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Free and Open Source Software versus Internet content filtering and censorship: A case study

Farid Shirazi*

Ryerson University, Ted Rogers School of IT Management, 350 Victoria Street, Toronto, Ontario, Canada M5B2K3

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ABSTRACT

This study critically investigates the main characteristics and features of anti-filtering packages provided by Free and Open Source Software (FOSS). For over a decade, the digital communities around the globe have used FOSS packages not only as an inexpensive way to access to information available on Internet, but also to disseminate thoughts, opinions and concerns about various socio-political and economic matters. Proxy servers and FOSS played a vital role in helping citizens in repressed countries to bypass the state imposed Internet content filtering and censorship practices. On the one hand, proxy servers act as redirectors to websites, and on the other hand, many of these servers are the main source for downloading FOSS anti-filtering software packages. These packages can provide secure web surfing via anonymous web access, data encryption, IP address masking, location concealment, browser history and cookie clean-ups but they also provide proxy software updates as well as domain name updates.

The main objectives of this study are to investigate the role of FOSS packages in combating Internet content filtering and censorship and empowering citizens to effectively participate in communication discourse. By evaluating some of the well known FOSS anti-filtering packages used by Iran's digital community, this study found that despite the success of FOSS in combating filtering and state censorship, the majority of these software packages were not designed to meet the needs of Internet users. In particular, they are poorly adapted to the slow Internet connections in many developing countries such as Iran. In addition, these software packages do not meet the level of sophistication used by authorities to filter the content of the Net. Therefore, this study offers a new model that takes into account not only the existing level of the Internet infrastructure but also the growing number of Internet users demanding more effective FOSS packages for faster access to uncensored information while maintaining anonymity.

1. Introduction

The recent democratic movements in the Middle East and North Africa (the MENA region) that started with the "Green Movement" of Iran in the aftermath of the controversial 2009 presidential election to the "Jasmine Revolution" in Tunisia which initiated many other waves of street protests in the Arab world—particularly in Bahrain, Yemen, Jordan, Egypt, Algeria and Libya. These events highlighted once again the important role of Information and Communication Technology (ICT) and, remarkably, the role of social media in mobilizing masses for freedom and democracy. These movements share many striking similarities including the role of the younger generation—the so-called grassroots journalists who documented the events as they occurred and posted the collected information in form of pictures, video clips and text to social networking and video sharing sites such as Twitter, Facebook and YouTube as well as other websites and blogs.

Many scholars have emphasized the emancipating role of Information and Communication Technologies (ICTs) in empowering citizens in their struggle for a more fair and just society (Ngwenyama, 1991; Wellman, 1999; Castells, 2000a; Lenihan, 2002; Norris, 2006; Stahl, 2008). The increased popularity of the Internet has not only resulted in increased citizens' participation in public discourse, but it has enabled citizens to request more transparency and accountability (Cigler and Burdett, 1998; Oates, 2003) from public servants, elected representatives and government officials. In other words, through the technologies, citizens are able to actively participate in dialogue with democratic actors by raising their concerns regarding local, national and global issues.

The recent movements in the MENA region show that ICTs are capable of providing citizens the opportunity to access free information and to gain knowledge about the world that is generally not available in the traditional media (print and broadcasting); yet these ICTs are the main target of state censorship and filtering. According to various reports published by independent

* Corresponding author.
E-mail address: f2shiraz@ryerson.ca

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institutes such as Freedom House (www.freedomhouse.org), Reporters Without Borders (www.rsf.org) and OpenNet Initiative (ONI) (www.opennetinitiative.net), ICT censorship and content filtering are common practices in many countries including those in the MENA region.

This case study investigates the impact of FOSS in empowering citizens to access and disseminate free information by raising the following three questions: (1) What mechanisms and methods are used to filter ICT contents? (2) What is the role of FOSS in providing citizens access to free information? And, (3) how can the efficiency of FOSS packages and web proxies be improved to meet Internet users' demands?

The empirical analysis of this study found that despite the sophisticated monitoring and censorship tools used by authorities in repressed countries, and despite the manpower resources allocated for such practices, FOSS software packages, in particular, helped citizens in these countries to gain access to uncensored web content. In addition, FOSS provided citizens the opportunities to participate in communication discourse in digital communities established around social network sites and blogs. However, the current design of FOSS packages and the arrangement of P2P networks supporting uncensored users need to be improved in order to more effectively and efficiently meet the requirements for users who have slow Internet connectivity. Also, the FOSS packages need to be appropriate for the limited network bandwidth available in these countries, especially when a growing number of users in these countries are connecting to the Internet.

The remainder of this paper is organized as follows: Section 2 provides a background review of FOSS and communication discourse. Section 3 describes the main features of popular FOSS anti-filtering packages as well as the monitoring and filtering technologies to restrict citizens' access to the Internet. Section 4 discusses data collection while Section 5 provides the survey regression model and the results of the data analysis and findings. Section 6 presents a framework for future FOSS anti-filtering design based on the findings of our survey analysis. Finally, Section 7 concludes this empirical study.

2. FOSS and public communication discourse

According to Chopra and Dexter (2007), software packages bear both socio-political and metaphysical implications in that they eliminate boundaries, create or reduce distinctions and provide opportunities to rework ontologies and revise politics. Dedrick and West (2003) argue that research on Open Source Software has mainly focused on the motivations of open source programmers and the structural organization of open source projects. This study views the Open Source Software from its emancipatory role in communication discourse. As suggested by Johnson (2007), the new technology provides opportunities to invent and reinvent new ideas, new venues and new knowledge that directly or indirectly impact societies. Freedom to access and disseminate information is considered the fundamental principle of human rights (WSIS, 2003) in today's so-called "networked societies" (Castells, 2000a,b). As such, access to broadband Internet in Finland, for example, is now among a citizen's basic human rights in accordance with recent Finnish legislation (Franzen, 2010). It is evident that, in democratic countries, the technology provides cheaper, faster and yet more efficient ways of engaging citizens in democratic decision-making processes despite the geographical distances and/or locations (Morrisett, 2003). Software applications may be capable of providing opportunities for enhancing communication between citizens, groups, the elected officials and representatives in form of blogs, web sites, search engines, social networking sites, e-mails and other means of digital participation such as e-government. Citizens use various ICT applications to discuss and express their opinions and ideas about various socio-political, environmental and economic matters.

Chopra and Dexter (2007) argue that by their nature, Internet protocols have open standards and follow publicly available specifications. However, the applications developed by these standards and/or the network infrastructures built around them have a major impact on the user's ability to access online resources. Some governments have found these network infrastructures and applications to be a serious threat to the way they exercise and maintain political and economic power. Authorities may consider the Internet and its various applications represent potential challenges to their power. According to Van Dijk (1996), dominance is a form of social power abuse in which authorities illegally and illegitimately exercise control over others for their own interests, often resulting in social inequality. We can observe such illegitimate dominance in the ICT infrastructure of some developing countries—particularly in MENA countries such as Iran where ICTs are heavily controlled by government agencies and the powerful elites in the form of imposed regulations and licensing restrictions on ISPs. There are many reports indicating that to exercise control over the Internet, authorities have ordered ISPs to not only monitor users' online activities but also to block and report these activities if they are deemed to violate the country's laws and regulations or if the activities indicate criticism of the elites. Many countries in the MENA region exercise the same restrictive press code to online media as well. For this purpose, sophisticated Internet monitoring and filtering tools are used by both governments and ISPs (see ONI for Middle East). In Iran, high speed Internet access is limited to government agencies and a handful registered firms. This type of Internet access is not available to individuals (Tait, 2006). As a consequence, Iran's high speed Internet for household use is among the least developed in the world. According to a recent report published by Ookla Net Index (Netindex, 2010) concerning statistics collected from 166 countries for the period of July 9, 2008 to January 8, 2011, South Korea was ranked first in terms of the quality of Internet service available (i.e., download, upload and network reliability). For example, on average, citizens in South Korea enjoyed the fastest Internet download and upload speed with an average of 37.4 Mbps and 20.5 Mbps respectively. South Korea also ranks highest on the Internet quality index (see Ookal Net Index for more details). Iran's position in this global ranking for the same period was 161st on the global list in terms of Internet downloading speed (0.66 Mbps) and 159th in terms of uploading speed (0.19 Mbps).

It is evident that imposing such restrictions will not only jeopardize the future development of ICTs, but will also impact the development of software applications which require reliable broadband Internet access related to business activities (e.g., e-commerce), health, education and other types of digital data exchanges that are dependent on such applications (e.g., audio and video).

Richard Stallman, the creator of the GNU operating system and the founder of the Free Software Foundation, defines free software principals as those that enable the following four components: (a) Freedom to run a program; (b) freedom to study the source code and the ability to modify it to meet users' needs; (c) freedom to redistribute the software package; and (d) freedom to distribute the modified code (GNU, 1996). In addition, this essay argues that one of the most important tasks of FOSS is to empower citizens in many developing countries in their ongoing cat-and-mouse game with censorship. FOSS can provide citizens opportunities to experience the freedom of access to information, freedom of expression, freedom of information exchange and the freedom to participate in communication discourse. Some may argue that anti-censoring/anti-jamming source code should be highly secured through code signing, code obfuscation, code wrapping and decoys