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A Text Mining Analysis of Academic Libraries' Tweets

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ABSTRACT

This study applies a text mining approach to a significant dataset of tweets by academic libraries. The dataset for this research was collected from the complete Twitter timelines of ten academic libraries. The total dataset comprised 23,707 tweets with 17,848 mentions, 7625 hashtags, and 5974 retweets. Academic libraries from the dataset have typically posted fewer than 50 tweets per month, though tweet volume grew rapidly in late-2013 through 2014. The results show variance between academic libraries in distribution of tweets over time. The most frequent word was "open," which was used in a variety of contexts by the academic libraries. It was noted that the most frequent bi-gram (two-word sequence) in the aggregated tweets was "special collections". The most frequent tri-gram (three-word sequence) was "save the date". The most frequent word categories in the semantic analysis for most libraries were related to "knowledge, insight, and information concerning personal and cultural relations". The most common category of the tweets was "Resources" among all the selected academic libraries. These findings highlight the importance of using data- and text-mining approaches in understanding the aggregate social data of academic libraries to aid in decision-making and strategic planning for patron outreach and marketing of services.

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INTRODUCTION

Social media applications have been increasingly adopted by libraries to market both resources and services (Collins & Quan-Haase, 2014) as well as to enhance the relationship with their patrons. It enables "information and knowledge sharing, service enhancement and promotion, interaction with student library users, at minimal costs" (Chu & Due, 2013, p. 72). Academic libraries are also adopting social media and this practice is dramatically changing how they interact with users (Del Bosque, Leif, & Skarl, 2012). For example, Twitter can create new relationships with patrons or strengthen existing ones (Cavanagh, 2015), as it is "used as an alternate channel of communication as well as a social utility to form personalized connections with users" (Boateng & Quan Liu, 2014, p.127).

In this vein, academic libraries can be seen as proactively responding to cultural changes involving technology (Shulman, Yep, & Tomé, 2015). In a previous study about academic libraries' response to emerging technology in higher education, including social media, Kumbhar (2014) found that academic libraries, overall, are responding positively; in fact, there are a growing number of academic libraries implementing social media applications (Al-Daihani & AlAwadhi, 2015). This is part of their commitment to adding value to information services delivery by being more directly connected with their patrons (Loudon & Hall, 2010). Some academic libraries have included plans for the use and implementation of social media within their greater operational strategy (Boateng & Quan Liu, 2014), which indicates the critical importance of not only adopting but regularly engaging with these tools.

As a contribution to the literature of social media in academic libraries, this study employs a variety of content analysis techniques to manually and automatically code tweet content (i.e., the content of libraries' individual Twitter posts). Large-scale automated content analysis allows libraries to benchmark their Twitter usage (specifically, their tweet posting content) against their peers in an effort to determine what content types might drive user engagement and interaction. It also highlights the importance of using data- and text-mining approaches in understanding the aggregate social data of academic libraries. This research is an initial investigation that provides useful insights and introduces a text-mining methodology for future research.

RESEARCH OBJECTIVES AND QUESTIONS

This study applies the text mining approach to ten academic libraries from top global universities, in order to describe their use of Twitter, and to analyze their tweet content. The study answers the following questions:

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- How often do academic libraries use Twitter?
- What type of content is posted by academic libraries on Twitter?
- What are the themes associated with academic libraries' tweets?

RELATED WORK

This section describes related work on social media use by academic libraries, and related work on Twitter, and text analysis.

SOCIAL MEDIA ADOPTION BY ACADEMIC LIBRARIES

Twitter and Facebook are the most commonly observed social media applications used by libraries (Palmer, 2014), which mirrors the use of Twitter and Facebook as the most popular social media tools used by the general public. One of the key features of these tools is that they enable two-way communication and interaction between a library and its patrons. This kind of dialog typically involves staff and patrons discussing books within the collection, or staff responding to general reference inquiries. Academic libraries "using them as outreach tools, a method of promoting themselves and their services within their communities and beyond" (Boateng & Quan Liu, 2014, p. 126). The ability to expand customer interaction through social media platforms has largely been seen as a success for academic libraries, as they have the potential to "tak[e] librarians and an institutional presence to the places where the patrons are, bridging the gap, and attempting to start new conversations" (Gaha & Hall, 2015, p. 49). Jain (2014) also discussed the potential of social media in marketing library and information services.

Twitter, in particular, "has been found to be useful in extending the reach of library and information services, as well a presenting an up to date image of services provision" (Loudon & Hall, 2010, p.240). According to Cuddy, Graham, & Morton-Owens (2010), Twitter platform also allows libraries to share news about facilities, resources, downtime, events, and staff. The content of some tweets includes notices about noisy construction near the library, and reminders about services the library wants to promote, such as instant message (IM) reference (Cuddy, Graham, & Morton-Owens, 2010). Loudon and Hall (2010) assert that these types of tweets are aimed at deploying news and enhancing current awareness related to library events, resources and services, and changes to hours of operation. Del Bosque et al. (2012) found that academic libraries tweet about library resources, hours of operation, library events, and campus and community events as well.

In sustaining as well as improving their social media presence, academic libraries often face a number of challenges that must be addressed (Ramsey & Vecchione, 2014; Zohoorian-Fooladi & Abrizah, 2014). Attracting "followers" for the library's Twitter feeds, for example, was reported to be difficult. In a study by Chu & Du (2013), it was found that students rarely contribute to social networking tools used by libraries, and it was found that students did not like using them. In addition, Stuart (2010) found that libraries often neglect the social aspects of Twitter and do not use it as an opportunity to connect with their followers. They are "striving to build audiences on multiple social media sites by creating engaging content and assessing their social media presence" (Burgert, Nann, and Sterling , 2014, p. 1). Loudon and Hall (2010) claimed that there seems to be little guidance or support from management in adoption of social media in academic libraries. Rather, libraries "are generally acting on their own initiative when it comes to devising and implementing, a strategy for the deployment of Twitter in the workplace" (Loudon & Hall, 2010, p. 239). The limited participation of users was also apparent to be a barrier for libraries (Chu & Du, 2013).

To overcome these difficulties and attract library patrons to their social media presence, Burgert et al. (2014, p.3) indicated that "it is important to keep content fresh, leverage relationships with campus partners, and widely publicize the library's social media presence". Twitter account holders at the library should be encouraging two-way communication (Cuddy et al., 2010). To do this, "librarians need to provide consistent updates with an approachable, casual tone, and listen to their users on the social media sites" (Burgert et al., 2014, p. 6). Kim, Abels, and Yang (2012), p. 1, reported that "some academic libraries have no clear published objectives for using Twitter or other social media." Therefore, text mining could be a potential solution toward understanding the most successful content types posted by libraries and their users, in an effort to satisfy the needs of these users and effectively engage them in using library services.

TEXT ANALYSIS

In social media, content analysis and text mining is often used to analyze user-generated text and support decision making (Abrahams, Fan, Wang, Zhang, & Jiao, 2015). Text-mining applications for libraries and other institutions include information extraction, topic tracking, summarization, categorization, clustering, concept linkage, information visualization, and question answering (Fan, Wallace, Rich, & Zhang, 2006). According to Zhang and Gu (2011), academic libraries could use text mining to benefit from these applications with the goal of supporting the decision making process.

In a recent paper, Sandhu (2015) indicated the importance of learning about data mining and Big Data tools for academic libraries to improve the efficiency of library and information services. Similarly, Zhang and Gu (2011) claimed that mining customer knowledge is important for academic libraries. The text-mining approach for social media data has been used in many other fields, such as business (Abrahams et al., 2015), health sciences (Sarker, et al., 2015), and political sciences (Stieglitz & Dang-Xuan, 2013).

The use of text-mining approaches is slowly beginning to appear in literature about library and information science; for example, Papatheodorou, Kapidakis, Sfakakis, and Vassiliou (2003) did a study that used data mining techniques to analyze user communities of digital libraries. In 2011, Zhang and Gu wrote a paper about text-mining applications specifically geared toward academic libraries. Since that time, a few additional library and information science papers have become available that focus on implementing text mining for social media data. In one such recent paper, Shulman et al. (2015) analyzed the Twitter network of two academic libraries in an effort to identify influential players and recruit them for information dissemination purposes. Another previous work, by Sewell (2013) analyzed academic library Twitter followers themselves. These studies focused more on social network analysis, indicating the importance of applying text-mining techniques to reveal more information from available social data.

METHODS

DATA COLLECTION

The dataset for this research was collected from the complete Twitter timelines of 10 academic libraries (i.e., all Tweets since joining the platform) through an archiving service (twimemachine.com) in December 2014. The libraries chosen were the libraries of the ten highest-ranking universities from the global Shanghai Ranking. The selection was restricted to English-speaking universities and to one library if the university had more than one library. Table 1 shows the descriptive information regarding these universities' Twitter accounts. In addition to tweet content, the following information was also retrieved: tweet date, number of times marked as a "favorite" by other users, number of times "retweeted" (or forwarded by other users to their own network), and date of joining Twitter.

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