News-sharing on Twitter reveals emergent fragmentation of media agenda and persistent polarization

Tomas Cicchini[1,3], Sofia M. del Pozo[1,2], Enzo Tagliazucchi[1,2], and Pablo Balenzuela[1,2]

[1]Departamento de Física, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires. Buenos Aires, Argentina.
[2]Instituto de Física de Buenos Aires (IFIBA), CONICET. Buenos Aires, Argentina.
[3]Instituto del Cálculo (IC), UBA-CONICET. Buenos Aires, Argentina.

Abstract

News sharing on social networks reveals how information disseminates among users. In this work, we used bipartite news-user networks to study the news sharing behavior of main Argentinian media outlets in Twitter, in order to understand the role of political polarization in the emergence of high affinity groups with respect to news sharing. The behavior of users resulted in well-differentiated communities of news articles identified by a unique distribution of media outlets. In particular, the structure of these communities revealed the dominant ideological polarization in Argentina. We also found that users formed two groups identified by their consumption of media outlets, which also displayed a bias towards the two main parties that dominate the political life in Argentina.

Keywords: Social network analysis, News consumption, Natural language processing

Introduction

The mass media play a preponderant role in the formation of public opinion [1, 2]. Nowadays, many people are exposed to news and share them through social media [3, 4]. Therefore, understanding the way in which information circulates through them plays a fundamental role in the process of opinion formation.

Information flow is strongly influenced by how users connect among them in different social media. This connectivity [5] arises with formation of ties based on affinity, group membership or trust in influential individuals or organizations, among other causes [6]. As these ties emerge, social networks become clustered, leading to constraints on information flow.

The emergence of highly connected groups of individuals is a topological feature that repeatedly arises in studies of social networks in relation to discussions around specific topics. They have been observed in networks defined by preferential message propagation (*retweet networks*, in the case of Twitter) [7] , as well as in networks of followers [8]. These groups reflect the clustering of individuals based on different measures of similarity among users [8] creating homogeneous communities that are frequently known as *echo chambers* [9]. In these works, the reported polarization phenomena refers to groups which extreme their opinions on discussions around a specific topic (gun control, vaccination, etc.). However, topics are rarely discussed in isolation [10] and the phenomenon of issue alignment phenomena plays a key role in polarization in the political process, leading to antagonistic ideological states.

In this work we investigate which are the key features leading to the emergence of well defined groups in the process of news sharing of the main media outlets in Argentina. The main hypothesis of this work is that

the way in which users share news on a social networks, such as Twitter, is mediated by personal preferences and ideological affinity in such a way that it is possible to detect emerging groups as a consequence of these interactions.

Data & Methods

Twitter users sharing links to media content were selected in order to analyze the emergence of structures from their complex pattern interactions, following a similar approach than in [3]. We focused our analysis on two different periods: from August 29th to September 30th 2019 and from June 4th to July 4th 2020.

With the aim of investigate the leading of the emergence of well defined groups, the complex pattern of news shared by multiple users can be mapped onto bipartite networks following the procedure sketched in [3].

Bipartite networks have two different classes of nodes and can be projected into news and user layers. Connections in the news projection indicate co-consumption across users, while the user projection describes users connected by news in common. These two projections were analyzed using community detection algorithms, as well as external metrics of the news were taking account, such as the semantic content and the media outlet they belong to. Moreover, we use topic detection and sentimental analysis in order to understand the structure of the news projection. In Figure 1 the results of the news networks analysis are shown.
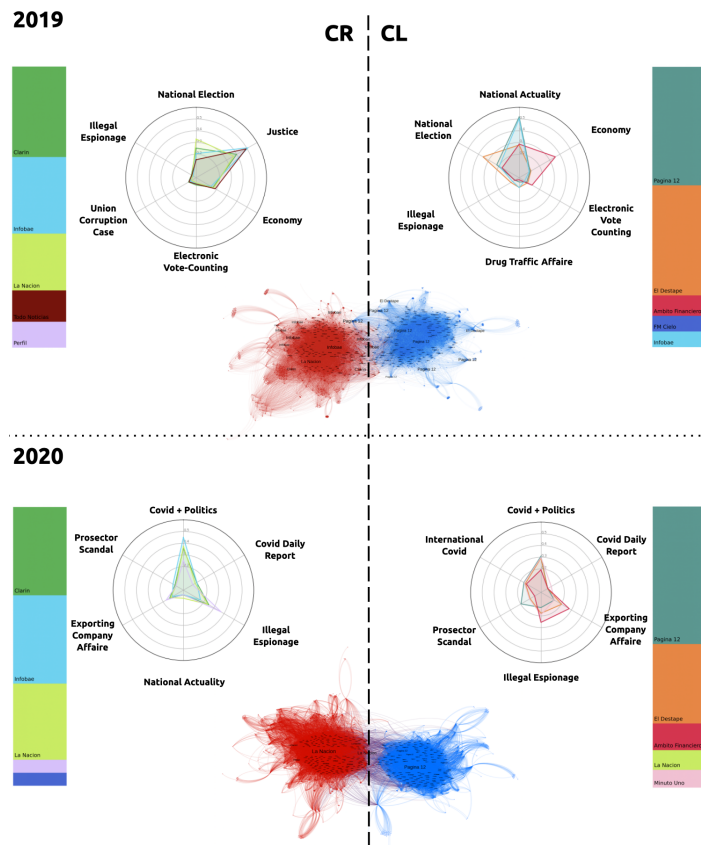

Figure 1: *Media outlets distributions and topic decomposition for the 2019 and 2020 two main communities. The stacked bars represent the media outlet distribution, while the radar plots display the media agenda. The agenda of each outlet is indicated with lines colored with the same color as in the stacked bar.*

News Networks

When detecting communities in the news networks we find a qualitatively correlation between the news media and the structure of communities. To quantify this, each community was described by a vector C_i^m, with each component associated with the amount of news from the media outlet m in the community i. With this, we calculate the cosine similarities between the main community vectors of the same year, and also from one year

to the other. Thus, we observe that there are subgroups of communities associated with certain media groups. In particular, a subgroup associated with center-left media and another, with center-right media. Then, we added the study of the sentiment bias around certain figures of national politics, with the aim of seeing if the Argentine political polarization was reflected in this community structure. These results confirmed that the center-left media set in both periods showed opposite behavior to that of the center-right. Further details can be found in [11].

User Networks

We also detect communities in the user network, finding a strong relationship between the media of news shared by users and the community to which they belong. Identifying users with a vector of media consumption m^i, we calculate the similarity between users and the average of these vectors of each community. We again find sets of communities more similar to each other, where the same media subgroups appear as before. Further details can be found in [11].

Discussion and Further Analysis

In this work we study if news sharing of Argentinian newspapers in social media produces the emergence of homogeneous groups in terms of media consumption habits. Our main contribution is the detection of echo chambers in bipartite user-news networks and their identification in terms of consumption patterns of media outlets associated with the underlying ideological leaning patterns in Argentinean political life.

Our results contribute to the characterization of echo chambers in terms of vector-media consumption and the use of sentiment bias to infer the leaning of media outlets. They also shed light on the process in which the political polarization in Argentina constrains the exposure to media content in social media.

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