

Issue networks on the Web: a proposal of components and characterization

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Abstract: Many types of research on Social Sciences, Political Sciences and Market Sciences present the need to obtain information about the opinion or public reaction to certain topics. The Web is a source of information which might help satisfying this need, but to achieve this goal it is necessary to develop concepts and methodologies allowing to understand how it works, and to extract the different forms of knowledge it contains. This article presents the concept of “issue network”, and through a theoretical revision of hyperlink studies, the concepts of “issue” and “actor” and the concept of issue network itself, we expose its characteristics, the problems it solves and the possibilities it offers to opinion studies.

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1. Introduction

Hyperlink analysis has been conducted in the fields of Physics (Barabasi, 2002), Computer Science (Brin and Page, 1998) or Information Science (Almind and Ingwersen, 1997). In Social Communication Studies, it has been applied to research about communication between political representatives (Ackland, 2005; Park and Thelwall, 2008), interest groups (Rogers and Ben-David, 2008; Shumate and Lipp, 2008; Shumate, 2012), or information flows between countries (Hsu and Park, 2012).

Nevertheless, there does not seem to be current consensus regarding how to interpret the results offered by hyperlink analysis. The dynamic nature of the Web and the lack of publication controls make it very hard to draw clear conclusions from the quantitative data this type of analysis might provide (Thelwal, 2006).

The difficult extraction of information samples that are large enough to be analyzed, the volatility of the samples extracted due to the constant publication of new information or phenomena such as “rich get richer”, meaning that the most hyperlinked sites receive more incoming links because of their already hyperlinked nature -which prevents from considering the logic reasons that tend to be attributed to hyperlink creation-, tend to complicate the development of an unitary theory on hyperlink analysis. Thus, combined methodologies are required to solve these research problems.

Precisely, the concept of “issue network” might be able to deal with this circumstance. To that end, we suggest a dual model which both distinguishes and applies to notions of “empirical networks” and “epistemological networks”. Thus, the analysis of empirical hyperlink networks, an analysis which only considers hyperlinks (because they are based in connections in the source code between several webpages), is related to the analysis of epistemological issue networks (based in the connections in the core of the debate topic), which analyses the connections established between different actors around a common interest topic (Young and Leonardi, 2012).

The main goal of the analysis of issue networks is to bring information regarding how the opinion-forming processes work online, as well as to extract objective data on the opinion currents generated around a topic over time.

More than four decades ago, the German sociologist Niklas Luhmann (1968) suggested the rise of a complex society brought about by the acceleration of the industrial and technological development of society and the increase of organizations oriented towards social administration or economic, political and cultural management. This quick transformation involved the rise of a model of complex society wherein agenda-setting appears as an organizing principle of the communication system, the political system and the public opinion.

In this new era, citizens are receiving news and information on public matters through very different and varied websites (Shaw, Stevenson and Hamm, 2002), and this statement raises a question which intends to be answered through the analysis of online issue networks. It is possible for researchers to keep developing studies to measure communication effects when the amount of sources influencing citizens is so large that it is difficult to quantify and analyse them?

For the analysis of issue networks in the Web to be applied dynamically enough so that it adapts to how opinion phenomena operate online, it is necessary to establish clear and systematic methodologies, which might be: (a) scalable and (b) reproduced in a reasonably short period of time.

However, we consider that only after clearly defining the elements characterizing issue networks we might be able to suggest analysis systems for them. This is why the goal of this article is to identify and describe the characteristics that the elements being part or intervening in an issue network have to present, and which according to previous research are the following: (1) hyperlink networks, (2) issues and (3) actors.

The following parts present a discussion on these three concepts and suggest an operative definition for each one of them: but firstly, and as context, we present a summary on issue networks theory.

2. Issue networks

The first definitions of “issue network” applied to web analysis emphasized hyperlink analysis, but added the analysis of the issue around which hyperlinks are generated. Rogers (2002) identifies the issue around which a network is created according to a keyword, without considering its characteristics or the possible problems caused by polysemy or synonymy: “an issue network is a hyperlink network through which information related to a keyword flows”.

In the field of Political Sciences, the concept of issue network had already been studied and applied before the appearance of the Web, particularly focusing on the debate (or controversy) topic, or the thematic area around which different political actors gathered, and not so much on the connections between those actors.

That is why in 1986 Schlozman and Tierney define an issue network as a network of politicians or actors related to the political field, who, either in the government or not, are linked by their interest, knowledge and commitment to a thematic area. This definition takes into account the factors determining that an individual or organization is considered an actor in an issue network, in this case being a political actor or being related to the political field. It also suggests a wider concept of thematic area which, unlike Rogers’ definition, is not simply defined by a keyword.

But Foot and Schneider (2002) define the concept of “web sphere” not only as a collection of websites dealing with a common theme, but also as a series of digital resources which are dynamically organized around an event, concept or theme, often connected through hyperlinks. This definition shifts emphasis from the hyperlink network to the event, concept or theme around which a series of digital resources is generated. The characteristics of the organizations or individuals generating this digital

resource do not become explicit, nor is it detailed whether the events, concepts or themes around which the web sphere is organized must fulfil some specific characteristics.

We believe that the problem with studies using hyperlink analysis is that the concepts of “issue” and “actor” have not been clearly defined, despite having been used and implicitly considered as important elements in the analysis of issue networks. Also, the issues around which hyperlink networks and actors which are ultimately responsible for creating those networks and bringing opinions related to the issues are formed are fundamental factors in the constitution of issue networks on the Web.

Considering all of the above, and to try and overcome the problem of lack of definition we have already highlighted, we devote the next parts of this article to study the characteristics of the three components intervening in our theoretical proposal of an issue network model: (1) hyperlink networks, (2) issues and (3) actors. At the end of each part, a definition will be suggested for each of the three indicated concepts.

2.1. Hyperlink networks

In the mid-1990s, Almind and Ingwersen (1997) coin the term “webometrics” to refer to a set of bibliometric research techniques applied to web studies, hyperlink study being among them. We understand by “hyperlink” the portion of source code of a webpage (element `<a>` plus attribute `href`) which activates a new browsing destination if the user clicks on it.

From an Information Science perspective, a hyperlink acts similarly to a bibliographic citation, since it involves that the author activating the link attributes a certain relevance to the destination page. Thus, networks created through hyperlinks can be explained in terms of credibility, prestige and trust (Kleinberg, 1999), as happens with citations in scientometric studies. Another way of considering hyperlinks, paraphrasing the founders of Google’s search engine, is in the form of a vote: if page A links to page B, page A is issuing a vote for page B. Thus, always according to Google, pages with many backlinks are considered quality or authoritative pages on a specific issue.

However, beyond the initial view which put the hyperlink on a level with the bibliographic citation, social network theory has indicated other functions of the hyperlink assuming that the pattern of connections established on the Web influences the behaviour of the actors establishing a hyperlink (Freeman, 2004).

Applying these concepts coming from social networks derives in a new perspective in hyperlink studies: the analysis of hyperlink networks (Park, 2003). This kind of analysis has been applied to the study of Internet regions such as the political sphere of the United States (Foot and Schneider, 2002), the visibility of nanotechnology in the Internet (Ackland et. al., 2007) or politicians’ websites in South Korea (Park and Thelwall, 2008).

According to this focus stemming from Communication Studies, in a hyperlink network actors are the organizations or individuals editing or managing websites, and hyperlinks are an associative mechanism between information creators. In this kind of networks, hyperlinks are not only mechanisms to grant credibility as happens with citations, but,

as Ackland and Gibson (2006) point out, they present at least five additional functions which are very significant:

- *Information provision*: hyperlinks might direct the visitors towards additional information sources.
- *Creation of networks and reinforcement*: hyperlinks allow for the organizations to create virtual alliances and networks and to keep and reinforce previously existing connections from the offline sphere through online-created bonds.
- *Creation of identity*: the creation of indirect or implicit connections between groups might help in strengthening the identity of the components of those groups by strengthening the identity of the group itself.
- *Exchange of audience*: the integration in a group might achieve, in a more efficient and immediate way, that audiences and potential supports are shared among the members of a group, specially in opinion groups.
- *Amplification of the message* or multiplying force: hyperlinks convey a distorted image of the extension of the support a message receives.

Thus, hyperlinks are not only useful for the information flow and the transmission of messages. They have a representative function which influences the creation of identities in the actors activating them, and allow for the creation of community bonds (Shumate, 2012).

Definition 1: Hyperlink networks

In Social Sciences and Information Sciences, a hyperlink network is a dynamic system which enables the information flow between different websites, and through which community connections are established between the actors creating the hyperlinks.

2.2. Issues

When applying a communicative approach of this kind, it is necessary to contemplate other factors into the analysis beyond hyperlinks themselves, to analyse the actors intervening in the network, whether they are individuals or organizations, and to analyse the issue these actors are associated with.

The first attempts to define the concept of “issue” from an interesting point of view for this article come from the field of Media Studies, specifically from the “agenda setting-theory”. This theory was presented in McCombs and Shaw’s celebrated article “The Agenda Setting Function of Mass Media” which defined the function of agenda-setting as the result of the connection between the emphasis mass media placed when dealing with an issue and the thematic priorities manifested by the members of an audience after receiving media impacts (McCombs and Shaw, 1972). That same year, Cobb and Elder defined the idea of “issue” as a conflict or reason or disagreement between two parties (Cobb and Elder, 1972).

In Sociology, Luhman (1974) developed the concept of “issue”, according to which public opinion must be conceived as the thematic structure of public communication. For Luhman, the structural transformation of the political system has increasingly involved the centrality of issues and political controversies. Thus, issues have become essential strategic resources in the politics of complex societies.

Within the same sociological current, Marletti (1985) distinguishes between a “topic” and a “political theme” or “issue”. The “topic” is but a form of symbolic generalization of singular situations enabling communication, whereas the “issue” or “political theme” is formed through the consolidation of stances defended in a controversy generated about a topic. Thus, political themes or issues are objects of discussion developed through the interaction between social and political actors with different stances.

The term “issue network” we use in this article comes from the abovementioned authors and theories. In Spanish –the language in which this article was originally written- there is no distinction between “topic” and “issue” (they both might be translated as “tema”, and even “theme” can be translated as “tema”), thus the need to exactly define the concept we are talking about when talking about an “issue”.

The object of study in the analysis of issue networks are these controversial or political issues, and hyperlink analysis is the technique which allows establishing the existing empirical connections between the actors defending their positions on an issue.

Navigation through hyperlinks might help understand the connections between different actors and the different positions regarding an issue, and might provide a wider context of the different voices participating in a thematic space (Rogers and Marres, 2000; Shumate and Dewitt, 2008; Young and Leonardi 2012). That is to say, by navigating hyperlinks we might access the different opinions and discourses of the actors participating in the network and obtain a global image of the issue discussed, also obtaining information about the actors behind the different discourses.

This proves that the empirical analysis of hyperlink networks which studies information flows might give a step towards epistemological analysis, which seeks to reveal the representative value of hyperlinks and the network they form. Thus issues, understood as discussion objects affecting society and developing through the interaction between actors with different positions, become an identifiable object of study.

Definition 2: Issues

An issue is a set of ideas, theories and concepts that generate controversy between groups of political, social or economic actors.

2.3. Actors

In the previous definition of “issue”, we highlighted the need for interaction between actors with different positions but, who must be considered an actor? Or, in other words, under which circumstances an individual or organization must be considered an actor?

Only by understanding the nature of the actors participating in the network and how those actors generate the different discourses and defend their positions we might be able to understand how issue networks work on the Web.

The concept of “actor” we suggest comes from the literature of social movements (Jenkins, 1995), interest groups (Berry, 1984) and stakeholders (Freeman, 1984). We consider that the phenomenon studied presents a significant level of similarity and is in a way interchangeable in those three areas: it concerns those defending a specific

demand. We use the term “actor” in an attempt to encompass these three areas by using a sole term which might include (1) individuals or organizations being part of a social movement (2) an interest group or (3) interested parties acting as stakeholders before a private corporation.

Thus, we argue that the theory of issue networks we present in this article might be applied, with the convenient adaptations to each case, in research related to Sociology, Political Science or Management Studies. We consider it would confuse to use a different term to identify the individuals or organizations intervening in each of the different issue networks, and therefore we suggest a term which is applicable to the three fields of study.

Both the studies on social movements (Sociology) and the studies on interest groups (Political Science) consider those making claims within the public arena, so that the citizens and the State are directly connected (Berry, 1984; Jenkins, 1995). In those cases, the focus lies on groups or organizations trying to influence the legislative power to develop laws defending their interests. However, Management Studies in general, and stakeholders’ studies in particular, consider those making claims within the realm of the private sphere, that is to say, those groups trying to influence decision-making processes within corporations (Freeman, 1984).

As we have seen, the factors taken into account when considering an individual or organization as an actor in an issue network vary according to whether this individual or organization acts in the private or public sphere. Likewise, the factors taken into account vary when studying the concept of “actor” from different theoretical or analytical perspectives.

According to Frooman (2010), there are three theories analyzing the concept of “actor”: the identity theory, the economic theory and the political theory. According to the identity theory, all an individual or organization needs to be considered part of an issue network is a grievance or demand related to the discussion issue; according to the economic theory, an actor might be considered part of an issue network if having the resources to participate in it; and finally, according to the political theory, an actor will be part of an issue network if having the chance to participate in it.

As previously described, the identification of actors is related to different factors depending on the area –public or private- the actor participates in, and according to the study area from which the analysis is conducted: identity theory, economic theory or political theory. However, and in an effort to simplify, we suggest an inclusive definition which allows encompassing these different perspectives and study areas, and which offers a flexible tool applicable to different cases and application areas.

Definition 3: Actor

An actor is any individual or organization, from the public or private sphere, whose grievances, resources or opportunity influence a discussion issue.

3. Conclusions and future work

The present article has highlighted the usefulness of applying a theory of issue networks to online opinion analysis, with a dual perspective which considers not only the empirical analysis of information flows produced in hyperlink networks, but also an epistemological analysis which reveals the representative value of the interaction between actors with different positions about a discussion issue.

A clarification of the concepts of hyperlink network, issue and actor has been suggested, since these concepts are usually employed in online opinion analysis, and, therefore, it might be useful to any researcher in this field regardless of the use of the issue networks theory that we suggest as a whole.

The characterization of these three concepts contributes to suggesting an operative definition of issue networks as part of our conclusions. We are presenting the definition in the following box:

Definition 4: Issue Network

In the Web, an issue network is a set of individuals or organizations who are related through a hyperlink network, posit opinions and use resources or opportunities to influence a discussion issue.

In future research, we expect the characterization and definition of the three components intervening in issue networks to allow for the implementation of an analysis methodology which provides information about how online opinion processes work and serves to extract objective data about the opinion currents generated on an issue over a period of time. This methodology should be applicable to various study fields such as Social Sciences, Political Sciences or Management Studies, adaptable to the dynamism of online opinion phenomena, and scalable enough to work on data volumes of different sizes.

In our research, and in order to identify the actors participating in an issue network, we suggest hyperlink analysis between websites dealing with a common discussion issue. In future research, it would be advisable to incorporate the analysis of social platforms such as Twitter, Facebook or Google+, which we consider might reveal connections between similar actors to the already well-studied hyperlink networks analysis between websites.

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