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Bayesian networks for complementing and building gender equality composite indicators

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Composite indicators are a common choice for synthesizing complex phenomena. Over the years, they have grown in popularity and are now applied in many social and environmental sciences. Among others, a subject of increasing interest is gender equality analysis. Gender composite indicators, even if easy to read, may provide a limited picture of the problem. Here we discuss the potentiality of Bayesian networks (BNs) to complement and build composite indicators. BNs are powerful tools for explaining the complex association structure in the dataset and developing scenarios to orient policy-making. Here we propose to use BNs to model the association structure among the gender equality index, its ingredient variables and other context socio-economic variables. In such a way the synergy between composite indicator and BN gives rise to both a monitoring tool for the gender equality gap status and a proactive inferential machine for proposing policies to reduce inequality. BNs can be also used to build the gender equality index, and, in general, any composite indicator. Specifically, we focus attention on an extension of BNs, namely Object-Oriented Bayesian networks (OOBNs). The modularity of the OOBN ensures a computational logic that is consistent with composite indicators, while also providing additional information about the relational structure of variables. An example is carried out on Italian province-level data.

Keywords: composite indicator, gender equality, multivariate dependencies, Object oriented Bayesian networks

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