Canada and Mexico trade patterns: an ego networks approach

Topic: Input-Output Tables as a Network I
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In this paper trading patterns of Mexico and Canada are analyzed using the so called â€œego networksâ€•. These two countries are part of NAFTA and their links with the main protagonist of the treaty, the United States of America, have defined many features of their economies; however, its trade links with other countries have been little investigated. In this work we do that. An ego network consist of a focal node ("ego"), together with the nodes they are directly connected to (termed "alters") plus the ties, if any, amongst the alters.

The ego networks are attractive due to the ease of data analysis compared to entire networks; the link information of the alters, usually obtained from the ego, have a simple and limited structure. To study the economic connections between groups of countries, ego network analysis has the advantage that these countries do not have to be prominent actors within the whole network and a fair insight can be obtained from their role in the structure of the world trade. In this article we will work with the database of WIOD (World Input-Output Data Base) locating alters for the economies of Canada and Mexico in terms of their export and import structure, both in gross exports value and added value terms. The main techniques for analyzing ego networks are based on the attributes of the alters. We shall start with a discussion of compositional measures that focus purely on summarizing the characteristics of an egoâ€™s alters. For example, we might be interested in determining the distribution of alters in regards to a specific categorical variable such as geographical localization, size of the countries, language and other characteristics. We can also investigate the composition of alters in terms of continuous variables and calculate the average, maximum, minimum, total values, and standard deviations of selected alter attributes. We want to investigate the diversity of alters with respect to specific variables such as the products exchanged. For categorical variables, we could obtain two classical measures of heterogeneity: Blauâ€™s index (also known as Herfindahlâ€™s measure), and Agrestiâ€™s IQV. Egos whose alters are mostly the same with respect to some categorical attribute (e.g., geographical proximity or language), will have small heterogeneity scores while those with more diversity in their ego-networks will have a value closer to 1. For continuous variables such as GDP or openness degree it is possible to get the standard deviation of the altersâ€™ values.
We will investigate the similarity between ego and alters, termed homophily, and also egoâ€™s propensity to have ties with alters in the same group or class as self. The grouping variable will be determined based on data availability. The measure is calculated by totaling egoâ€™s ties to alters who are â€œexternalâ€• (i.e., those that are in a different attribute category), subtracting the number of egoâ€™s ties to alters who are â€œinternalâ€• (i.e., from the same attribute category) and dividing by network size. Finally, we shall study structural characteristics of Canada and Mexico networks such as density and structural holes. According to structural holes theory it is advantageous in many settings for ego to be connected to many alters who are themselves unconnected to the other alters in egoâ€™s network and try to take advantage of such situation filling up those holes.