Methods

Input FactSet data: 943131 rows and 4 columns. It contains supplier-buyer data along with the time duration. The data starts from April 2003 and upto May 2017.

Column 1. Supply relation start date

Column 2. Supply relation end date

Column 3. Supplier company

Column 4. Buyer company.

Creating tier-wise directing network graphs over 40 quarters

1. First, we create a matrix representation of Quarter-wise supply relation data. This matrix contains "Total number of Quarters" columns and "Total number of company relations" rows. Each entry in this matrix is 1 if there is a supply relation from company a to b at quarter t.
2. The above matrix is used to create directed network graphs at each quarter. Each directed network graph contains nodes which represents companies and directed links which represents supply relation from company a to b.
3. We perform network analysis for supply network by considering one focal company and its suppliers. We filter the directed network graph and create a new directed graph that contains only the ‘focal company’ and its suppliers. This directed graph will be used for all further analysis and obtaining results.
4. The first step in analysis is to obtain the Euclidean distance of suppliers from the focal company. This distance is used to define the tier of a given supplier. For example, a supplier in tier-3 would be at a Euclidean distance of 3 from the focal company. In other words, has 2 suppliers between itself and focal company along the shortest supply path.

Note: Euclidean distance is the shortest path in terms of nodes traverse to reach one node from the other.

5. After creating directed network graphs and obtaining information on tier value of suppliers for 40 quarters, we move to next part of the analysis.