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TopoRadio: Mapping Research on Spanish-LanguageRadio in the United States

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Abstract

This article analyzes the construction of TopoRadio (toporadio.org), an interactive map that showcases publications and archives about Spanish-language radio in the U.S. The map aims to promote a more inclusive and comprehensive representation of U.S. radio history by improving the visibility of contributions from Latinx broadcasters. The article addresses how map-making historically suppressed Spanish-language radio programs and proposes using critical cartography as a framework for mapping back this history. The technical elements of TopoRadio, including publication selection criteria, metadata design, geocoding process, and the appraisal of Geographic Information Systems (GIS) software, are described to provide scholars with a reproducible method for creating interactive mapping projects. The article concludes with an assessment of the map's effectiveness as a research tool and an analysis of the publications in the field of Spanish-language radio studies included on the map.

Keywords: critical cartography; digital humanities; geographic information systems; Latinidades; Spanish-language radio

Publication Type: research article

Introduction

Spanish-language radio has been part of the United States' broadcast landscape since the radio era's dawn. While English-language listenership has declined, Spanish-language stations continue to expand their audience, geographic reach, and market share, yet their contributions remain inaudible within the dominant radio history (Casillas, 2013; Castañeda, 2014; Paxman, 2018; Rodriguez, 1999). However, the Spanish-language and Bilingual Caucus of the Radio Preservation Task Force (RPTF) is working to amplify the voices of Latinx broadcasters and operates under a mandate from the Library of Congress to create a "comprehensive inventory of extant American radio archival collections, aid in the preservation of radio history, and develop pedagogical [tools] for utilizing radio and sound archives" (VanCour, 2016, p. 396). TopoRadio (toporadio.org) was developed in partnership with the caucus to address these three goals. The project is an online, interactive map that invites the public to discover books, articles, and archives on the history and ongoing cultural and economic impact of Spanish-language radio in the United States based on the locations of the radio stations examined by each publication.

This article explores the theoretical and technical development of TopoRadio while arguing that a geographic discovery tool is a viable option for presenting bibliographic information and that such a tool can contribute to expanding public recognition of the power of Spanish-language radio. The first part of the article examines map-making as a site of social action through the theory of critical cartography. This concept is especially relevant given how the United States

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government historically used maps to suppress Spanish-language broadcasts. This critical cartography framework is then applied to the work of other scholars who have developed geographic discovery tools that reconstruct marginalized or fragmented histories. The second part of this article details each step in building TopoRadio, including selecting, analyzing, geocoding, and mapping each publication. This technical overview offers a reproducible method for building interactive maps supporting similar activist-minded projects. Finally, this article uses the geospatial representation of books and articles to conduct a bibliometric content analysis of the current state of scholarship on Spanish-language radio and to provide suggestions for further research.

Literature Review

Map-Making as Social Action

On its face, a map appears disinterested: It reports the features found in an area. However, the world is too detailed and complex to be entirely represented on a map. A cartographer must decide what a map will and will not include based on their criteria for what is essential to map readers. Halder and Michel (2018) argue that "maps articulate statements that are shaped by social relations, discourses, and practices, but these statements also influence them in turn. Hence maps are always political" (p. 13). Cartographers choose which features and populations to chart based on the existing social values and power relationships that are determined to be essential to map readers. The opposite has graver consequences. When features or populations are not deemed map-worthy, this has the power to, quite literally, wipe whole communities or historical narratives off the map. As cartographers continue to rearticulate social value judgements through their maps, they promote wider circulation and credence to structures of power that marginalize specific communities and historical narratives. As Crampton (2010) puts it, "mapping creates knowledge as much as (and for some, instead of) reflecting it" (p. 46).

Mesquita (2018) rejects the notion of political neutrality in map-making and describes how maps are used to execute the "domination of colonizers over the colonized, for consolidating economic blocks, for justifying private control over public spaces" (p. 26). Maps have long accompanied and legitimated colonial conquests. They were instrumental in delivering over half of Mexican territory to the U.S. during negotiations of the Treaty of Guadalupe Hidalgo (St. John, 2011), which is a pertinent example for scholars of Spanish-language radio.

Alternatively, maps can support social action if they draw from an anti-colonial political posture. Mesquita (2018) promotes an approach to mapping known in cartographic and Geographic Information Systems (GIS) circles as counter-mapping or critical cartography, which inverts the "sovereignty of a cartography of control" into "starting points for subversive actions" (p. 29). He contends that instead of erasing communities, maps can make "obscure and established powers more perceptible in front of them" (p. 26), thus fostering grassroots social change. Halder and Michel (2018) also discuss the strategy of counter-mapping, which was developed among native communities to map-back territories seized by the U.S. government.

Counter-mappings "often contain a paradoxical element: to be heard and recognized, the claim for territory and empowerment has to translate indigenous cosmovisions into dominant cartographic tools. Hence, there is always the danger of distorting original messages or intentions" (Halder & Michel, 2018, p. 16).

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Critical cartography does not offer a regimented system or method for charting anti-colonial maps. Instead, it can be understood as a series of questions that examine the political forces driving map production.

The current project, TopoRadio, positions itself within this critical cartography discourse. Through mapping the marginalized history of Spanish-language radio, the project exposes how maps have been used to suppress Spanish-language broadcasters. For example, the Federal Communications Commission (FCC) regulates public access to the wavelengths of the electromagnetic spectrum reserved for radio by granting broadcast licenses based on geographic area. Only in 1946 did KCOR of San Antonio become the first fully-fledged Spanish-language station after years of discriminatory license denials by the FCC. The fear was that licensed Spanish-language stations would counteract assimilation into the English mainstream (Castañeda, 2013).

Also, in line with critical cartographic thinking, TopoRadio questions its own aim to map a marginalized history, which could come at the expense of co-opting or distorting the original intentions of Latinx radio producers. The RPTF, whose expertise guides the development of TopoRadio, is cognizant of the power that collection choices have over shaping a "comprehensive inventory" of radio history (VanCour, 2016, p. 396). Goodman et al. (2019), themselves members of the RPTF, argue that cultural memory work is laden with "decisions surrounding which types of collections and collecting institutions to privilege or deemphasize, determining whose histories and cultural experiences are granted legitimacy, and whose are marginalized or suppressed" (p. 3084). Hence, TopoRadio needs to question the process by which publications are selected for mapping.

TopoRadio does not pretend to hold expertise on the social impact of Spanish-language radio. Instead, the project seeks to promote those scholars who have dedicated their careers to its study. The project amplifies their work and repurposes traditional avenues of power (e.g., map-making) to achieve the medium's due recognition. For example, Casillas (2010) discusses how audiences and broadcasters already use call-in programs to create a "biographical moment across distance" (p. 46) or to report checkpoints by Immigration and Customs Enforcement around Los Angeles (Casillas, 2011). This research shows that choosing an interactive map has a profound significance. Geography is essential to radio research, including granting FCC licenses, transmission range, and connection between the community of listeners and radio hosts.

Review of Geographic Discovery Systems

TopoRadio takes inspiration from three interactive mapping projects that have similarly sought to make power imbalances visible through mapping. The first, Borderlands Archives Cartography (BAC), fully demonstrates the notion of mapping back, as explained by Halder and Michel (2018). BAC uses an interactive map as a discovery tool for 19th and mid-20th-century newspapers from the U.S.-Mexico border region. Álvarez and Fernández (2019), authors of the project, orient BAC to highlight examples of local press coverage by and for residents of the border region to contradict "the idea of the region as static, a recent division, and threat" (para. 3) that is so often peddled by the national media. Noticeably absent from the BAC map of the border region is the U.S.-Mexico national border (a solid line, the political boundary). Plotted over this borderless border region are the locations of historic newspapers, which further the map's political goal of showing the wide geographic range of the border region and understanding "the

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region and its communities before and after it became a division line" (Álvarez & Fernández, 2019, para. 4).

BAC uses a Wix template for its project website and Carto for its geospatial visualization. However, this arrangement presents a few limitations. First, Carto requires a yearly subscription fee. Second, when Carto is embedded on a Wix site, the information panels that open when a researcher clicks on a newspaper's location are sized so that the top fields of metadata about the newspaper fall outside the map frame. Lastly, some newspaper collections are not freely available and are behind the paywall of services such as Readex.

The second project that TopoRadio evaluated during its development is A History of Dominican Music in the United States, curated by the Dominican Studies Institute (DSI) at the City College of New York. DSI (2020) orients the map to highlight musicians who "have been excluded from mainstream narratives documenting American music. In the end, this project embeds the history of Dominican music into the history of U.S. musical traditions and the larger cultural legacy of American society" (para. 10). The project allows researchers to see overlaps in communities and events over time by linking historical photos and handbills to current locations on the map. This arrangement also works to counteract the misconception that Dominican music developed in isolation from the mainstream: The music was everywhere in the city.

A History of Dominican Music uses a custom map built with the Google Maps API. This development-intensive model provides the most room for customization. DSI (2020) takes full advantage of this customization. It has created a seamless method for researchers to bring up information, pieces of ephemera, and photographs from DSI's collections when they click on a point on the map.

The third project demonstrating critical cartography that TopoRadio considered during the development phase is Where We Were Safe. This project is primarily an archive of oral histories, maps, and testimonies about the cultural and political development that accompanied the advent of Salsa music to specific venues and businesses mentioned in the interviews. Echeverría Ortiz (2021), one of the project's authors, states that the project "utilize[s] memory as resistance to preserve a collective knowledge" (para. 11). This is similar to Mesquita's (2018) concept of "collective intelligence" in map-making (p. 29). Those who participated by giving oral histories were making their mark on the map. While many venues have fallen victim to the wrecking ball, oral histories combined with archival material can recreate these lost spaces.

The website, map, and associated media are presented and hosted through Klynt. This service, which markets itself as a digital storytelling tool, enables the project to draw together oral histories, archival materials, and geospatial data. Klynt requires a one-time fee to register an account. Cultural memory projects that rely on third-party services run the risk of one day finding out that the service will be discontinued. This is a severe risk for projects that seek to document and preserve the past.

Methodology

TopoRadio borrows many lessons regarding the geospatial design and display of information from the three projects reviewed in the previous section. TopoRadio departs from these three in its novel approach to mapping bibliographic resources based on the radio stations mentioned in each publication's text. The name TopoRadio is a blend of the words *topografía* and *radio*. *Topo* is

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the Spanish word for mole, from which the project derives its mascot: the humble, subterranean talpid who sniffs through the soil just as TopoRadio does through scholarly literature. The following section examines the process of building the TopoRadio prototype, which includes selecting a pilot body of publications, establishing a metadata schema, determining radio station identities, and plotting the publications geospatially.

Project Design

TopoRadio offers researchers an online, interactive map to find bibliographic and archival resources relating to Spanish-language radio's social and economic impact in the United States. The primary purpose is for researchers to discover scholarly articles and archives by zooming into regions of the map. A secondary discovery method is to use a keyword search. The locations of the radio station studios plotted on the map serve as the primary point of contact between the publications and the researcher. To facilitate this point of contact, GIS software links the geospatial coordinates of a radio station, the publications that discuss that station, and bibliographic information about that publication. The street address of a radio station is a discrete geographic location and thus lends itself to geospatial representation. Furthermore, connecting publications to the radio stations they examine can quickly demonstrate overlap among the publications, as different publications addressing the same radio station would be linked to the location of that studio. The map is embedded in a custom website, toporadio.org, which offers space for contextual information about Spanish-language radio history.

Selecting Publications

The first stage of the project involved collecting a pilot set of publications. RPTF members Dr. Dolores Inés Casillas, Director of Chicano Studies Institute at the University of California, Santa Barbara, and Dr. Sonia Robles, Assistant Professor of History at the University of Delaware, are two scholars of Spanish-language radio who marry their scholarship with social action. They provided the project with subject area expertise. Their recommendations, Casillas's (2018) bibliography, and searches in the Hispanic American Periodicals Index provided the pilot set of articles (n = 30). This project then consulted with the RPTF database, archivists, and librarians at major radio or Latinx studies collections to compile the list of archival collections.

Metadata Schema

The second step of the project was to formulate the metadata schema. RPTF members were integral in developing the fundamental requirements for displaying stations and publications on the map. The primary entry point to the data set is the radio station's location. Clicking on the station opens an information panel where the identifying information about that station should first be presented. Although the project aims to promote scholarship on radio stations, immediately displaying information on a publication after clicking on a radio station could confuse researchers. Table 1 lists TopoRadio's metadata schema for stations and publications.

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Table 1. Metadata Elements for Radio Stations and Publications

No.	Metadata Element	Description
1	Call Letters	The 3–4 letters assigned by the FCC that stations use to identify themselves on air (e.g., KDNA)
2	Frequency	The AM or FM band of the electromagnetic spectrum on which a station transmits its programs (e.g., 1250 AM)
3	Station Name	The name the station uses to identify itself
4	Station Location	The place where the station has its primary studios. For places in the U.S., this will take the form of City, State. For foreign locations, this will take the form of City, Country (e.g., Los Angeles, California; Monterrey, Mexico)
5	Station Link	An active URL to the station's website. If a historic station predates the internet, a link to a historical repository or fan site will be used instead
6	Research about this Station	The title of the publication in capital case
7	Author	The first and last name of the author (e.g., Sonia Robles)
8	Publication Year	The year that the publication was published
9	Publication Type	Controlled vocabulary: Article, Book, Book Chapter, Doctoral Dissertation, Master's Thesis, Monograph
10	Broader Work	For book chapters, this would be the name of the book in which the chapter was published. For articles, this would be the name of the journal
11	Publisher	Name of the organization that published the article
12	Publication Link	Permalink to WorldCat record. If the work was published as a free PDF, such as a report, the link will direct users to this PDF
13	Research Notes	Brief synopsis of the publication's research on the radio station
14	Latitude	North-south component of the location coordinates for the radio station. This is required by the GIS platform to plot the station's location but will not be visible to the researcher

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15	Longitude	East-west component of the location coordinates for the radio station. This is required by the GIS platform to plot the station's location but will not be visible to the researcher

Table 1 demonstrates how specific fields are named for the researcher's convenience. For example, while the label for element six could be "Publication Title," the label "Research about this Station" explicitly links the publication to the radio station. To facilitate the discovery of a publication, the schema includes permalinks to WorldCat in element 12 so that researchers can secure a copy from the closest library.

Radio Station Identification

The project's third stage was to determine the identities of the radio stations profiled in each publication. Articles were individually scanned for mentions of radio stations in their text. Stations were often only identified according to element three from Table 1 ("Station Name"). If a publication did not identify elements one, two, or four from Table 1, the project used several strategies to fill in the holes in the metadata. For contemporary stations, the project consulted the FCC's Public Inspection Files database (publicfiles.fcc.gov). For historic stations, TopoRadio consulted informal sources, such as fan sites or trade magazines. For example, Keith Elster's Phoenix Broadcasting History Page (keithelster.tripod.com/phxradiotv) was last updated in 2000. Similarly, metadata from archival collections, such as the University of California online digital collections at Calisphere, provided missing metadata about stations. Numerous other examples exist, but this sort of detective work proved incredibly time-consuming.

Geocoding and GIS Preparation

The fourth and final stage of the project involved plotting the data using GIS software. Transforming text information, such as a radio station's address, into mappable geospatial coordinates is called geocoding (United States Department of Agriculture, 2006). After identifying a station's address through the process described in the previous section, Google Maps was used to geocode or determine the geospatial coordinates of a radio station. This information was recorded using elements 14 and 15 of Table 1.

The evaluation of the three previously described interactive maps conducted during the literature review informed the selection of GIS software. The functional requirements of the GIS software included that it: (a) accept the data set in a comma-separated values (CSV) document, (b) present a unique icon that indicates the location of a radio station, (c) permit users a desktop and mobile experience, (d) reveal further information about the station and scholarly publication after clicking by way of a customizable information box, and (e) offer a keyword search box. Furthermore, the long-term maintenance of the project was a concern. The GIS software needed to display the data set at minimal or no cost and be supported by a company or community that would not discontinue its service.

QGIS, ArcGIS Online, Klynt, Google Maps, and Carto were considered. While QGIS is free and supported by an expansive and passionate community of users, it does not have a web application component, so creating an interactive experience for TopoRadio's website would be challenging. Klynt and Carto, used effectively by Where We Were Safe and Borderlands Archives Cartography,

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respectively, require a subscription fee, and the staying power of these platforms remains untested.

Additionally, subscription fees play into the long-term maintenance of a website. What happens to the data set when a subscription expires or the company is sold? Mckee (2019) describes a frustrating experience after mapping the Institute for the Study of the Ancient World's collections with Google Fusion Tables; Google suddenly announced that it would discontinue support for Fusion Tables, and the library was forced to redevelop the project with a new custom-built GIS solution.

ArcGIS Online is the web version of ESRI's desktop GIS software ArcGIS, which is an industry standard. ESRI offers Free Public Accounts, which are free individual accounts for this service. Maps are developed in the browser and are optimized for embedding or use as a standalone, interactive map with a connected service called Web Application. TopoRadio created layers on its map by uploading CSV files of its dataset to ArcGIS Online. Then the project curated the search feature, starting view, and arrangement of interactive buttons for toporadio.org with the Web Application service.

The map is served through a custom website designed according to the recommendations and testing tools made available by the A11Y Project. The site is hosted for free on GitHub Pages (github.com/esilberberg/TopoRadio).

Results

The TopoRadio prototype maps 30 publications and 23 archives. It provides conceptual proof that maps can serve as an interface for discovering scholarly publications and bringing to light trends within a body of research. Figure 1 shows the TopoRadio homepage and illustrates the project's functional requirements for the interface. Radio locations are marked by a broadcast tower logo and the station's call letters. When users click on a logo, it opens an information panel that presents the bibliographic and station identity information from Table 1. The radio station name and publication title are offered as links to the station's homepage and the WorldCat entry, respectively. Articles that address the same radio station are connected to the same logo, and users can cycle through all publications via arrow buttons at the bottom of the information panel. ArcGIS Web Application also enables customization of the search bar, which allows the project designer to enable keyword searching of all metadata fields from Table 1. For example, the search bar can access the publication title and research notes (elements 6 and 13, respectively, from Table 1), which facilitates searching using keywords such as "community radio."

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Figure 1. Homepage of toporadio.org. Copyright 2023 by Eric Silberberg.

The display of books and articles geospatially enables bibliometric content analysis of scholarship on Spanish-language radio. Haddow (2018) defines bibliometric content analysis as those methods that seek to understand the scope and interconnectedness of scholarly publications within a domain by applying quantitative measures to authorship, citation, or content. The first 30 geocoded books and articles yielded 102 data points that covered 63 different radio stations. Research on Spanish-language radio is a new field, with 74.1% of publications included on the map being published since 2011. Additionally, research in the field is conducted mainly by women, who account for 68.7% of authorship.

Overall, 15 stations appear in two or more publications. Table 2 lists the stations referenced by three or more publications. RPTF collaborators Casillas and Robles asked whether scholarship has extended beyond radio markets in historically Spanish-speaking communities. TopoRadio, specifically Table 2, demonstrates that research needs to increase the study of Spanish-language radio outside traditional Latinx communities in Texas and California. Few publications address radio in the Southeastern United States outside Miami, Florida.

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Table 2. Radio Stations Referenced at Least Three Times within Publications

Station	Location	Number of References
KCOR	San Antonio, TX	6
XEW	Mexico City, Mexico	6
KDNA	Granger, WA	4
KELW	Burbank, CA	4
KLAX	East Los Angeles, CA	4
KSCA	Los Angeles, CA	4
KSJV	Fresno, CA	4
KBBF	Santa Rosa, CA	3

Discussion

This article emphasizes the reproducibility and affordability of the methods used to create a project like TopoRadio. The reason for this is to offer other scholars a road map for creating similar projects that seek to reconstruct marginalized histories. The combination of an ArcGIS Web Application via ESRI's Free Public Account option and a custom website hosted on GitHub offers a sustainable model given that there is no annual cost to maintain the site, and both platforms have strong online support communities, which allows scholars to find answers to their technical questions online quickly. The biggest threat to the sustainability of this model is whether ESRI will continue to offer its Free Public Account in the future. Another concern is that identifying the radio stations in each publication took time, requiring a manual review of each publication. This article imagines a future iteration of the project that uses natural language processing to automate, at least partially, the station identification process.

The technical application of this model would only be complete with a theoretical grounding in critical cartography. Halder and Michel (2018) state that while maps reinforce social power relations, they also hold liberatory potential. This requires scholars to believe that one can use the instruments of oppression against oneself. In the case of TopoRadio, map-making as social action plays out in three key ways. First, the irony is not lost on the project collaborators that the FCC, which had denied licensure to Latinx broadcasters from the start of the commercial radio era in 1920 until KCOR received the first license in 1946, served as a critical and trustworthy resource for identifying Spanish-language stations. The FCC's Public Inspection Files database provided TopoRadio with the studio addresses for most radio stations, which was essential information for geocoding. Simply put: no addresses, no map.

Second, critical cartography calls attention to relatively few radio archives on the map and the social and economic forces that created this absence. Nearly all the 23 archives mapped by TopoRadio are not from a specific radio station but from other types of archives containing a few

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folders or boxes relating to Spanish-language radio. De La Torre (2022) points out that the cost of maintaining an archive has been beyond the budget of community radio stations. She employs the techniques of community archiving to document the history of independent Latinx broadcasters, allowing TopoRadio to highlight the critical role stations like KDNA play in building community. On the commercial side, Castañeda (2014) cites the consolidation of the Spanish-language media market as a primary cause for the complete lack of archives. As a result, TopoRadio has relied on the work of scholars and secondary sources, rather than archives, to piece together this history.

Third, a critical cartography framework would question the absence of stations mapped across the Southeast, as previously discussed and visible in Figure 1. This is a concerning blank space on the map, considering that the region has seen the most significant growth of Spanish-speaking communities since 2010 (Noe-Bustamante et al., 2020). There is Spanish-language radio in the Southeast, and there is room for further research on the development of broadcasting in this region.

There is some evidence of TopoRadio's ability to broaden public access to books, articles, and archives about Spanish-language radio. The project has received five research consultation requests from scholars who have used TopoRadio in their research. Their queries have focused on acquiring specific titles and gaining access to archives on the map. Additionally, two families conducting genealogical research have contacted TopoRadio to learn more about a family member who worked in radio broadcasting and to get a hold of all publications about their family members. These examples highlight two areas for further research. One is to conduct a round of user-testing to determine how well TopoRadio's functions and metadata schema serve the public. The other is to develop lesson plans on how to use TopoRadio in media and ethnic studies classes in a way that empowers students to identify holes in scholarship on Spanish-language radio and to develop their research topics based on those observations.

Conclusion

This article offers librarians, scholars, and radio enthusiasts a technical and theoretical blueprint for constructing a geospatial visualization tool for bibliographic discovery. The combination of an ArcGIS Web Application and a custom website hosted on GitHub results in a free, sustainable model with a manageable learning curve. However, the full significance of the technical evaluation presented in this article becomes apparent only when viewed within the framework of critical cartography. TopoRadio uses technology to map back the previously overlooked contributions of Spanish-language broadcasters in the United States. The project's foundation lies in Mesquita's (2018) assertion that maps stem from "collective intelligence" (p. 29), as TopoRadio is greatly indebted to the extensive research and academic labor of scholars in the field. These scholars have reconstructed the history, and TopoRadio serves as a vehicle to amplify that work. The TopoRadio collaborators hope the project will further the RPTF's mission and provide a unique experience for the public to learn more about the history of Spanish-language radio in the United States. The project seeks to add books, articles, and archives to the map as other researchers and students continue exploring Spanish-language radio's social and economic impact.

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