

# MASTERS FINAL ORAL EXAMINATION

**Monday, October 31<sup>st</sup>  
4:00p.m. @ 223 Atanasoff**

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Major Professor: Jin Tian

## **Using Node Ordering to Improve Structure MCMC for Bayesian Model Averaging**

In this thesis I address the important problem of estimating the structure of Bayesian network models using Bayesian Model averaging approach. Bayesian networks are probabilistic graphic models which are widely used for probabilistic inference and causal modelling. Learning the structure of Bayesian networks can reveal insights into the causal structure of underlying domain. Owing to the super exponential structure space, it is a challenging task to find the most suitable network model that explains the data. The problem is worsened when the amount of available data is modest, as there might be numerous models with non negligible posterior. Therefore, we are interested in calculation of posterior of a feature like presence of an edge from one particular node to another or a particular set being a parent of a specific node. The contribution of this thesis includes a Markov Chain Monte Carlo simulation approach to sample network structures from a posterior distribution of structures given data and then using Bayesian Model Averaging approach to estimate the posterior of various features.

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