

**Thesis Title: “Development of Intelligent Algorithms in Data Mining and Their Application in Prediction”**

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**Abstract**

The modern world is a data-driven one. We are surrounded by data and these data are varying and changing rapidly by time as data sets have grown in size and complexity. In the other hand, models can be derived from these large volumes of data. Traditional approaches for processing of these huge data sets cannot perform this task accurately. In order to, there has been an inevitable shift away from direct hands-on data analysis toward more sophisticated tools. Data Mining is the entire process of applying new techniques for knowledge discovery.

In this research, we reveal main principles and aspects of data mining and application of data mining methods and algorithms for Data-Driven System Identification and Prediction. My dissertation focused on application of intelligent and Bio-inspired algorithms for predictive modeling via Data Mining approaches. Various methods and approaches have been proposed for predictive modeling. These methods vary from classical methods, e.g. mathematical and statistical methods, to new approaches using intelligent and Evolutionary methods and models. These new approaches like, Artificial Neural Networks (ANN) and Neuro-Fuzzy models take advantages of learning algorithms and yielded better accuracies in prediction. In particular, combination of these approaches with other Metaheuristic methods such as Particle Swarm Optimization (PSO) and Ant Colony Systems (ACS) can be used to solve different combinatorial optimization problems. My thesis is about combination of Ant Colony Systems (ACS) with Neuro-Fuzzy based models and I could improve LOLIMOT algorithm by an Ant Colony based learning method. My improved algorithm has better performance and better prediction results with lower prediction error. This new algorithm applied for solar activity prediction using solar activity data sets.