

PhD Thesis on "Reliable Modelling of Social Network Data"

Gabriele Braghelli

Supervisors: Dr Daniel J. Redhead, Prof. Marijtje A. J. van Duijn, and Dr Letty Koopman

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Project Description

In social and behavioral sciences, researchers often rely on self-reported data to map social relationships such as friendship, advice, or collaboration networks. However, these self-reports are far from perfect: people may forget, misinterpret, or apply different criteria when identifying their social ties. As a result, reported networks often diverge from the true underlying structure, leading to biased conclusions. This PhD project aims to develop statistical models that explicitly account for measurement bias in social network data while also capturing higher-order network patterns and multiple relational layers. The work is based on Bayesian latent network models, which estimate both the hidden "true" network and the biases in individual reports.

These models will be extended to include features such as transitivity (friends of friends becoming friends) and to handle multiplex networks, where several types of relationship are observed simultaneously (e.g. friendship, advice, support). To validate the models, the project will analyze multiple large-scale and diverse datasets, including classroom friendship networks from the CILS4EU, RECENS and SocioPatterns projects, as well as cognitive social structure data from BaYaka forager communities. The aim is to evaluate how different data collection methods shape the reliability and inferred structure of social ties.

Ultimately, this research bridges advances in social network analysis and psychometrics, providing a more reliable and theoretically grounded understanding of human social structures. The final results will include an open-source R package and a tutorial paper to make the new methods accessible to the wider research community.