An Evolutionary Bayesian Network Learning Algorithm using Feature Subset Selection for Bayesian Network Classifiers

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Abstract

Classification is the process of constructing (learning) a model (classifier) to predict the class (labels) for given data. Bayesian belief network classifiers allow the representation of dependencies between subsets of attributes of a dataset. But learning an optimal Bayesian belief network for a Bayesian network classifier is a NPhard problem. A number of heuristic-based algorithms have been proposed for supervised learning of bayesian belief network such as Tree-Augmented Naive Bayes (TAN), Hidden Naive Bayes (HNB). In the past decade, swarm intelligence (SI) based algorithms have been proposed for many optimization problems. Swarm intelligence based algorithms are characterized by the collective decentralized decision-making of several independent agents to search for the optimal solution in the solution search space. In this paper, we propose a hybrid swarm intelligence based Bayesian network classifier combining Hunting Group search with Feature subset selections. The Hunting Group Search - Feature Subset Selection (HuGS-FSS) algorithm has been inspired by the behaviour of a pack of hunting animals such as wolves. The classification accuracy of the proposed HuGSFSS algorithm is tested against other state of the art Bayesian
network classifiers such as Naive Bayes, TAN, A2De, and HNB. Through comprehensive evaluation using 28 benchmark classification datasets from the UCI repository, we show that HuGS-FSS outperforms the other state of the art algorithms.

References


Index Terms

Computer Science
Networks

Keywords

Bayesian Network Classifier, Hunting Search Algorithm, Evolutionary Computation