UNIVERSITY of GUELPH

COLLEGE *of* ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

MSc Seminar

Friday October 1, 2021 at 10:30am via Zoom

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Characterizing Causal Dependency in the Context of Learning NAT-modeled Bayesian Networks

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Abstract:

Handling uncertainty and probabilistic reasoning are major problems in complex decision making systems, such as medical diagnosis and risk management. Bayesian networks (BNs) were developed to cope with exponential space occupation and inference time with large number of random variables by exploiting conditional independence. However, BNs still have the limitation when the number of causes of each variable increase greatly. Hence, the Non-Impeding Noisy-AND Tree (NAT) model was studied to improve the efficiency due to its multiple merits. The method that learning NAT-modeled BNs from data was also developed by combining heuristic structure search with MDL scoring function. It was shown that this approach is feasible when data satisfy NAT causal independence, high tree-width, and low density structure.

The previous research left some issues behind, on which this study would focus. The three topics are listed as following:
1. Enhance experimental investigation with real world data
2. NAT topology induced uneven dependency among causes
3. Simulation of faithful source BNs

This study will conduct corresponding experiments to solve these issues and gain better understanding about causal dependency on learning NAT-modeled BNs.