

Public Abstract

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Title:An Algorithm for the Automatic Construction of Bayesian Networks with limited Domain Knowledge as applied to the prediction of Economic and Development Indicators of 248 Countries and World Regions

Humans have a natural tendency to express knowledge in terms of generalities, instead of individually measurable variables. However, to make for computers to make sense of a domain, information must be expressed in terms of measurable variables. Current computational methods either require the domain representation to be expressed in terms these variables (which can be hard for a human in many domains), or seek to discover these relationships by assuming the variables are not generalizable (ignoring human knowledge entirely). This project proposes a method to allow a computer to both, use this knowledge expressed in terms of generalities, and discover relations between the measurable variables. The computer program implemented produces a Bayesian network using a modification of an automated method developed by Friedman, Nachman, and Peér in 1999. These modifications allow testing which variables depend on which others with much greater efficiency than Friedman et al's methods (reduced from hours to seconds). The program is tested on economic and development variables by examining how closely the networks it produces can replicate the results of Smets and Wouters hand-designed economic prediction program, and whether the use of knowledge from the UNESCO (expressed in terms of generalities) can improve upon this.