EMPIRICAL STUDY ON GREEDY ALGORITHMS FOR LEARNING DECOMPOSABLE MARKOV NETWORKS, K. J. Nunez, J. Chen*, Louisiana State University, Department of Computer Science, Baton Rouge, LA, 70803, jianhua@csc.lsu.edu

Storing discrete probability distributions is memory-expensive, but approximating these distributions using decomposable Markov networks with a limited treewidth effectively reduces this expense. Finding an optimal Markov network for this problem is NP-hard and, as a result, there exists a need for efficient algorithms that may not yield an optimal solution, like greedy algorithms. Three such greedy algorithms are discussed and empirically compared in this thesis: Malvestuto's Hyperedge Greedy Algorithm, HGA; an application of the Forward Selection Algorithm, FSA-K; and the Edgewise Greedy Algorithm, EGA. These algorithms vary in approximation accuracy and efficiency. Each of these algorithms were implemented into a computer program and experiments were conducted to compare the accuracy and speed of the algorithms to one another under varying conditions. The experiments show that (1) all algorithms produce models with similar accuracy; (2) the EGA is the most efficient; (3) the HGA produces on average a model with higher accuracy if the treewidth is large and a model with lower accuracy if the treewidth is small in comparison to the other algorithms, but is the least efficient; (4) the EGA coupled with a local search procedure produces models with the best accuracy and requires 50 percent more execution time than the EGA without the local search procedure.