

The society of Venice during the 18th century: an analysis of marriage certificates using Bayesian models for social networks,

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Abstract (maximum of 300 words):

The development of statistical models for analysing network data has produced important results in the social, natural and economic sciences. Nevertheless, the application on studying historical social networks, which would give us the possibility to deepen our understanding of past societies, is still underdeveloped. In this research we analysed the role of the distance between the *contrade* and the *sestieri* of residence of the spouses and their witnesses in the construction of friendships relations, thanks to the arrangement of marriage acts of a Venetian parish in the 18th century.

We chose to adopt latent factor models in order to consider both the network structure present in the data and the possible presence of unobserved variables. Both additive and multiplicative latent factor were used: the former are able to model second-order dependencies such as degree heterogeneity and reciprocity; the latter are able to capture higher-order dependencies typical of social networks such as the presence of clusters and transitivity. The response variable, the count of spouse-witness pairs between different districts, was modelled both as a Gaussian, for simplicity of treatment, and as a Poisson, for adherence to the type of variable.

At the statistical level several models have obtained good results, but it has been verified that the model that has shown the best performance and that is easier to interpret is a Poisson network model.

The results obtained show that there is a negative association between the distance between residences and the relationship studied; on the other hand, there does not seem to be evidence of an association with *sestieri*. Therefore, at the application level, it has been demonstrated how the adoption of these models can extend the knowledge of past societies through documents already adopted in historical demography.

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