused on problems elsewhere in the plant.For these examples, expert systems can be used to automatically implement the rules applied by human operators.

PROCESSING LARGE AMOUNTS OF DATA

Many large technology enterprises have distributed or centralized computer-based management systems. Data is easily collected by these SYS terns, but when problems occur, the operator may be overwhelmed with signals and data, making it difficult to determine the true cause of the plant failure.

In addition, advanced varnishes of impending problems often appear before signals appear, but these signs are very difficult to detect in the data mass.

An expert system applied to this problem will help identify problems in the early stages and provide brief advice to the operator in an emergency. The goal is to reduce the number and severity of plant deaths and prevent complete plant closure.

ADVANTAGES OF EXPERT SYSTEMS

Expert SYS terns are computer-based and can be constantly vigilant. They can monitor the plant constantly. This is especially important given that many technological processes are disrupted when the operator focuses on other areas or functions of the plant.

A key feature of expert systems is that the expert or knowledge in the problem area is not procedural. Because knowledge is not deeply embedded in a computer program, it is very conspicuous. This makes it easier to add a great experience to your knowledge base. In addition to the operational experience of the plant, this process and management includes engineering principles. This knowledge can be general or plant-specific. Thus, the operator can be provided with online expertise in case of crisis.

Non-procedural data retention is also important if the expert system is expected to be the basis for the operator to draw conclusions. This feature of expert systems,when applied to real-time applications, this is important because it ensures that the operator appreciates the results achieved. It also includes inconsistencies and gaps in knowledge that need to be identified.

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If the hypothesis was to approve the expansion of the network, each subclass could be inherited from the same attributes

that led to the problem if it was managed uncontrollably using inheritance mechanisms. from the parent class (i.e. controller). Therefore, ESCORT, in turn, must ensure that each leader inherits his or her opinion with maximum reliability on the attributes of the parent class test hypotheses. Level - Continuous roller).

It is not possible to test all hypotheses except assigning attributes to classes. However, for example, they are not inherited by a particular plant, and if they have a liquid flog in the pipe to determine the palm classes, a f lovometer can come out. The test is interrelated with other classes and is performed by a hand machine asking to determine the cause.

The final value of the actual mapping manager is linkedthe time function converts the database into a variable. a This ted Gateway'sby and output connections.position of the linguistic converter descriptor. The control example for the control device is the valve and if possible (and only because of i f).

Power value between O and I. The mapping function is defined by the conditional program to the user, the reason being linked to each variable. It can only logically give an on or off signal (e.g. when describing a level as High or Binary it can only ensure that the correct valve / controller is connected for this reason) “fuzzy” (e.g.past). As in LINKman, the meanings of the process are used to describe the connection to the system at the factory. Additional,

Linguistic descriptors are contextual. Which valve is connected to which ESCORT at the factory leads to the Fashion concept.

Modes allow you to link linguistic identifiers to the Of plant the plant.values application. the information given to the classes provides a systematic generalization to the class operation The higher this knowledge is applied, the more general it will be. Finally, the system identifies where actions are possible. It is still possible to apply the knowledge needed to solve the problem. These actions are boring. This knowledge is just called advice or they can be done by a special factory that I can do ESCORT directly through the process management system. special knowledge.

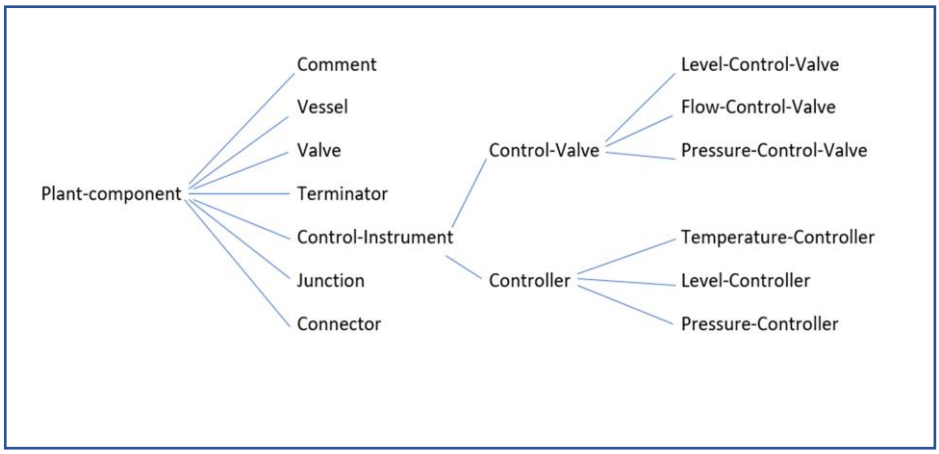
Information about the problem, including symptoms, possible causes, and recommended actions, is sent to the Operator’s term na1, an explanation behind the review in the “Knowledge Engineering” section. For ESCORT (RE), Knovledge Engineering has dropped to tvo stages.

Knowledge presentation. A highly managed engineering experience consisting of a description of knowledge gained from any real source (e.g. diagrams) and the introduction of knowledge that can be obtained at an early stage to manage process and time from KE expert system paper. For example, important body t. Even for a small plant, the number of

relationships between plant substances represented by the relationships that need to be described is very large. A part of the agram has been introduced, during which vivi vi vi controls must be placed on knowledge so that information about process fluids and the Knowledge Engineering function is converted into existing reactions and separations. It can also be managed. operating principles of the control ring, failure modes and operation of t randuser and control valves

This concept is recognized in the design of heat exchangers manufactured from the ESCORT perspective. The presentation of data consists of highly structured cause-and-effect relationships, which, while liking the complex processes described, evoke a mass order according to the temptations of knowledge acquisition when creating a knowledge base. made to integrate as much knowledge as possible from the class structure. A central feature of this representation is that knowledge must be included for heating classes, class structure. All plants are divided into categories and genetic mechanisms are cared for as a class of objects. In turn, these classes distribute their knowledge from grade 0 to subclasses and subclasses. This structure is the branches of the plant. Shown in Figure 1.

It is possible to define a test attribute for a class of concerns. Punishment for learning. For example, controllers can be as common as possible - this is the point where the cycle conditions are set, the error, and so on. It may be necessary to use variables such as HIGH or LOV to ensure the correct application of knowledge about linguistic descriptors. cases.



CONCLUSIONS

The LINKman app has shown that rule-based managers can be used to achieve some success. He showed us the process of applying the rules governing the operation of the plant and drawing conclusions

from the experience of management engineering is very simple and by observing the normal operation of the plant.

In addition to creating rules, Hovever should create meanings for linguistic descriptors such as Too-High or Too-Lov. This procedure is similar in nature to the installation of control systems.

The artificial intelligence used in process monitoring and control has the real prospect of briefly advising the operator based on extensive experience. This online expertise should help prevent crises by identifying problems at an early stage and reducing the amount of information provided as the crisis approaches.

The application of ESCORT to a real technology plant will allow us to assess the capabilities of the technology and learn how to install such systems in the future.

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