SEMINAR ANNOUNCEMENT

Thursday, 18th July 2024
at 04:00 pm
Room T023 - Abacus Building (U14)

Bounded Counterfactual Reasoning with PGMs

Speaker
Dr Rafael Cabañas
Universidad de Almeria

Abstract

Causality is currently an emerging direction in data science, offering numerous potential applications in various domains such as Artificial Intelligence, Economics, Social Science, and Medicine. Causal inference enables reasoning about hypothetical scenarios; for example, in a medical trial, it could involve estimating the probability of recovery for a deceased patient had they received a different treatment. Pearl's structural causal models (SCMs) represent a popular formalism for causality. These models consist of endogenous (manifest) and exogenous (usually latent) variables, with the endogenous values determined from the exogenous ones through structural equations. Often, the exogenous probabilities in an SCM are unavailable due to insufficient data for these variables. Consequently, many causal and counterfactual queries are unidentifiable and cannot be calculated by standard inference algorithms for Bayesian networks. Recently, various methods have been proposed for bounding such queries, treating it as a problem of learning Probabilistic Graphical Models (PGMs) with latent variables.

Short bio

Rafael Cabañas is currently a postdoctoral researcher in the Department of Mathematics at the University of Almería under the "María Zambrano" program, funded by the Spanish Ministry of Universities. Next September, he will begin working as an assistant professor of statistics. His research focuses on data science and machine learning, specifically in probabilistic graphical models (PGMs). His scientific production includes 11 JCR publications, with 4 of them in Q1, and 19 conference papers, one of which is Core A.

Rafael conducted his early research on Bayesian networks as a bachelor and master student in informatics at the University of Castilla-La Mancha. He received a pre-doctoral FPI scholarship, funded by the Spanish Ministry of Science and Innovation, to pursue his PhD at the Department of Computer Science and AI at the University of Granada. During his PhD, he worked on approximate inference of influence diagrams and imprecise probabilities and had the opportunity to conduct research visits in Denmark and Switzerland.

In 2016, Rafael obtained a research assistant position at Aalborg University to participate in the European project AMIDST. He worked on developing an open-source library for streaming data analysis, which has been used by companies such as Mercedes Benz, BCC, and Hugin-Expert. In late 2017, he was hired as a researcher at the University of Almería, where he participated in two national research projects and developed a Python library for a probabilistic programming language on TensorFlow, known as InferPy. This library facilitates the definition of probabilistic models combined with neural networks.

From May 2019 to December 2021, Rafael worked as a postdoctoral researcher with the Imprecise Probability group at IDSIA in Lugano, Switzerland. During this period, he worked on technology transfer projects with the Swiss bank UBS, applying his scientific expertise to real industry problems. In January 2022, he returned to the University of Almería with his current contract. In the last few years, his research has mainly focused on causal and counterfactual reasoning with PGMs.

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