



**COLLEGE of ENGINEERING  
AND PHYSICAL SCIENCES**

SCHOOL OF COMPUTER SCIENCE

## **MSc Seminar**

**Tuesday January 22, 2019 at 11AM in Reynolds, Room 2224**

**Learning Non-Impeding Noisy-AND Tree Model Based  
Bayesian Networks from Data**

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### **ABSTRACT:**

Bayesian Networks (BNs) is a widely utilized formalism for representing knowledge in intelligent agents on partially observable and stochastic application environments, including medical diagnosis, equipment trouble shooting, crime scene investigation, and many others. When tabular conditional probability tables are used in BNs, the space complexity of BNs is exponential on the number  $m$  of parent variables per variable. The time complexity of inference by such BNs is also lower-bounded exponentially by  $m$ . Non-Impeding Noisy-AND Tree (NAT) model based BNs can significantly improve both the space and time complexity above, rendering both complexity measures linear on  $m$ , for a wide range of sparse BN structures. In this talk, the background on NAT models and on learning BNs from data will be reviewed. In particular, the score-based approach for learning BN structures using Bayesian Dirichlet (BD) and Minimum Description Length (MDL) scoring functions will be surveyed, as well as existing strategies for search over alternative BN structures. The proposed thesis research will study learning NAT model based BNs from data. The challenges and research tasks involved will be outlined.