

Rough neural expert systems

ABSTRACT

The knowledge acquisition process is a crucial stage in the technology of expert systems. However, this process is not well defined. One of the promising structured sources of learning can be found in the recent work on neural network technology. A neural network can serve as a knowledge base of expert systems that does classification tasks. Another way of learning is by using the rough set as a new mathematical tool to deal with uncertain and imprecise data. Two methods based on rough set analysis were developed and merged with the integration of neural networks and expert systems, forming a new hybrid architecture of expert systems called a rough neural expert system. The first method works as a pre-processor for neural networks within the architecture, and it is called a pre-processing rough engine, while the second one was added to the architecture for building a new structure of inference engine called a rough neural inference engine. Consequently, a new architecture of knowledge base was designed. This new architecture was based on the connectionist of neural networks and the reduction of rough set analysis. The performance of the proposed system was evaluated by an application to the field of medical diagnosis using a real example of hepatitis diseases. The results indicate that the new methods have improved the inference procedures of the expert systems, and have showed that this new architecture has some properties over the conventional architectures of expert systems.

Keyword: Knowledge acquisition process; Rough set analysis; Neural network