DMS StatLab
Data Methods and Systems Statistical Laboratory
DEPARTMENT OF ECONOMICS AND MANAGEMENT
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BAYESIAN NETWORKS AT WORK

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Department of Economics and Management

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10.15 - INTRODUCTION

MAURIZIO CARPITA
University of Brescia

KEYNOTE LECTURE

RON KENETT
KPA Ltd., Raanana, Israel, University of Turin, Italy
Center for Risk Engineering, NYU Poly, New York, USA

ON BAYESIAN NETWORKS AND INFORMATION QUALITY (INFOQ)

MARCO SCUTARI
University of Oxford

MODELLING SURVEY DATA WITH BAYESIAN NETWORKS

FEDERICA CUGNATA, GIOVANNI PERUCCA, SILVIA SALINI
University of Turin, Politecnico of Milan, University of Milan

BAYESIAN NETWORKS IN EFFECTIVENESS OF EDUCATION

SABRINA BERLANDA, SILVIA GOLIA, MONICA PEDRAZZA
University of Verona, University of Brescia, University of Verona

FINDING CAUSAL CONNECTIONS IN NURSE-PATIENT RELATIONSHIPS

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ABSTRACTS

RON KENETT

KPA Ltd., Raanana, Israel, University of Turin, Italy
Center for Risk Engineering, NYU Poly, New York, USA

ON BAYESIAN NETWORKS AND INFORMATION QUALITY (INFOQ)

Numbers are not data and data analysis does not necessarily produce information and knowledge. Statistics, data mining, and artificial intelligence are disciplines focused on extracting knowledge from data. They provide tools for testing hypotheses, predicting new observations, quantifying population effects, and efficiently summarizing data. In these fields, quantitative and qualitative data is used to derive knowledge. The concept of Information Quality (InfoQ) is defined by Kenett and Shmueli as the potential of a dataset to achieve a specific (scientific or practical) goal using a given data analysis method. Eight dimensions help assess the level of InfoQ of a report. These are: 1) Data Resolution, 2) Data Structure, 3) Data Integration, 4) Temporal Relevance, 5) Generalizability, 6) Chronology of Data and Goal, 7) Operationalization, and 8) Communication. In this talk we show, with examples, how Bayesian networks generate high InfoQ. Specifically, we refer to examples from customer surveys of high tech companies, risk management of telecom systems, monitoring of bioreactors and managing healthcare of diabetic patients.

MARCO SCUTARI

University of Oxford

MODELLING SURVEY DATA WITH BAYESIAN NETWORKS

Bayesian networks have been extensively used in many fields to describe the interplay between the components of complex phenomena. An example is survey data, which is used to illustrate the first chapter of "Bayesian Networks in R" (Chapman & Hall, 2014). The aim of the survey is to investigate the usage patterns of different means of transport, with a focus on cars and trains. Such surveys are used to assess customer satisfaction across different social groups, to evaluate public policies or for urban planning. The two main problems in modelling such data are specifying the structure of the model and investigating how different socio-economic factors are related and confounded both among themselves and with respect to the object of the survey.

FEDERICA CUGNATA, GIOVANNI PERUCCA, SILVIA SALINI

University of Turin, Politecnico of Milan, University of Milan

BAYESIAN NETWORKS IN EFFECTIVENESS OF EDUCATION

A broad literature focused on the effectiveness of tertiary education. In classical models a performance indicator is regressed on a set of individual characteristics of the individuals and fixed effects (FE) at the institution-level. The FE coefficients are interpreted as the pure value added of the universities. The innovative contribution of the present paper resides in the use of Bayesian Networks (BN) to assess the effectiveness of tertiary education. The results of an empirical study focused on Italian universities are discussed, to present the use of BN as a decision support tool for policy making purposes.

SABRINA BERLANDA, SILVIA GOLIA, MONICA PEDRAZZA

University of Verona, University of Brescia, University of Verona

FINDING CAUSAL CONNECTIONS IN NURSE-PATIENT RELATIONSHIPS

The aim of the presentation refers to the study of the causal connections existing between nurses' competence and ability to provide care-giving, their well-being at work, including attachment, self-efficacy in emotion regulation and burnout, and their affective commitment with the hospital. The data come from the survey on nurse-patient relationship carried out in 2014 involving nurses working in North East Italy. The variables of interest are obtained by using the Partial Credit Model applied to the corresponding sections of the survey. The Directed Acyclic Graph is constructed considering an extension of the PC algorithm, taking into account the non-normality of the variables.