Developing a Hierarchical Particle Swarm based Fuzzy Decision Tree Algorithm

Student : Fang-Jr Shiau   Advisor : Dr. Chieh-Yuan Tsai

Institute of Industrial Engineering and Management

Yuan-Ze University

ABSTRACT

Decision tree is one of most common techniques for classification problems in data mining. Recently, fuzzy set theory has been applied to decision tree construction to improve its performance. However, how to design flexile fuzzy membership functions for each attribute and how to reduce the total number of rules and improve the classification interpretability are two major concerns. To solve the problems, this research proposes a hieratical particle swarm optimization to develop a fuzzy decision tree algorithm (HPS-FDT). In this proposed HPS-FDT algorithm, all particles are encoded using a hieratical approach to improve the efficiency of solution search. The developed HPS-FDT builds a decision tree to achieve: (1) Maximize the classification accuracy, (2) Minimize the number of rules and (3) Minimize the number of attributes and membership functions. Through a serious of benchmark data validation, the proposed HPS-FDT algorithm shows the high performance for several classification problems. In addition, the proposed HPS-FDT algorithm is tested using a mutual fund dataset provided by an internet bank to show the real world implementation possiblility. With the results, managers can make a better marketing strategy for specific target customers.