Jewelry Yep and Jason Shulman

Analyzing the library's Twitter network

Using NodeXL to visualize impact

Social media has become a staple of today's online activities. Libraries, always keen on finding more effective ways to meet users at their point-of-need, are joining social media channels such as Facebook, Instagram, and Twitter. Establishing an institutional presence allows librarians to extend the library's online reach.

During the 2012–13 academic year, the Richard Stockton College of New Jersey's Bjork Library[1] revived its social media program by concentrating efforts on Twitter. Our goals were simple. First, we wanted to expand our audience, or followers, in Twitter lingo. The second goal was to analyze the impact of our efforts. In addressing this, we found ourselves delving into the world of networks, the invisible web of connections linking the social media accounts of the college community.

The library enlisted the help of a faculty member from the Physics department, Jason Shulman. With his assistance, we employed research-grade tools to visualize and exploit this web when it became apparent that the standard assessment methodologies failed to tell the story of Twitter's impact. It's easy to count and track Twitter followers, but what role do these numbers play in the library's goal to connect college students to appropriate information sources?

The program began with the promotion of the Twitter account to students and faculty in our instruction sessions. Faculty were also recruited to publicize the effort in their courses, using whatever incentive they deemed appropriate. We found that an e-mail from a professor to the students requesting their support, and sometimes offering a modest amount of extra credit, was often quite effective. Prior to these efforts, the account languished with about two dozen followers, yet we observed a five-fold increase over the course of one semester.

Examination of Twitter followers is useful in determining a library's social media audience. Social media managers can use such data to deliver relevant information and market services that will engage and benefit the library's online audience. While important, this type of assessment does not address a valuable aspect of social media: the network. Engaging and helpful content is one requirement for a social media account to gain and keep followers. If the content is sufficiently interesting, it can be passed along by the followers to others not directly connected to the original account. Such advertizing is free and can be exploited with a little consideration of the network.

Networks

In our digital age, the concept of networks is pervasive. Online social networks, like the subject of this work, have become central components to many people's lives; however, networks have always been a part of the human experience. Individuals have always existed

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in a personal social network, comprised of friendships, marriages, business relationships, etc., to which almost everyone in the world is connected. In fact, one has to go to the far reaches of civilization to find a human outside of this giant network that forms our global society.

Simply put, a network is a collection of entities, called nodes, which connect to or interact with each other. Organizing things in this way is very general, making it practiced in disciplines as different as mathematics and literature. As a consequence, an unnecessarily large collection of synonymic terminology has developed. A physicist might use the words *nodes* and *links* to describe objects of interest and connections, while a mathematician would call them *vertices* and *edges*. We mention this because NodeXL, the tool described in this article, uses the latter phrasing.

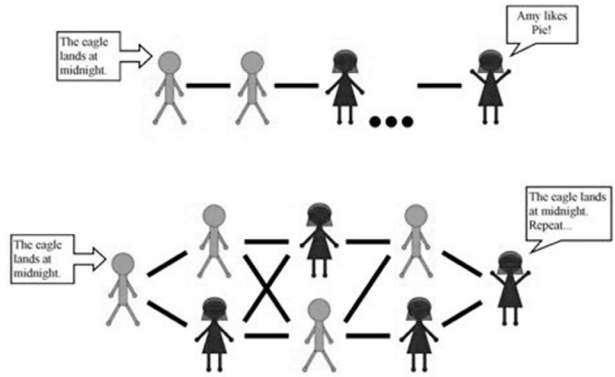

Figure 1. (Top panel) A traditional game of telephone. The message inevitably becomes distorted and cannot be corrected. (Bottom panel) An improved network for information transmission. Multiple connections allow people to verify the message before passing it along. There are multiple paths to destination in case one becomes damaged or removed. The two situations indicate that the wiring of the network affects information transmission, an effect not limited to children's games. View this article online for detailed images.

Why would a library care about a concept as academic as networks? The wiring of the connections determines many important properties of the network. This can be illustrated by a simple, and perhaps fitting,[2] example. Many of us played the school-yard activity Telephone as children. The game begins with the first person whispering a secret to his or her neighbor, who then whispers it to the next person. This continues until the last person announces the message to the group. The fun lies in the fact that the announcement is rarely the same as the original secret; it changes during its travel (Figure 1). The network in this case is formed by the people (nodes) connected to a neighbor on each side. The game works (or doesn't) due to the poor transmission of information between players. Once the message has changed, it is impossible to correct it. Now imagine the game played with people in a more densely connected, web-like network. With multiple connections, the message can be checked and corrected, resulting in a more robust transmission and boring game. We see that the manner in which nodes are connected can drastically impact information transmission in a network. The Bjork Library was interested in analyzing and perhaps extending its online reach, i.e. information flow, so examination of its Twitter network became necessary.

Before such analysis can begin, the network must first be obtained. That is, the nodes (accounts) and connections (followed/following relationships) must be determined. This information is buried within Twitter itself, and an impossible amount of account viewing would be required to trace all of the connections. Fortunately, NodeXL, an easy-to-use software package, can begin extracting the required information with just a couple of clicks. This results in a model of a library's Twitter network that allows librarians to see the relationship of followers to the library and other relevant sources of information (Figure 2).

What is NodeXL?

NodeXL is a free, open-source software tool that enables users to map social networks using Microsoft Excel. It was developed by Marc Smith and his team at Microsoft Research. Contributors represent a variety of institutions, including University of Maryland, Brigham Young University, Stanford University, and Oxford Internet Institute. NodeXL is funded by user donations and supported by the Microsoft Research External Projects Group.[3] It can be downloaded from the Microsoft Research[4] or NodeXL CodePlex3 site. NodeXL is compatible with versions of Excel 2007 and later but not with Mac versions of Excel. It can be used with a variety of social media outlets; however, Bjork Library chose to focus on visualizing its direct Twitter network.

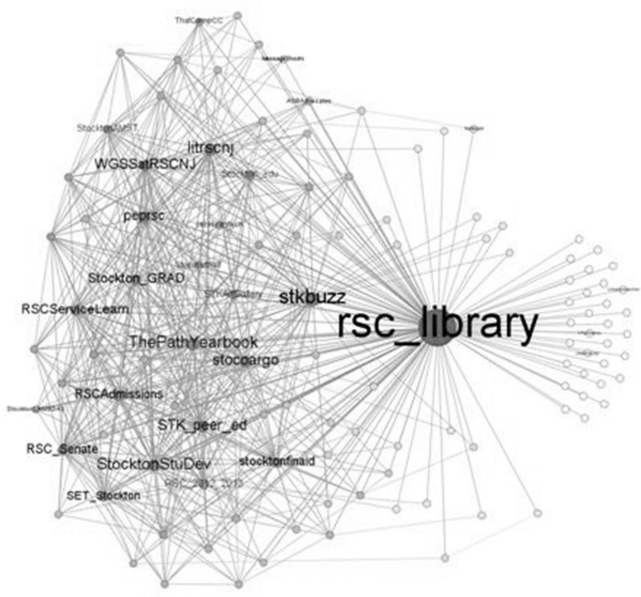

Figure 2. The Bjork Library's Twitter network. Node and text size are proportional to the number of connections. All accounts connected to (following) the library are shown. The library account connects individual users to relevant academic accounts, both on and off campus.

The use of NodeXL requires no previous knowledge of network analysis tools. Users may manually input data to Excel or authorize the program to collect data from Twitter. Visualizations of the network are automatically generated and can be customized easily. There is an extensive NodeXL Graph Gallery from which users can draw inspiration and see what other users or institutions have done.[5]

We selected NodeXL as an assessment tool due to its cost and available online support and tutorials. Furthermore, the importance of the automatic data collection from Twitter cannot be overstated. It allows noncomputer programmers to begin downloading data in a matter of minutes. Another important feature is the automatic calculation of network metrics, such as the importance of each node in the network and the node degree, the number of connections possessed by a node. Such parameters often require thousands of calculations, which certainly cannot be performed by hand. For Twitter networks, NodeXL also automatically downloads account information, e.g., number of followers, account location, and date of account creation. We found the production and manipulation of network maps using NodeXL's interface to be straightforward.

Bjork Library's network analysis

Figure 2 shows Bjork Library's Twitter network after the semester-long push to increase followers. It's clear that the library connects otherwise unconnected students (cluster on the right) to Twitter accounts affiliated with Stockton and other academic communities, making the library's Twitter account a gateway for information. Part of a librarian's role is to connect users to reliable and relevant sources of knowledge. In addition to the library-related posts, the library now connects users to content from the Stockton community at large. For example, Bjork Library

follows @RSCServiceLearn, the Stockton Service Learning department's Twitter account. Due to this connection, the library's followers can now receive important Service Learning information when tweets are reposted, or "retweeted," by the library. Such connections increase the value of the Twitter account to library patrons. Service Learning also benefits from retweeting, as 81 new users are exposed to its content (Figure 3).

More importantly for the library, however, is the opposite effect, the extension of the library's reach beyond that of its direct followers. The figure demonstrates that the @RSCServiceLearn account has many connections and is capable of sending information from the library's account to many others who are not currently directly connected to the library. The impact, however, cannot be seen from the library's network, i.e., Figure 2.

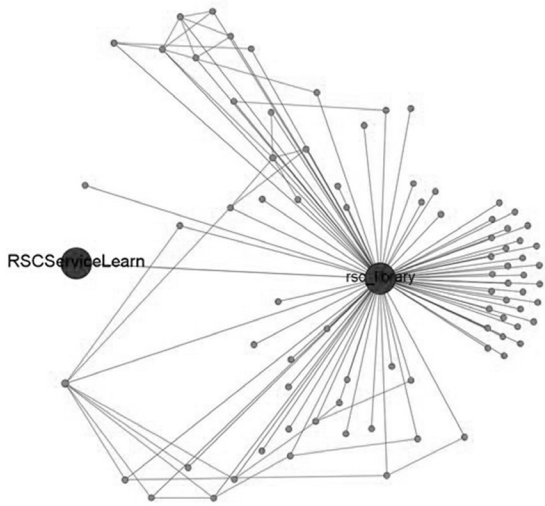

Figure 3. Eighty-one Twitter accounts connected to the library but not RSCServiceLearn. An agreement between the Library and Service Learning (SL) to retweet relevant messages would expose these accounts to SL information. This would represent a substantial increase in exposure for the RSCServiceLearn account. Similarly, retweeting a library message by SL would result in a significant increase in dissemination.

One would have to analyze the Service Learning network of followers to determine the number of new Twitter users exposed to the library's message. We can, however, reasonably assume it would be significant since Service Learning has a large number of followers. Thus, the library can extend its reach by partnering with Service Learning and other hubs (highly connected nodes) in the network, agreeing to mutually retweet relevant content and thereby connecting with Twitter users not directly following the library's account. This will lead to greater dissemination of the library's information, and the increase in exposure could draw in more followers if the content is appreciated.

Ideas for other applications of NodeXL

NodeXL can be used to create a variety of models that suit an institution's priorities and social media goals. We were interested in understanding our library's reach on Twitter so we constructed a network of our followers. However, you can also create network models of Twitter lists and specific search terms. Additionally, NodeXL can be used to create network models of other social media platforms including Flickr and YouTube. One thing to note is that NodeXL does not work with institutional Facebook pages.

Another alternative use of NodeXL is to create a network model of a subset of followed accounts, referred to in Twitter lingo as *friends*. Twitter allows users to organize friends into lists. NodeXL users can then import lists information to create a network map. This application would be helpful for institutions following a variety of users such as other libraries, institutions, librarians, faculty, and students because it allows social media managers to focus on establishing target audiences for potential marketing or interaction.

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communities, including: R. David Lankes, *The Atlas of New Librarianship* (Cambridge, MA: MIT Press, 2011); R. David Lankes, et. al., "Participatory Networks: The Library as Conversation," *Information Research* 12 (October, 2007), accessed August 28, 2013, http://InformationR.net/ir/12-4/colis05.html; David Carr, *Open Conversations: Public Learning in Libraries and Museums,* (Santa Barbara, CA: Libraries Unlimited/ABC-CLIO, 2011); and Nancy Kranich and Carlton Sears, "The Conversation Continues @ your library," *American Libraries* 43 (March/April 2012): 22, accessed August 28, 2013, http://americanlibrariesmagazine.org/columns/my-mind/conversation-continues-your-library.

4. A framework for considering the graduate experience is: Lucinda Covert-Vail and Scott Collard, *New Roles for New Times: Research Library Services for Graduate Students* (Washington, DC: Association of Research Libraries, December 2012), accessed August 28, 2013, www.arl.org/storage/documents/publications/nrnt-grad-roles-20dec12.pdf.

5. The Harwood Institute "Turn Outward" tool is one of many available on ALA's website "Libraries Transforming Communities," under the heading: Tools for Community Engagement and Innovation at www.ala.org/transforminglibraries/sites/ala.org.transforminglibraries/files/content/HarwoodHalfHour_TurnOutward_FINAL.pdf. For additional resources, see also, the Harwood Institute website: www.theharwoodinstitute.org/how-to-turn-outward/.

6. For a useful review about measuring academic library engagement, see Craig Gibson and Christopher Dixon, "New Metrics for Academic Library Engagement," Proceedings of the Association of College and Research Libraries, 2011: 340-351, accessed August 28, 2013, www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/national/2011/papers/new_metrics.pdf.

7. Richard Harwood and Aaron Leavy, *Why We're Here: The Powerful Impact of Public Broadcasters When They Turn Outward* (Dayton, OH: The Kettering Foundation, 2011), 116.

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Concluding remarks

The potential impact of a library's social media account extends beyond its direct followers. This potential can be realized by exploiting the network of connections. Here, we describe a simple method of extending a Twitter account's impact by developing relationships with other influential players in addition to increasing the number of followers. This can be accomplished in a few easy steps,

- Install NodeXL. Use it to obtain the network of Twitter users following your institution's account.
- Examine the resulting picture of the network. Identify potentially influential accounts, such as those with many connections.
- Develop relationships with those accounts by agreeing to retweet relevant information. These relationships are mutually beneficial. We showed that forwarding a tweet from Service Learning would reach 81 more people. One can expect a similar benefit to the library, although an analysis of Service Learning's network is necessary to quantify the effect. This is possible with a little interdepartmental collaboration, to the benefit of all.

Notes

1. RSC Library Twitter Feed, https://twitter.com/RSC_Library.

2. In 2012 and 2013, for the International Games Day @ your library, an international group of libraries participated in a global game of Telephone (also called Gossip), http://globalgossipgame.wordpress.com/.

3. NodeXL: Network Overview, Discovery and Exploration for Excel, Microsoft, last modified December 6, 2013, http://nodexl.codeplex.com.

4. NodeXL: Network Overview, Discovery and Exploration for Exel, Microsoft Research, accessed December 12, 2013, http://research.microsoft.com/en-us/projects/nodexl/.

5. NodeXL Graph Gallery, www.nodexlgraphgallery.org/Pages/Default.aspx.