

0.1 Qualitative Analysis of Community Memberships Across Types

As demonstrated in [?] in the context of modularity maximization-based community detection, an exponential number of nearby partitions may exist that nearly maximize an objective function used to measure the goodness-of-fit of a graph partition. Because of this and related issues, it is always wise to perform some sort of curated study of the communities returned by any community detection algorithm to verify their meaningfulness with respect to the scientific question at hand. In this section, we consider a collection of communities in such a study.

In the topic-based communities, we find a single community consisting of 83 users who tweet about environmental issues and frequently use hashtags such as #green, #eco and #sustainability. We also find a different community of 47 users who tweet about small businesses and entrepreneurship, using hashtags such as #smallbiz, #marketing and #entrepreneur. In both cases most members of the topic-based communities are not found in the same community in the other networks, indicating that while these people talk about the same things and can therefore be considered a community based on their content, they do not strongly interact with each other nor behave the same, and so belong to different social groups with respect to interactions and behavior.

Another interesting example is the one of a community whose topics tend focus on Denver and Colorado. These users do not belong to the same community in the interaction-based network, but most of them do belong to the same community in the activity-based network. This indicates that these users react to the same events and issues regarding Colorado and are therefore strongly connected in the topic-based and activity-based networks, but at the same time they do not directly interact with each other and are therefore more loosely connected in the interaction-based networks, where they belong to different communities.