TRACKING INNOVATION NETWORKS IN ELECTRICITY USING TWITTER

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Overview

In this paper, we make an approximation of the innovation network in the electricity sector worldwide. The structure of the network matters to determines the cumulative body of knowledge and the virality of new ideas. Understanding the shape of this network can help explain, for instance, the patterns of diffusion of technological innovation such as the direction, speed, growth and accuracy of future innovations, i.e. the degree of network effect, (Katz et al. 1994, p. 94).

The second objective is to identify influential players within this network. Our premises are as follows: each participant has a piece of information necessary for the solution of specific problems. The problem can only be solved when all information is pooled. Individuals interact and influence one another, but they do so more with those participants with whom they have proximity. While each member of the network can communicate directly with those with whom they are directly linked, they can reach out many more depending on their level of connectivity. The more these nodes are positioned at the core of the network, the more likely they will influence innovation, or be early adopters. Centrality gives participants a technological edge, and a percepcion of leadership and influence. Other important players are “gatekeepers”. These are nodes that while not necessarily central, are the single entry point connecting a cluster with the rest of the network. They could influence the group by withholding information or distorting its transmission.

Methods

In the past, it would have been very difficult to draw a map like this. However, participants now leave digital traces of their relationships. We approximate the network of innovation in the electricity sector, which includes venture capitalist, government agencies, university professors, and firms. The seed of this network is a dataset of electricity startups database that we developed and describe in Fuentes, et.al. (2022). This dataset includes these startups’ Twitter accounts. We snowball this original dataset by recording who these startups follow, and classify them according to their main activity as venture capitalists, government agencies, university professors, etc. The underlying assumption of this database is that if two participants know X, it is more likely that they know each other.

One way to identify leaders in communities is to question positional (formal) leaders to develop a list of reputed (informal) leaders; then ask these reported reputed leaders to determine their top influential. We instrument this idea using Twitter. We identify those accounts from our data eset with the highest number of shared connections, strong ties (participants who follow each other) and weak ties (accounts whose following is not reciprocated).

Results

Our results will visually show patterns of social network and we will analyse their consequences.

- The first result is the identification of central players (leaders) in the entire network, by region and by category.
- Then we assess the overall structure of the network: average distance between participants, webbiness, and clusters.
- We then categorize networks and subnetworks as closed or open, depending on the existance of weak, strong or absent ties. This is important because a closed networks can collude, while more open networks can promote innovation as new ideas reach the cluster thanks to strength of weka ties.
- Then since the aim of this excercise is to to understand ahead of time which ideas will become more viral we analyse what are the key interests of key network participants. We match their "revealed" interests in Twitter with 4 megatrends --decarbonization, digitalization, distributed technologies or electrification-- and the 43 key technology domains that we identified earlier in Fuentes et.al. (2022).

Conclusions

There are many caveats with this approach. First, this is an informal network and "friendships" in social networks are not really comparable to friendships in real life. We therefore may be overestimating the size of the network and how solid these relationships are. However, Twitter is a channel for information flow. Another is that networks are loose structures that are created spontaneously, and whose outcomes would be difficult to direct.

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