

Spatial correlation in bipartite networks: the impact of the geographical distances on the relations in a corpus of medieval transactions

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Abstract. In this article, the influence between a spatial information and interactions between individuals is addressed. This issue is illustrated through the analysis of a corpus of notarial acts established during the Middle Ages. In this corpus, the persons interact in common transactions that are geolocalized. The present work tries to quantify the impact of this spatial information on the relations between people. As the spatial information as well as the relations between individuals are derived from the same source (the transactions in which the individuals have been involved), a standard Mantel test (Mantel, 1967) is not suited to address this issue. A similar methodology, based on the adaptation of the original permutation test, is thus proposed and illustrated in that context.¹

1 Introduction

Relational models are increasingly used as a theoretical framework in a number of real life situations. Indeed, “graphs” are useful models to mathematically describe co-expression networks and metabolic pathways (biology), social relationships, computer networks or any other kind of data where the objects under study, the “entities”, are related to each others by a given type of relation (Dorogovtsev and Mendes, 2003; Newman et al., 2006). In the simplest case, the graph is made of N nodes (or vertices) $V = \{x_1, \dots, x_N\}$, each one representing an entity, and a set of edges $E \subset V \times V$,

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