

## Visualizing the Commercial Activity of a City by Analyzing the Data Information in Layers

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**Abstract :** This paper aims to demonstrate how network models can be used to understand and to deal with some aspects of urban complexity. As it is well known, the Theory of Architecture and Urbanism has been using for decades' intellectual tools based on the 'sciences of complexity' as a strategy to propose theoretical approaches about cities and about architecture. In this sense, it is possible to find a vast literature in which for instance network theory is used as an instrument to understand very diverse questions about cities: from their commercial activity to their heritage condition. The contribution of this research consists in adding one step of complexity to this process: instead of working with one single primal graph as it is usually done, we will show how new network models arise from the consideration of two different primal graphs interacting in two layers. When we model an urban network through a mathematical structure like a graph, the city is usually represented by a set of nodes and edges that reproduce its topology, with the data generated or extracted from the city embedded in it. All this information is normally displayed in a single layer. Here, we propose to separate the information in two layers so that we can evaluate the interaction between them. Besides, both layers may be composed of structures that do not have to coincide: from this bi-layer system, groups of interactions emerge, suggesting reflections and in consequence, possible actions.

**Keywords :** graphs, mathematics, networks, urban studies

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