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Thematic and Authorship Networks of Publications on Mexico-U.S. Migration

The changes the Internet has produced in the circulation of digital information have created a need for establishing guidelines for research methods that can be used to collect and analyze data from various online environments. Netnography is one of the methods that helps researchers in various fields. It is being used more and more widely because it facilitates collecting large amounts of data and information that can be quickly organized and analyzed with a variety of computer tools.

Using information study techniques, one can explore the thematic trends in research by disciplinary field and identify connections between authors. In the example I present here, I gathered data from the Web of Science and then analyzed social networks with the vosviewer program. The objective was to discover thematic networks and networks of authors in the field of Mexico-United States migration studies.

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Scientific Collaboration

Since the middle of the twentieth century, collaboration among research teams made up of peers from a variety of disciplines, institutions, and countries has become common practice because it facilitates analyzing a subject of mutual interest from various perspectives. Scientific collaboration is also referred to as team science or large-scale collaboration. The way participants are organized depends on the nature of the research, as well as the resources available and each researcher's expertise.

Information and communications technologies provide useful tools to facilitate the research process and allow for the exchange of points of view among research teams. This means that each researcher can establish work relationships with colleagues from all over the world and become part of academic networks.

Participation in academic networks can generate coauthored publications. In bibliometrics, these are valued as a means of making scientific production more visible.

Netnography is a technique that uses public access information to identify the elements related to the object of study.

With regard to Mexico-U.S. migration, we can discover which aspects are studied academically and what connections exist among authors who study these issues.

The Usefulness of Netnography

Implementing research methods that allow for recovering, combining, and analyzing information and data generated by a variety of online contexts and virtual communities is one of the many changes produced by the invention and growing use of the Internet.

Netnography, as one of the most widely used of these methods, is a technique that uses public access information to identify the elements related to the object of study, thereby allowing researchers to make inferences. It includes the use of technological tools to extract and analyze information and data contained in digital media, like those that facilitate text mining to analyze terms, mine the data, and analyze digital images and social networks, or other aspects.

While most authors recognize that netnography is useful for market studies,[1] this is not the only area where it can be applied. Its utility extends to areas such as tourism or sociology,[2] and, to a large extent, it can also be used in information studies.

Analysis of Social Networks

Social networks have been analyzed from various perspectives. Studies of social networks have been used to examine problems like marginalization, lack of safety, or community health issues. In information studies, they are also useful for finding co-authorship networks.

The basic units for observing social networks are the *social actors* (persons or entities) that they link together. Sociograms,[3] representing social relationships, are a fundamental tool for analyzing social networks. However, a sociogram cannot be constructed purely on the basis of a computer program; it also requires data collection.

In this exercise, I collected records from the Web of Science, a bibliographic database of scientific publications covering various fields of knowledge. The guarantee Web of Science offers is that it facilitates the retrieval of articles published in prestigious international journals and, thus, reflects the current dynamics in the production of knowledge.

To systematize the data and then generate the corresponding graph, I used vosviewer, a program appropriate for analyzing bibliometric networks, to discover the connections between authors. It also allows for text mining to visualize terms and their interrelations based on word frequency.

Without these two tools it would be very difficult to do network analysis and obtain up-to-date results. The vast editorial production and the bibliographical data that refer to it constitute large amounts of information that cannot be processed manually. This requires computing tools that offer speed and accuracy in extracting and systematizing the relevant data.

Text mining using the titles of articles is fundamental for establishing the connections between topics. It is a research area of automatic information processing that analyzes digital information to find trends, patterns, and associations in a collection of texts, and is helpful in discovering knowledge contained in a large body of unstructured information.[4]

Thematic and Authorship Networks On the Study of Mexico-U.S. Migration

As stated above, for the case illustrated here, I extracted data from the Web of Science; I then processed the search results with vosviewer software to generate the sociograms, or maps, that allow us to visualize the relationships within the network. Here I graphically represent the connections between topics:

Thematic Retrieval from Web of Science

Here, I retrieved the data by using the term "migration Mexico and United States of America," which produced 270 records. I chose the 100 most recent.

Using the VOSviewer program

In the vosviewer analysis, I chose the option "Co-occurrences of the most cited articles' keywords," and obtained the first map of results shown in Figure 1.

The size of the nodes shows the comparison in terms of the number of articles by topic. The terms "migration," "immigration," "violence," and "Central America" stand out in the center of the network.

By selecting the option "Co-occurrences of key words in the most recent articles," I obtained a second map (see Figure 2).

The most recent articles deal with almost the same topics as those most cited, although with a greater tendency to address the study of migrants and international migration. The nodes are more dispersed, to the point that the term "conservation" is directly related to the central theme "migration," but the connection occurs only with two other terms.

Regarding relations among authors, I obtained one sociogram of those most cited and one that shows the interrelations among other co-authors. The most-cited authors and their interrelations can be seen in the third map (see Figure 3).

> Text mining using the titles of articles is fundamental for establishing the connections among topics.

The graph coincides with the one Newman mentions when he establishes the difference between the centrality of researchers who have a diversified collaboration network and authors with peripheral collaborations.[5] In social networks such as this one, the authors are nodes and they are connected to others when there is collaborative production. The most productive authors stand out for the number of interrelations they have and their centrality in the network.

The central author is Carlos Magis Rodríguez, a researcher at the National Institute of Public Health (INSP) and one of his main themes is "migration and HIV." This

Figure 1
Most Cited Articles in Web of Science
January 2021[6]

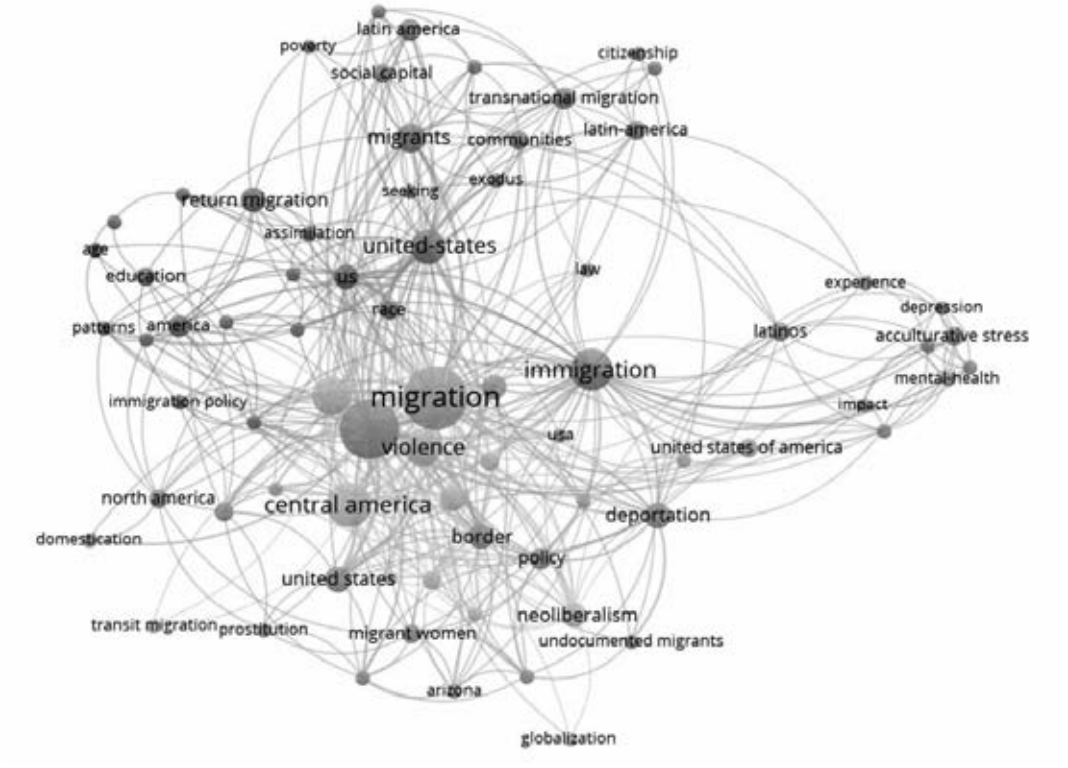


Figure 2
Recent Articles in Web of Science
January 2021

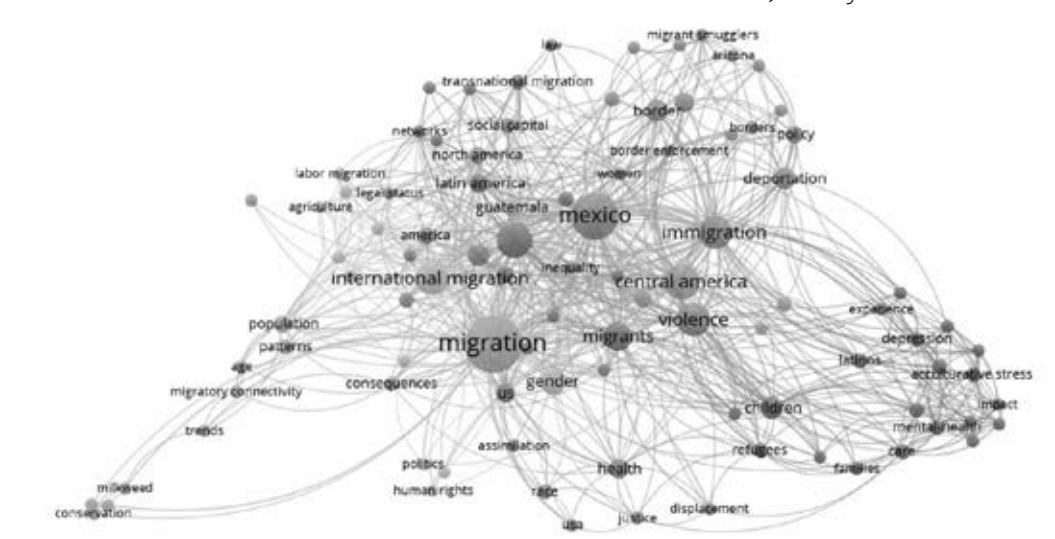
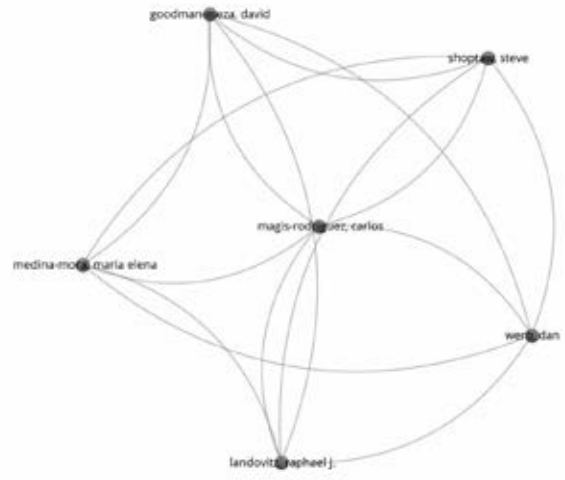


Figure 3
Most-Cited Authors
January 2021



indicates that this topic is of significant interest for researchers on Mexico-U.S. relations, since Magis is one of the most-cited authors.

As we can observe, the connections between authors and themes may be difficult to detect if the search and the reading are done manually. A tool like vosviewer, which has algorithms that allow for an analysis that takes into account the number of quality citations, as well as the recurrence of terms, and the relevance of the authors, makes it feasible to locate many topics, authors, and their interrelations that would be impossible to find otherwise. This is very helpful for enriching research because it allows one to focus on the most relevant authors and issues, as well as topics that could be of interest but, given that they are less central, might be overlooked by other instruments.

Analytical frameworks like the ones mentioned here allow for discovering the trends in topics explored and the orientations used in specialized literature, as well as the scientific collaboration that has generated the articles. Studies can be as specific as necessary. The important thing is to combine the use of technological tools with the appropriate methodology for each research project. VM

Notes

1 Robert V. Kozinets, *Netnography: Doing Ethnographic Research Online* (London: Sage Publications, 2010).
2 Wookhyun An and Silverio Alarcón, "From Netnography to Segmentation for the Description of the Rural Tourism Market Based on Tourist Experiences in Spain," *Journal of Destination Marketing & Management* 19 (2021), DOI: 10.1016/j.jdmm.2020.100549.
3 Hannah Knox, "Social Networks and the Study of Relations: Networks as Method, Metaphor and Form," *Economy and Society*, vol. 35, no. 1 (February 2006), p. 117.
4 Marcial Contreras Barrera, "Minería de texto: una visión actual," *Biblioteca Universitaria*, vol. 17, no. 2 (July-December, 2014).
5 Mark E. J. Newman, "Coauthorship Networks and Patterns of Scientific Collaboration," *Proceedings of the National Academy of Sciences* 101, suppl. 1 (April 6, 2004).
6 All three figures were developed by the author. [Editor's Note.]