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Title: A latent space approach for interdependent ego-networks with application to criminal networks

Abstract:
A new latent variable modelling approach is presented to investigate the latent structure of criminal networks. This allows us to explain the relational structure of the data by estimating the positions of the suspects in a latent social space. In particular, we illustrate this new methodology by exploring a complex network consisting of interdependent ego-networks based on the wiretaps acquired by the Italian Police in 2014 on 28 suspects (egos) during an investigation about human smuggling out of Libya. The statistical challenge with these ego-networks is that the large number of alters (more than 15k) can potentially be members of several ego-networks. Moreover, from a computational point of view, this model is difficult to estimate due to the intractability of the likelihood. To efficiently overcome this difficulty we adopt an efficient variational algorithm. The flexible modelling framework introduced can be adapted to a wide range of network settings.