Intelligent Systems for Power System Control Center Operator Assistance and Training

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Abstract

Modern Power System Control Centres must operate and control medium and large electrical networks that usually cover a large geographic area. The accomplishment of these tasks has been made possible due to important developments either in computer and transmission of information techniques.

Nowadays, complex Power Systems require a very accurate and efficient control what makes Control Centres especially important. These centres are equipped with SCADA (Supervisory Control and Data Acquisition) systems allowing to acquire information about the Power System and its transmission to Control Centres in real-time.

Due to the symbolic nature of the reasoning involved in some control tasks, Artificial Intelligence techniques appeared as a promising solution. Some years ago, some of the most important electrical utilities around the world began to develop knowledge-based applications to incorporate in their Control Centers. These applications deal with the information available in the Control Center and help operators in decision making.

Some of the authors of this paper have been involved in the development of SPARSE, an expert system for alarm processing and operator assistance in service restoration developed for the Portuguese transmission network.

The experience acquired during the development of this project made us especially aware of specific points that can mean the difference between a successful and an unsuccessful project in this area. Using this know how we managed to involve a bigger working team in a new project whose acronym is SATOREN. This working team involves people from academic institutions and also an important industrial partner: REN (The Portuguese Transmission Network owner).

The aim of SATOREN is to develop an integrated intelligent system for power system Control Centers. This paper provides an overview of the SATOREN system, including an example based on a real incident, and describes some modules of the system that are considered especially important for the successful use of Expert Systems in real-time applications in Control Centers, such as the intelligent and adaptive user interface, the knowledge maintenance assistant, the verification and validation assistant and the tutor module.