

Three Facets of Online Political Networks: Communities, Antagonisms and Controversial Issues

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ABSTRACT

Without any doubt, for the last decade, online social networks have been hubs for political participation both for elite members such as politicians, parliamentary members, and ordinary citizens. Each online activity leaves digital traces of the users participating which enable researchers to study online political behavior and build multi-faceted sensors to understand the underlying dynamics. In this talk, I broadly focus on three facets of online political behaviors of users and how to model them. First, I investigate the formations of communities in online political networks. Second, I focus on detecting negative linkages between users such as enmities or antagonisms. Third, I present the problem of the controversial issue and frame detection in online political networks. For each part, I give one exemplary recent work and possible future directions to take.

KEYWORDS

Online Political Networks; Community Detection; Negative Link Prediction; Sentiment Analysis; Word Embedding

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1 BACKGROUND AND SUMMARY

Online social networks have been attracting people from a wide range of political spectrum for the last decade to express their political opinions, share the news that they care with their contacts, form groups and debate with or against each other. Beyond individual participation, protests are organized [7], [12], new alt-right movements emerge [3], terrorist organizations recruit [11] and many other political activities reside in online environments. Most importantly they leave an immense amount of digital footprints while participating. These traces of people's online political activities

give researchers unequivocal opportunities to analyze, reason and predict the human behavior in online political settings.

The challenges of conventional social media mining research is present for political sub-domain of social media data as well. Sparsity of the user network and short and noisy nature of textual content constitute the major body of the challenges. Moreover, in the political sub-domain a high level of irony and indirectness are involved. In this talk, I focus on three dimensions of multi-faceted human activity in online political networks,

- online communities and what do users have in common in a politically pure online community,
- antagonisms, enmities or any other form of negative linkages between users in online political networks,
- and controversial issues causing polarization in online political networks and frames each side puts forward for issues.

Further details for each dimension are given in Section 1.1, 1.2, and 1.3, respectively. I give one recent proposed model for each dimension of online political activities of users and possible future directions for research.

1.1 Community Detection

Community detection is an integral part of studying online political networks. A community in an online political network is a group of users which interact with each other more than they interact with others and share similar characteristics in terms of their political belongings. Many studies show that endorsement network of users gives invaluable piece of information to detect underlying politically pure communities. For example, in the political sub-domain of Twitter, retweet network of politically motivated users uncover the political identities of groups [1], broadly. However, the sparse nature of endorsement networks challenges to identify political groups in complete chunks. Many users do not endorse each other although they propagate similar political contents. It may be simply because they do not know each other.

In this talk, a recent work [8] that tackles the sparsity problem by employing network-independent features of users is presented. The role textual content, shared article URLs and platform specific content tags (i.e. hashtags) play in formation of communities is studied by proposing three different non-negative matrix factorization frameworks. The work also incorporates social balance theory to introduce new artificial endorsement links between users to overcome the sparsity problem. Possible future directions are

investigated in three folds; temporal dynamics of communities, emerging and fading communities.

1.2 Negative Link Prediction

Capturing disagreements, antagonisms, and enmities constitutes another vital dimension of understanding online political activities of users. They may be even more informative than detecting alliances, agreements or coalitions in the settings where endorsement and sharing is motivated by the online platform. Two typical examples are Facebook and Twitter in which features of endorsement and sharing is available in different forms such as retweet, like or share while opposition, disagreement or any form of denouncement are not. Features of platform-specific positive interactions help us to understand the nature of positive links between users. However, capturing negative links is a much more challenging task since there is no explicit “dislike” feature in major online social network platforms.

In the talk, a recent work [10] which suggests exploring sentiment signals in textual interactions, platform-specific positive interactions and their composition for negative link prediction is briefly discussed. The work assumes that if textual interactions of two users (i.e. mentioning in Twitter) carry many negative sentiment words, two users likely to form negative link between each other. It further assumes two users to have a positive link in between if they use any platform-specific positive interactions towards each other. It also follows simple social balance rules such that enemy of my enemy is my friend and friend of my friend is my friend to advance the link prediction model. In the talk, two applications of the framework are presented to show the added value of the negative links in detecting communities more accurately and in describing rivalries and coalitions more effectively.

1.3 Issue and Frame Detection

The last facet of understanding online political activities of users this talk focuses is detecting controversial issues and frames. Online social network users express their opinions on various political issues. Needless to say, each user brings its own perspective and nuances are inevitable. Characterizing which issues polarize online crowds, while which issues bring communities closer is a key to understand the dynamics behind formation of coalitions and conflicts. Moreover, capturing the sides communities take for a controversial issue correctly is also valuable. Although it is a well studied problem for conventional text documents such as parliamentary floor debate records, a few effort has been put forward for detecting controversial issues for online social networks [4] [5] [6].

By [2], framing is defined as *selecting some aspects of a perceived reality and make them more salient in a communicating text*. A recent work [9] that incorporates the concept of framing to capture controversial issues into a word embedding model is discussed to illustrate a solution to the problem of issue and frame detection. It proposes to model dimensions of embedding space as frames that are highlighted by different groups. Then, it computes a unique community specific vector representation of each issue. The distance between community specific word vector representations of each issue becomes an effective metric to quantify the controversy

of it. The more distant the vectors of the issue are the more different frames are used for the issue by each communities.

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