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Regional Use of Social Networking Tools

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Abstract

Social networking services (SNSs) empower users to communicate, connect, and engage with others across the Internet. These tools have exploded in use worldwide. This paper explores the regional use of these tools to determine if participation with a subset of SNSs can be applied to identify a user's country of origin. A better understanding of regional SNS behavior provides a more comprehensive profile of country-specific users, supporting computer network defense (CND) efforts and computer network attacks (CNA) attribution. The conclusions are as follows:

- Existing open source reporting yields an understanding of the market penetration of social networking tools for various regions and countries.
- Preferences for social networking tools have become somewhat universal. Irrespective of location, users are gravitating towards the same tools.
- The native social networking services of countries in Northern Asia and Eastern Europe have remained relevant. These tools can be leveraged as discriminators to resolve a user's location.
- Reporting provided evidence to suggest that mobile devices influence SNS selection and promote social networking adoption.
- Cultural factors provide insights into the regional usage of social networking tools, but additional research and quantitative analysis are required to add fidelity to the employment of cultural indicators in deriving a user's country of origin.
- Which social networking tools are used is only part of the equation when resolving a user's location. Other variables should be incorporated to create an informed assessment of the social media output's geographic origin.

1 Background

Social networking tools represent an amalgamation of "social networks" and "interactive mass media" [Acar 2014, p. 3]. These sites promote communication by enabling people to create profiles and interact with Internet users around the world. Social networking services (SNSs) have exploded in both use and influence over the past decade. In 2013, Pew Research cited that more than 70% of Internet users worldwide use a social networking tool [Pew Research Center 2014]. The increasing availability and adoption of smartphones coupled with expanding high-speed data networks have bolstered connectivity levels, accelerating the real-time use and impact of social networking platforms across the globe. The influence of social media extends far beyond its users; it has played a major role in business, geo-politics, and social movements such as the Arab Spring. Looking at social networking users at the macro level, research has revealed that these tools tend to be used more often by younger generations, females, "opinion seekers," and individuals who signal extrovert behavior, a need for "belongingness," and "collective self-esteem" [Acar 2014, p. 31]. While SNSs all reside on the Internet, how tools are selected and used can vary. This paper explores the possibility of leveraging a user's participation with a subset of social networking tools to determine that user's country of origin. Historically, there have been instances where users within a country have turned to specific social networking applications. Some of the more notable examples include Twitter and the Arab Spring, as well as Twitter and the 2014 protests in Turkey.

In evaluating the prospect of correlating users' locations with their use of social networking, this initiative surveyed the social media landscape to identify the most prevalent social networking services globally, as well as relevant local tools in specific regions. In addition to the tool assessment, this paper briefly touches on additional criteria related to social networking adoption: cultural factors and mobile device use. Supplementary research on these additional variables, along with an investigation of the location data contained in social media posts, can improve the confidence level of employing social networking tool usage to corroborate a user's country of origin.

2 Survey of Social Networking Tools

We conducted a survey of social networking tools to identify the most prominent social networking platforms globally. We referenced a variety of sources to identify and validate the importance of tools in terms of popularity and market share including comScore, GlobalWebIndex, Alexa, and financial reports for the parent companies of the social networking tools. The subsequent list includes global market leaders and a brief synopsis of their user base, functionality, and market penetration.

2.1 Social Networking Global Leaders

U.S.-based SNSs lead the social networking scene in terms of market share. Table 1 captures the monthly active user base for the top SNSs, based on figures from company websites and financial reports. LinkedIn does not provide a monthly active user number, but it reports 300 million registered users. Because Pinterest is not publicly traded, user data was not available, and Tumblr data was pulled from an announcement that Yahoo made when acquiring the social network.

Table 1: Monthly Number of Active Users for Top SNSs

Social Network	Monthly Active Users
Facebook	1.28 billion
Google+	540 million
YouTube	280 million
Twitter	255 million
LinkedIn	n/a
Pinterest	n/a
Tumblr	300 million
Instagram	200 million

The active-user base numbers underscore Facebook's dominance in terms of size, with other SNSs hovering around the active-user threshold of 200 to 300 million.

From an international perspective, the social networking applications that have the greatest influence are Facebook, YouTube, Twitter, and LinkedIn. Below, we describe all the social networking services listed in Table 1.

2.1.1 Facebook

Founded in 2004, Facebook's mission conveys a commitment to connect individuals around the world and empowers its users to share [Facebook 2014a]. It has prevailed as the top social networking platform worldwide with users exceeding one billion as of the first quarter of 2014 [Facebook 2014b]. In the United States, it has significant market penetration with close to 60% of American adults and almost 75% of Americans between the ages of 12 and 17 [Smith 2014]. Its strong presence extends far beyond the United States: Facebook is the prevailing social media

channel of choice in 127 of 137 countries, based on traffic data from Alexa Internet Inc., a subsidiary of Amazon [Cosenza 2013]. Table 2 captures 2012 Facebook penetration among Internet users by region.

Table 2: Facebook Penetration Among Internet Users by Region

Region	% of Population Internet Users	Facebook
Africa	14.9%	30.8%
Asia	26.9%	23.6%
Central and South Pacific	67.7%	60.1%
Europe	63.5%	46.9%
Latin America	31.3%	91.4%
Middle East	39.1%	26.3%
North America	78.6%	67.2%
South America	46.8%	70.9%

Source: www.internetworldstats.com

In terms of monthly active users, Asia makes up roughly 30.5% of Facebook's user base, followed by Europe with 22.65%, and the United States and Canada with 16% [Cosenza 2013]. A strategic focus on emerging and local markets coupled with growing Internet penetration signals that Facebook's biggest user base is shifting overseas. In fact, Facebook cites that 81.2% of its daily active users reside outside of the United States and Canada.

2.1.2 Google+

Google+ is a social networking service provided by Google. Users create public Google profiles and share information through those profiles, controlling who sees the information they share. As of 2014, Google asserts that Google+ has approximately 540 million monthly active users, but almost half do not visit the social network [Miller 2014]. Because Google+ is integrated with other Google services (e.g., Gmail, YouTube, Google Maps), user adoption numbers are bolstered by this relationship. Google+'s deepest regional penetration outside of the United States is in the Asia-Pacific region and South America.

2.1.3 Twitter

Twitter, which has been in existence since 2006, represents the largest micro-blogging site [Acar 2013]. It allows its users to post and send *tweets*—short messages of up to 140 characters—to the world or directly to other Twitter users. The first quarter of 2014 revealed that Twitter has an average monthly active-user base of 255 million users. While Twitter's home market is in the United States, its audience overseas is growing rapidly similar to Facebook. Analysis conducted by Business Insider Intelligence revealed that 14 countries demonstrated higher Twitter usage than the United States: Saudi Arabia, Indonesia, the Philippines, South Africa, Turkey, Thailand, India, the United Arab Emirates (UAE), Mexico, Spain, the United Kingdom (UK), Argentina, Malaysia, and Japan. Forty-one percent of Saudis who are online are using Twitter—the highest percentage worldwide [Smith 2013]. Indonesia and the Philippines trail behind closely. Similar to Facebook, Twitter's user base is growing rapidly in the Asia-Pacific region. Twitter is officially blocked in China, Iran, and Turkey and closely censored in Syria and Venezuela; however, these measures have not deterred users within these countries from finding ways to access the service.

2.1.4 LinkedIn

LinkedIn is a social networking tool targeted at connecting professionals. In terms of global market share, LinkedIn has approximately 300 million users. Approximately one-third of those users reside within the United States, and the balance is spread across approximately 200 countries. LinkedIn has been cited as having the oldest audience among social media tools. Like Facebook and Twitter, LinkedIn has experienced increased adoption in the Asia-Pacific region with over 46 million LinkedIn users in the region. LinkedIn has gained users in this region by leading a language localization initiative, attracting users from Indonesia, Korea, Malaysia, Singapore, Japan, and India [Simply Zesty 2012].

2.1.5 YouTube

YouTube focuses primarily on video sharing. Founded in 2005, YouTube has been owned and operated by Google since late 2006. Trendstream, a UK market research firm, updated its GlobalWebIndex to include YouTube. YouTube, with approximately 280 million users, falls in third place behind Facebook and Google+ in terms of social platform active usage in 2013 [Kosner 2013]. According to Google, one billion unique users visit YouTube each month, which is approximately one in every two Internet users. Furthermore, 80% of YouTube traffic comes from outside of the United States, and the platform is localized across 61 countries and languages.

2.1.6 Pinterest

Pinterest is a social network that enables users to visually bookmark images in a digital scrapbook and discover images by perusing other users' bookmarks. It is used predominately by females, with one in three U.S. women using Pinterest, according to a study conducted by the Pew Research Center. Nearly half of its users reside within the United States, and its footprint globally is relatively small with some market penetration in Canada and Europe.

2.1.7 Tumblr

Tumblr is a micro-blogging platform and social networking website that emphasizes the use of multimedia in blog posts. After users create a post, they can keep it private or allow other users to follow it and even reblog it. In 2013, Tumblr (acquired by Yahoo) boasted 117 million unique visitors worldwide; however, Yahoo cited 300 million active monthly users, suggesting a possible discrepancy [Austin 2013]. Currently, Tumblr has approximately 191 million blogs and is available in 13 languages. Contrary to LinkedIn, Tumblr has the youngest audience. According to a social platform usage report conducted by GlobalWebIndex, 47% of its users are between the ages of 16 and 24. Forty-two percent of its traffic is domestic; however, Yahoo is trying to grow an international audience, so this percentage may decline in the future.

2.1.8 Instagram

Instagram, acquired by Facebook in 2012, is a mobile social networking service that allows users to capture pictures and videos and propagate them across other social networking services. In the spring of 2014, Instagram announced it had surpassed 200 million monthly active users. In research published by GlobalWebIndex, Instagram was identified as the fastest growing social me-

dia site worldwide [Lunden 2014]. Excluding China, GlobalWebIndex showed that Instagram active usage is below 10% in regions other than the United States, with Latin America trailing behind the U.S. by 1 percentage point.

2.2 Local Social Networking Services

While a significant number of social networking tools exist, market research indicates that usage has been converging towards dominant players such as Facebook and Twitter over the past two years. Indigenous social platform usage, which caters to local audiences, has been declining steadily with the exception of China and Russia [Lunden 2014]. In the next section, we explore the regional adoption of SNS tools and identify local social networks that have remained relevant in specific regions despite robust international expansion efforts by market leaders.

3 Regional Preferences for Social Networking Tools

The eight tools described in the previous section represent the most prominent players in a teeming social media space where hundreds of new tools emerge daily. In an effort to ascertain regional partialities for SNS tools, we examined user adoption and social networking usage at a regional level. We extracted social networking adoption rates from a study conducted by Sample and Karamanian.[1] In that study, the authors derived the SNS adoption rate by dividing an application's users (within a country) by the number of Internet users in each country as reported on the Internet World Stats website (http://www.internetworldstats.com/). Countries with an Internet adoption rate of less than 20% were excluded from their study. We organized these observations by region in the subsequent sections. The user data from Internet World Stats is from June 30, 2012; the Internet adoption rate and Facebook penetration have likely increased since then. The strongest user data existed for Facebook (63 countries); the user numbers for Twitter (25 countries) and LinkedIn (56 countries) were aggregated from Beevolve, PeerReach, and Semiocast.

In addition to SNS market penetration, we also examined regional web traffic to social networking sites. Alexa Internet Inc. uses the web traffic data it provides to create a list of the top sites frequented by users in a specific country. To calculate this site ranking, Alexa combines the number of average daily visitors and the number of page views over 30-day periods. When writing this report, we looked at the top 50 sites for 91 countries to identify social networking tools that satisfied this threshold. For the majority of countries, Facebook, YouTube, and Twitter landed in the top 50. Some regions exhibited a sustained presence from local social networking services; native tools were particularly strong in Eastern Europe and Northern Asia. Also, we observed a growing presence (although a significantly smaller one) of new social tools like Tumblr and Instagram in several countries.

[1] Sample, Char & Karamanian, Andre. "Application of Hofstede's Cultural Dimensions in Social Networking." International Conference on Cyber Warfare and Security (2014).

4 African Region

Compared to more developed regions, SNS adoption is lower in the African region (as shown in the Facebook usage amounts listed in Table 2). The low usage may be attributed to low Internet penetration population rates. Of the 58 countries in Africa, only the 6 listed in Table 3 exceeded the 20% threshold for Internet users, according to the data retrieved from Internet World Stats. Some of this data dates back to 2012; however, several countries are well below 10%, demonstrating a delay in Internet connectivity for them.

Table 3: SNS Adoption in African Countries

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Kenya	47.3	9.6	n/a	n/a
Morocco	51	30.9	4.4	n/a
Nigeria	28.4	13.7	2.1	3.7
Reunion	35.6	80.0	n/a	n/a
Seychelles	43.2	71.0	n/a	n/a
Tunisia	39.1	79.3	n/a	n/a
Median	**41.2**	**50.1**	**3.25**	**3.7**

Despite the lag in Internet access and lower SNS adoption, recent studies have shown that Africans devote the bulk of their online time to social networking platforms; Facebook is the most visited website in most of Africa [Essoungou 2010]. Based on Alexa's web traffic analysis (see Table 4), Facebook, Twitter, and YouTube are the most popular SNSs in Africa. LinkedIn exhibited a very weak presence in Africa, with Instagram and Tumblr breaking into the top 50 for Nigeria, South Africa, and Ghana. In addition, WhatsApp—a cross-platform mobile messaging app acquired by Facebook—has also gained significant traction in Africa. WhatsApp accounts for more than 23% of data traffic in Africa [GadgetZA 2014].

Table 4: Rankings of the Top SNSs in African Countries

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank	Instagram Rank
Algeria	1	3	49	n/a	n/a
Ethiopia	1	2	30	n/a	n/a
Ghana	1	5	10	n/a	n/a
Libya	1	4	14	n/a	n/a
Madagascar	5	2	-	n/a	n/a
Morocco	2	3	20	n/a	n/a
Nigeria	3	5	7	11	22
Sir Lanka	2	4	21	n/a	n/a
South Africa	3	4	9	n/a	n/a
Sudan	2	3	19	n/a	n/a
Uganda	2	4	8	n/a	n/a
Median Site Rank	**2**	**4**	**16.5**	**11**	**22**

Source: alexa.com

Several social networks have been developed locally within Africa to meet the needs of Africans. These SNSs have tailored their products to both national and regional audiences. One of the most prominent is Mxit, which is considered to be Africa's largest social network. It originated in South Africa as a free mobile instant-messaging application and has evolved into a "global mobile social network" [Kermeliotis 2012]. Mxit allows its users to chat, swap photos, and use a digital currency to buy goods. It has over 55 million registered users and 4.9 million monthly active users in South Africa, and it supports over 8,000 mobile devices [Mxit 2014]. Because Mxit fills the void between basic mobile devices and smartphones, it has gained traction in emerging markets where smartphones are less prevalent.

4.1 Regional Insights

Facebook and YouTube represent the social front-runners in Africa, with Twitter trailing behind them. While these other African SNSs were identified by IT News Africa, user numbers were difficult to validate, and none of the sites made it to top 50 of Alexa's top sites report: AfricanZone, Blueworld, AfricanPlanet, Afro Terminal, and Yookos [Tredger 2012]. With a projection of 300 million smartphone connections in Africa by 2017, Twitter may increase its channel strength [Caulderwood 2014]. One important observation about African social networking usage is that mobile compatibility and usage are incredibly important. Africa is a "mobile-only" continent [Nelson 2014]. Consequently, African users demonstrate a tendency to adopt mobile instant-messaging tools like WhatsApp and Mxit. The use of these messaging apps offers an additional discriminator connecting users to the African region.

5 Asia Region

Asia's dense population has created lots of opportunity for social networking. The Asia-Pacific has the largest social networking audience with approximately 777 million people, which equates to almost 45% of total social users worldwide [Washington 2013]. Table 5 captures the social networking adoption rates of Asian countries that have broached 20% Internet access. Because of the sheer size of Asia and regional differences, we organized and compared the social networking statistics for the Northern Pacific and Southeastern segments.

Table 5: Top SNS Adoption in Asian Countries

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Asia-Pacific				
Australia	88.8	59.7	26.2	9.2
China	40.1	0.11	0.7	n/a
Hong Kong	74.5	75.7	14.4	n/a
Japan	79.5	19.98	0.96	11
New Zealand	88	59.2	25.3	18.3
South Korea	82.5	24.8	1.74	n/a
Taiwan	75.4	75.5	3.35	n/a
Median	**79.5**	**59.5**	**3.4**	**11**
Southeast Asia				
Indonesia	22.1	92.9	n/a	19
Malaysia	60.7	76.6	8.48	6.3
Philippines	32.4	88.9	6.19	4
Singapore	75	72.6	29.5	n/a
Thailand	30	88.1	3.55	7
Vietnam	33.9	34.3	2.1	n/a
Median	**33.2**	**82.4**	**6.2**	**6.7**

China officially blocks Facebook and Twitter, accounting for the negligible market penetration shown in Table 5. Despite blocking these sites, users in China have reported accessing the prohibited sites. According to the Business Insider website, 84 million Chinese users claim they have accessed Twitter through unauthorized entry into virtual private networks (VPNs) or through other hacking techniques. While India is not represented in the table above due to low Internet penetration, India and Indonesia represent 2.87% and 1.43% of the Twitter user base respectively, signaling a keenness for tweets in these countries [Beevolve 2012].

Table 6 presents the top social networking websites in Asia, according to Alexa. They are listed by sub-region, since the North Pacific region of Asia has a slightly different social backdrop than Southeast Asia.

Table 6: Top Sites in Asian Countries

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank
Asia-Pacific				
Australia	3	4	10	n/a
Hong Kong	3	5	n/a	22
Japan	7	5	16	n/a
New Zealand	3	4	14	n/a
South Korea	2	3	25	n/a
Taiwan	2	8	n/a	n/a
Median Rank	**3**	**4.5**	**15**	**22**
Southeast Asia				
Bangladesh	1	4	21	19
Cambodia	1	3	n/a	n/a
India	3	4	11	10
Indonesia	2	4	11	n/a
Japan	7	5	16	n/a
Malaysia	2	4	13	17
Pakistan	1	13	11	10
Philippines	1	4	8	10
Singapore	3	4	9	7
Thailand	2	3	17	22
Vietnam	3	5	n/a	n/a
Median Rank	**2**	**4**	**11**	**10**

Source: alexa.com

The site traffic data reported by Alexa indicates an upswing in Facebook and Twitter usage in the Asian region. This increase may be attributed to a wide variety of factors: targeted marketing strategy, desire for international connections, or better mobile experience. According to Alexa's data and insights into user adoption from Sample and Karamanian's study, Facebook, YouTube, Twitter, and LinkedIn appear to be social site leaders in the Southeast Asia market.

One noteworthy local tool in Southeast Asia is Zing, a homegrown Vietnamese SNS that comprises an array of portals connecting users to news, music, instant-messaging programs, games, and other SNSs. In September 2012, Alexa named it the sixth top website in Vietnam, so it still trailed Facebook. Vietnam represented Facebook's fastest growing country.

5.1 Local Social Networking Services in Northern Asia

Despite the global popularity of Facebook, Northern Asian countries have developed many of their own SNSs. China's decision to block the global SNS giants may be a contributing factor to the strength of these social networks. In addition, some of these local tools were designed with a "mobile first" strategy and with cultural preferences in mind, potentially influencing user patronage.

Sina Weibo is a Chinese micro-blogging service that boasts over 129 million monthly active users. Its main competitor is Tencent Weibo, which has grown by integrating into other SNSs. From a social perspective, Weibo has served as a forum for Chinese micro-bloggers to criticize Chinese policies and government actions.

Tencent Weibo has been described as China's implementation of Twitter [Li 2014a]. It functions as a visible public forum similar to Twitter in the United States, but it enables users to pack more content into their "weibo" than a tweet: the equivalent of 70 to 80 words. Tencent Weibo has reported having over 600 million registered users and complies with Chinese guidelines in order to operate and remain accessible to the Chinese public.

Renren, which means "everyone" in Chinese, is perceived by many as the Facebook solution for China and bears a strong resemblance to that social network. Renren offers users a wide range of capabilities to connect with other users, share information, post user-generated content, and play games. While its 2014 financial reports indicated having 210 million activated users, Renren did not appear on Alexa's list of the top 50 sites in China.

WeChat has been cited as the number one social mobile application in China with a subscriber base of roughly 300 million users. It facilitates communication between friends or exclusive recipients selected by the user. With the proliferation of mobile devices, WeChat has surged in adoption largely due to its mobile strategy. WeChat offers increased privacy with its feature that allows users to restrict their broadcasts; that ability may appeal to the Chinese culture, which values privacy [Li 2014b].

QZone is an SNS that evolved from a personal blogging service operated by Tencent, which also owns WeChat and QQ instant messenger. QZone is integrated with both of these services, bolstering its adoption. In March 2014, the Social Times website reported that QZone was China's most popular social site, boasting more than 625 million active users monthly. QZone is positioned as a more private channel (in contrast to Weibo) because network expansion requires knowledge of a user ID. Consequently, QZone circles are tighter. This SNS placed an early emphasis on mobile devices, which has supported its growth. QZone also has features that enable users to decorate photos—something that has attracted Asian users.

Mixi is a Japanese SNS that focuses on connecting users with similar interests. It offers some unique features, such as limited access to Japanese users and concealment of user's real identities, appealing to the privacy-conscious Japanese culture. Mixi's user base is largely between the ages of 15 and 24 and resides in an urban area on Kanto, which is outside of Tokyo. Mixi, which cited over 27 million users in March 2012, became known as the "king of Japan's social networking" space [Ghedin 2013]. However over the past two years, Facebook has succeeded in unseating

Mixi from its social throne. Facebook currently has roughly 15 million actives users in Japan, which is about 15% of its Internet population [Ghedin 2013].

Cyworld has been cited as the leading SNS in South Korea. It initially positioned itself as a platform that connected users in cyberspace through avatars and gave them the opportunity to make friends. It also successfully facilitated the acquisition of virtual goods through a digital currency. At one point, it claimed to have participation from more than half of Korea's population, with strong penetration among young adults. Cyworld's use has declined due to a demand for a mobile platform that offers global connections and Facebook's dedicated international expansion efforts; Cyworld did not appear in Alexa's list of the South Korea's top 50 sites.

Table 7: Top Local SNSs in North Asian Countries

Country	QQ	Sina Weibo	Tencent Weibo	Mixi
China	2	4	5	-
Japan	29	-	22	47
South Korea	7	11	33	-
Taiwan	3	48	39	-
Median Rank	**3**	**7.5**	**27.5**	**47**

Source: alexa.com

5.2 Regional Insights

Facebook and YouTube maintain a consistently strong presence in both Northern and Southern Asia with Twitter and LinkedIn making inroads in select countries. Because local tools have persisted in the northern countries, user engagement with these services could be used as a location discriminator. For example, QQ, Sina Weibo, and Tencent Weibo usage yields traceability to China, South Korea, and possibly Taiwan. In addition, Mixi usage in conjunction with other tools signals a Japanese user. The Southern portion of Asia does not have local tools that can be leveraged to draw conclusions about country use.

6 European Region

At the beginning of 2014, Europe claimed approximately 300 million active social media users, which equates to roughly 40% of the European population [Kemp 2014]. Similar to Asia, local SNS preferences persisted in specific areas. Consequently, we compared the tool usage between the Eastern and Western components of Europe. Table 8 depicts SNS adoption rates for Facebook, LinkedIn, and Twitter; the market usage was extracted from Sample and Karamanian's study, which used countries where Internet penetration exceeded 20%.

Table 8: SNS Adoption in Europe

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Western Europe				
Austria	79.8	44.4	5.8	6.3
Belgium	81.3	57.9	20.75	n/a
Croatia	70.7	50.3	8.6	n/a
Denmark	90	60.8	26.4	n/a
Finland	89.4	48.6	11.6	n/a
France	79.6	49	12.2	4
Germany	83	37.5	4.1	1
Greece	53	67.3	12.2	n/a
Hungary	65.4	65.4	5.7	n/a
Ireland	76.8	60.2	28.1	n/a
Italy	58.4	64	1.6	5
Netherlands	92.9	48.5	29.2	11
Norway	96.9	60.7	20.2	n/a
Portugal	55.2	78.3	24.5	n/a
Serbia	56.4	82.2	7.4	n/a
Slovenia	72.1	50.7	-	n/a
Spain	67.2	55.6	16.9	14
Sweden	92.7	58.6	18.5	5.6
Switzerland	82.1	46.9	16.3	n/a
Turkey	45.7	88.1	7.5	45.7
United Kingdom	83.6	62.4	26.5	12
Median	**79.6**	**58.6**	**14.25**	**12**

Eastern Europe				
Country	**% Population of Internet Users**	**Facebook**	**LinkedIn**	**Twitter**
Bosnia-Hercego-vina	67.9	44.1	n/a	n/a
Bulgaria	51	2.8	9	n/a
Czech Republic	73	51.6	7.2	n/a
Latvia	71.7	26.3	n/a	n/a
Lithuania	65.1	48.7	6.9	n/a
Poland	64.9	33.4	3.4	n/a
Romania	44.1	55.7	11.82	n/a
Russia	47.7	11.7	3.1	4
Slovakia	79.1	46.8	4.7	n/a
Median	**65.1**	**44.1**	**6.9**	**4**

According to We Are Social's report titled *European Digital Landscape 2014*, Facebook currently dominates Western Europeans' social consumption, and VKontakte (a Russian social network) retains its grip on Eastern Europe, particularly in Russia, Ukraine, and Belarus [We Are Social 2014]. A few additional native applications have remained relevant in the Western countries as well, but it is still relatively rare.

6.1 Western Europe

The top website data from Alexa reinforced the findings of We Are Social's report. Facebook dominated the social scene, with Twitter and LinkedIn falling closely behind. Most of the local Western European SNSs have been unseated by Facebook, Twitter, and LinkedIn as indicated by the top social site rankings in Table 9. Brief synopses of former leading local services are included below. Xing, a German version of LinkedIn, is the only site that crossed Alexa's traffic thresholds, suggesting continued relevance.

Table 9: Top Sites in Western European Countries

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank
Austria	2	4	18	21
Belgium	2	4	10	7
Bosnia-Herce-govina	1	3	26	48
Croatia	2	4	20	21
Denmark	3	4	19	8
Finland	3	4	12	15
France	3	4	12	11
Germany	2	4	25	29
Greece	2	4	11	27
Hungary	2	4	-	50
Iceland	1	4	24	21
Ireland	3	4	8	6
Italy	2	4	14	12

Luxembourg	3	4	11	8
Netherlands	3	4	12	6
Norway	2	4	15	14
Portugal	2	4	17	12
Spain	3	4	5	10
Sweden	3	4	14	12
Switzerland	3	4	8	12
UK	3	4	10	11
Median Rank	**2**	**4**	**13**	**12**

Source: alexa.com

Xing, headquartered in Germany, is a social software platform focused on professional networking similar to LinkedIn. It is available in over 12 languages including English, German, Korean, and Japanese. It trails LinkedIn's global penetration but has been quite popular in Germany, Austria, and Switzerland, making it into Alexa's list of the top 50 sites in all three countries.

Hyves previously represented the largest social network in the Netherlands, penetrating almost two-thirds of the Dutch population. Facebook crept in, eventually overtaking Hyves' market share in 2011.

Nasza-Klasa is a Polish social networking site that is popular among a slightly older population. While Facebook is the number-one social network in Poland, Nasza-Klasa is second, with over 8 million active users [Gunn 2013]. Its value proposition focuses on connecting old school friends.

Tuenti is a Spanish-based social networking platform that offers user profiles, videos, photos, and chat applications. This largely national SNS was initially targeted at the Internet audience in Spain but has since branched out internationally.

6.2 Eastern Europe

Eastern European countries display more diversity in terms of their SNS selections in comparison to their Western counterparts. In addition, the VKontakte and Odnoklassniki Russian social networks have a pronounced presence in several Eastern European countries. Table 10 highlights how VKontakte and Odnoklassniki rank against the global SNS leaders in Eastern Europe.

Table 10: Top Sites in Eastern European Countries

Country	Vk. Rank	Odnok. Rank	YouTube Rank	Facebook Rank	Twitter Rank	LinkedIn Rank
Armenia	n/a	n/a	n/a	2	22	16
Azerbaijan	n/a	n/a	n/a	1	n/a	22
Belarus	2	12	5	10	18	n/a
Bulgaria	n/a	n/a	5	3	n/a	21
Czech Republic	n/a	n/a	5	2	35	24
Georgia*	8	10	4	1	48	35
Latvia*	11	18	4	3	17	40
Moldova	8	5	4	3	24	31
Poland	n/a	n/a	5	2	n/a	36

Romania	n/a	n/a	4	2	26	20
Russia	2	8	6	7	13	36
Slovakia	n/a	n/a	4	2	-	36
Ukraine	3	10	4	6	23	47
Median Rank	**5.5**	**10**	**4**	**2**	**23**	**33**

Source: alexa.com

VKontakte, which has been described as Russia's version of Facebook with over 44 million users across the country, represents the second most visited site in Russia. It is also used heavily by users in Ukraine and the Eastern European region. Although it is available in over 70 languages, it is especially popular with Russian-speaking users.

Odnoklassniki is the second leading SNS in Russia with additional market penetration in Ukraine, Kazakhstan, Azerbaijan, Armenia, and Belarus (according to alexa.com). It boasts roughly 40 million users and trails VKontakte as the number-two SNS in Russia.

Draugiem is an SNS heavily used in Latvia as a communication tool. Launched in 2004, Draugiem is an anomaly in Europe because, unlike other regional social networks, it has the highest number of active users in Latvia. With a small user base (2.2 million), Draugiem has over 60% market penetration.

6.3 Regional Insights

Looking at SNS use in Europe reveals a distinction between the Eastern and Western European social landscape. In Western Europe, local SNSs have largely been eliminated. In addition to the leading four services, younger SNSs (Pinterest, Tumblr, and Instagram) are approaching Alexa's threshold for the top 50 sites in several countries: Finland, France, Hungary, Ireland, Italy, Luxembourg, Norway, Netherlands, Portugal, Spain, and the UK. The elevated Alexa ranking of these younger SNSs suggests nascent penetration in Western Europe that is largely absent from regions outside of the United States. Eastern Europe exhibits a clear regional partiality for Russian-based SNSs.

7 Middle East

Social networking platforms have grown exponentially in the Middle East since 2011 [Dubai School of Government 2013, p. 4]. Examining SNS usage in the Middle East showed a large void in terms of indigenous social networking tools. The one exception is Cloob, a Persian social networking site that emerged after the Iranian government blocked other social competitors. It is ranked 19th by Alexa in terms of the top sites in Iran, and its user base of around 1 million comprises primarily Iranian men over 65 years old. SNS usage in the Middle East is concentrated around the universal social leaders: Facebook, Twitter, and YouTube. LinkedIn has a presence in a handful of countries. Table 11 captures the SNS adoption rates for Facebook, LinkedIn, and Twitter; these rates were extracted from Sample and Karamanian's study.

Table 11: SNS Adoption in the Middle East

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Egypt	35.6	n/a	40.8	2
Iran	53.3	33.1	2.2	n/a
Israel	70	71.3	17.7	n/a
S. Arabia	49	45.0	n/a	33
Median	**51.2**	**45**	**17.7**	**17.5**

According to the Dubai School of Government's *5th Arab Social Media Report*, the UAE, Jordan, Lebanon, and Qatar have the highest Facebook penetration in terms of their overall population. Table 12 depicts a Middle Eastern social landscape that is controlled by Facebook, YouTube, and Twitter.

Table 12: Top SNSs in the Middle East

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank
Bahrain	4	3	7	17
Egypt	1	3	20	n/a
Iran	n/a	45	n/a	n/a
Iraq	1	4	25	n/a
Israel	3	4	24	7
Kuwait	1	5	7	12
Lebanon	1	5	7	12
Qatar	2	3	11	12
Saudi Arabia	4	2	6	38
Syria	1	3	18	n/a
UAE	3	4	10	n/a
Yemen	1	2	6	n/a
Median Rank	**1**	**3.5**	**10**	**12**

Source: alexa.com

Facebook, YouTube, and Twitter all have a strong presence in the Middle East with median site ranks of 10 and under. LinkedIn has also started to broach the Arab social scene.

7.1 Regional Insights

Social networking tool preferences in the Middle East align with worldwide trends. However, the levels of SNS usage in this region are noteworthy. According to a study conducted by Peer Insight, 32% of Saudi Arabia's Internet users use Twitter—the highest percentage in the Middle East; this observation aligned closely with the adoption rate in Table 11. This Saudi Twitter user base accounts for more than half of all the Arab active Twitter users [Dubai School of Government 2013, p. 4]. Roughly half of all the tweets produced in the Middle East originate from Saudi Arabia, with 90% of them composed in Arabic [Radcliffe 2013]. A total of 285 million videos are viewed via YouTube in the Middle East, earning the number-two spot for most video views in the world [Dubai School of Government 2013, p. 4]. Unique to the Middle East, female participation with social networking tools is below the global average. The Dubai School of Government's report also indicated that, despite its top position, Facebook has experienced a dip in usage, while the number of Twitter users in the region has increased by over 79% [Dubai School of Government 2013, p. 27]. These data points, along with the level of engagement, suggest that Twitter may be classified as a favored social channel.

8 Latin America

With more than 94% of Internet users in Latin America using social networking tools, the market is saturated [Simcott 2014]. According to a study conducted by comScore, Latin Americans spend a significant amount of time using social networks: 10 hours per month on Facebook, LinkedIn, and Twitter—more than twice the worldwide average [Economist 2013]. Similar to the previous regions, the respective SNS adoption rates are included for Facebook, LinkedIn, and Twitter in Table 13. Latin America trails Southeast Asia's median Facebook adoption rate only slightly at 82.4.

Table 13: SNS Adoption in Latin America

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Argentina	67	67	n/a	n/a
Brazil	45.6	66.1	17.48	5
Chile	58.6	96.8	22.1	n/a
Columbia	59.5	64.3	11.3	10
Costa Rica	43.1	94.4	19.38	n/a
Ecuador	43.8	74.5	11.6	n/a
El Salvador	24.5	24	n/a	n/a
Mexico	36.5	91.5	12.6	8
Panama	42.8	67.4	17	n/a
Peru	36.5	86.7	17	n/a
Venezuela	41	80.7	11.5	41
Median	**43.1**	**74.5**	**17**	**9**

Table 14 captures the top social sites in Latin America, according to Alexa.

Table 14: Top SNSs in Latin America

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank
Argentina	2	4	9	n/a
Bolivia	2	3	18	n/a
Brazil	2	4	12	13
Chile	3	4	8	n/a
Colombia	3	4	7	20
Costa Rica	2	4	14	18
Ecuador	2	3	8	21
El Salvador	1	3	7	38
Guatemala	1	4	10	18
Honduras	2	4	7	n/a
Mexico	2	4	7	12
Panama	2	3	4	10
Paraguay	1	4	11	n/a
Uruguay	3	4	13	17
Median Rank	**2**	**4**	**8.5**	**18**

Source: alexa.com

As in other regions, users in Latin America favor Facebook and Twitter. Facebook is the most popular social networking tool; with 179 million users, Latin America has 13% more Facebook users than the United States. Brazil uses Facebook more than any other Latin American country: Brazilians spend 95% of their social media time using that SNS. Latin America also has an active Twitter user base. Peer Reach determined that Brazil has the fifth largest Twitter user base (4.3% of global users) with Mexico, Argentina, and Colombia accounting for 3%, 2.6%, and 1.9% of Twitter's global user base, respectively [Simcott 2014]. A handful of local social networking sites exist in Latin America, but they are confined mainly to Brazil.

Orkut is a social networking suite owned and operated by Google and has an audience of over 66 million people. It offers similar functionality to Facebook and Google+, allowing users to create profiles, connect with friends, and discover users with similar interests. Orkut is targeted and used primarily in Brazil (52.4%) with a small market penetration in India (13.1%) [Alexa 2014]. It originated in the United States.

Badoo is marketed as a social networking site, but in terms of features and interactions, it functions more as a dating social networking service**.** It has strong market penetration in South America, particularly Brazil, and boasts roughly 160 million users [Socialbakers 2012].

8.1 Regional Insights

Latin American social networking tools consist primarily of Facebook, Twitter, YouTube, and LinkedIn, although Pinterest and Google+ are both making inroads in this region. Brazil is the third biggest Google+ user, trailed by Mexico and Colombia [Simcott 2014]. Overall, local sites are not used heavily in Latin America with the exception of Brazil; a clear differentiator for this region is the amount of time spent on social networking tools.

9 North America

As we said earlier, the dominant social networking sites were developed in the United States. While you might expect usage to be higher in this region due to the tools' founding origins, it is clear that these services are growing rapidly overseas based on activity levels observed in other regions. Table 15 captures the SNS adoption rates of Facebook, LinkedIn, and Twitter for Canada and the United States.

Table 15: SNS Adoption in North America

Country	% Population of Internet Users	Facebook	LinkedIn	Twitter
Canada	83	63.5	30.5	7
United States	78.1	67.7	37.8	11
Median	**80.6**	**65.6**	**34.5**	**9**

We Are Social, an agency that studies the impact of social media, estimates that social media penetration hovers around 53% in North America with approximately two hours a day being devoted to social networking in the United States and Canada. The agency also reported that Facebook, Twitter, Google+, Pinterest, and LinkedIn are the top five social platforms in Canada. The United States had similar preferences with the exception of LinkedIn; Instagram surpassed LinkedIn with its growing popularity in the United States. Table 16 captures the most highly trafficked social networking sites in Canada and the United States.

Table 16: Top Social Networking Sites in North America

Country	Facebook Rank	YouTube Rank	Twitter Rank	LinkedIn Rank	Pinterest Rank	Instagram Rank	Tumblr Rank
Canada	3	4	9	n/a	14	n/a	20
United States	2	3	7	8	12	16	21
Median Rank	**2.5**	**3.5**	**8**	**8**	**13**	**16**	**21**

Source: alexa.com

9.1 Regional Insights

In reviewing Alexa's list of the top 50 websites in the United States and Canada, we noticed that a higher number of social networking tools crossed Alexa's top 25 sites threshold. New market entrants like Pinterest, Instagram, and Tumblr were ranked significantly higher than in other regions of the world. This elevated status may be a signal of fatigue with dominant players like Facebook. North America was unique in this respect.

10 Culture and Social Networking

Clyde Kluckhohn, an American anthropologist, compiled over 150 definitions of culture, which all underscored a similar characteristic of culture: “a shared mindset” [Acar 2014, p. 101]. That mindset influences a wide range of behaviors: communication, interaction, self-expression, relationships, respect for authority, and individualism. The influence of a society’s culture and values on individuals’ behavior has been studied in a variety of applications ranging from cross-cultural communication, organizational management, and consumer marketing. However, little research on culture’s influence on the selection and use of social networking tools has been conducted. When assessing regional biases, it helps to look at the influence of cultural variables on social networking.

In his book *Culture and Social Media*, Acar examines a wide range of theories that have been applied to understand the impact and adoption of social media. He looks at two predominant theories on cultural metrics: Hall’s high- and low-context cultures and Hofstede’s cultural dimensions theory. Acar applied these theories, along with additional research on social networking comparisons between countries, to explore how culture may influence social media usage.

10.1 High- and Low-Context Cultures

In his book *Beyond Culture*, Hall proposed that cultures could be evaluated on a scale referred to as the high- and low-context continuum, which is derived from individuals’ environment and social roles. Low-context cultures, where context is less important, are characterized by expressive, direct, and formal interactions [Acar 2014, p. 104]. Low-context cultures also align with an individualist and linear way of thinking, according to Hall. On the contrary, high-context cultures reflect indirect, less formal, and figurative statements; they also promote collectivism and group values [Acar 2014, p. 105]. Hall believed that Japanese, Latin Americans, Mediterraneans, and Middle Easterners have a high-context culture and Northern Europeans and English-speaking nations have a low-context culture [Acar 2014, p. 104]. Research suggests that a relationship exists between cultural context and technology use [Acar 2014, pp. 106-107]. Samsung researchers determined that high-context cultures favor text messaging over voicemail because a conversation with a machine conflicts with the cultural model of a two-way conversation with engaged participants. A large-scale empirical study conducted by Yang Wen, Adamic, Ackerman, and Lin revealed that emails and instant messages from users in low-context cultures included more “sentimental verbiage” than high-context cultures [Yang 2013].

Acar’s study, which compared the tweets of Japanese students (high-context culture) to those of American students (low-context culture), revealed that Japanese asked fewer questions than Americans and tweeted less about news. These observations aligned with Hall’s theory that asking questions may seem disruptive to group harmony or disrespectful. Acar also noted that collectivist cultures are more likely to mention someone else in a Tweet [Yang 2013, p. 117]. Buzzfeed has reported on how Americans post photos of themselves, whereas in India, Facebook photos center on public figures and religion [Sharrock 2013].

A similar study conducted by Rue and Stefone indicated that Americans use social media more frequently than Singaporeans, who tend to share visual posts rather than text posts when compared to Americans. These studies suggest that the social posts possess cultural hues that can help determine a user's country of origin.

10.2 Hofstede's Cultural Dimensions

Hofstede's theory provides a paradigm that quantifies the impact of cultural values on behavior through the identification of six cultural dimensions:

- power distance index
- individualism versus collectivism
- masculine versus feminine
- uncertainty avoidance index
- long-term orientation versus short-term orientation
- indulgence versus restraint

These dimensions relate to cultural behaviors. For example, individualism versus collectivism represents individual or group propensities in a culture. Previous studies using Hofstede's theory supported a relationship between culture and the adoption of new communication channels such as the Internet. Research also revealed that different cultures use social media differently. Studies conducted by Rosen and Lackaff showed individualistic cultures demonstrated a tendency to share more photos, self-promote, and engage with individuals they did not know personally [Acar 2014, p. 114]. Americans, an individualist society, also exhibited a higher concern for privacy than the Chinese, a collectivist society [Wang 2011].

Sample and Karamanian conducted an observational study using Hofstede's cultural dimensions theory for Facebook, LinkedIn, and Twitter. The preliminary findings revealed a correlation between the adoption rates of these three SNSs and specific cultural dimensions, and a strong correlation between those adoption rates and indulgence. Hofstede defines an indulgent culture as one that supports the gratification of one's needs and happiness versus a culture of restraint that fosters a need to regulate self-gratification [Hofstede Centre 2014].

10.3 Incorporating Culture

As the use of social networking tools becomes less distinct, it is helpful to introduce additional variables that can explain regional preferences. A cultural lens can provide additional insights and a strong frame of reference when validating a user's origin. Additional research on culture's influence would be helpful in adding context that could drive origin queries and establish region assignment.

11 Emerging Markets

An eMarketer report predicted the number of social network users around the world will reach 2.55 billion by 2017 [eMarketer 2013]. The areas driving this growth are located in the emerging markets of the Middle East, Africa, and Asia-Pacific. The latter currently has the largest social network audience, but the Middle East and Africa are expected to have the second largest by the end of 2013 despite their population penetration rates being on the lower end. While Twitter has plateaued in the United States, it is expanding rapidly in international markets. The Pew Research Center released a report in 2012 that revealed social networking is growing more in developing countries than in developed markets. Media consumption in emerging markets differs drastically from the developed world. The survey revealed that people in lower income nations who have Internet access "use social networking at rates that are as high, or higher, than those found in affluent countries" [McNaughton 2012]. While social networking was previously more popular in affluent nations than in poor ones, that popularity may have depended on the rates of Internet access.

11.1 The Mobile Factor

Mobile technology and phone penetration has facilitated Internet access in less developed nations. As of December 2012, over 30 percent of the mobile subscribers use their device to access Internet data services. The Middle East and Africa are expected to have the largest gains in new social networking users because Internet usage is expanding in both regions, ultimately leading to a rise in social networking. Both of these markets represent venues where users rely heavily on smartphones. In Saudi Arabia, mobile phone penetration exceeds 200%, which explains why half of the YouTube consumption there takes place on cellphones [Radcliffe 2013]. According to CNN, the African continent has emerged as the world's "second most connected region by mobile subscriptions" [Jidenma 2014]. Mobile subscribers are expected to hit one billion by 2015 according to Informa Telecoms. Mobile device access has enabled Africa's large youth population to leverage social networking tools. According to Nmachi Jidenma, "access to social networks via mobile devices" has yielded a platform for Africa's youth to express themselves and participate, leading to a significant impact on "elections, governance, and accountability….self-organizing and demanding better leadership." One important consideration in understanding mobile device usage in these countries is the type of device being used in less developed nations. Inexpensive devices offering a strong battery life and "energy frugal" applications are critical [Wall 2014]. Consequently, mobile devices can factor into SNS usage as observed through the widespread adoption of WhatsApp and WeChat in the region. The market power and use of mobile devices in developing countries suggest that mobile device access is a variable that merits consideration when looking at social networking tool choices and interactions at a regional level.

11.2 Mobile Banking

The level of mobile connectivity in Africa is somewhat astounding. "More people in Africa have access to a mobile phone than electricity" [Shapshak 2012]. Mobile devices and wireless technology have inspired innovative solutions and fueled a robust mobile banking sector. Three-fourths

of the countries with the highest use of mobile banking are located in Africa; 68 percent of Kenyans use mobile banking [Economist 2012]. Similar to Africa, mobile banking markets have emerged in many developing countries where mobile money can deliver much needed financial services to areas that lack the infrastructure needed to deliver traditional banking services. With a focus on building and establishing mobile banking sectors in these areas, Internet access is accelerated as observed in the electricity gap. In a study conducted by Pew Research, once people have access to the Internet, they tend to use SNSs. With a mobile device being the single gateway to so many critical services, we wonder how the mobile factor, and in this particular case mobile banking, may influence social networking preferences in developing regions.

12 Conclusions and Future Work

The ubiquity and market penetration of dominant social networking tools such as Facebook and Twitter can make it challenging to distinguish between a user in the United States and one in the Middle East or other regions. Users across the world are interacting with similar subsets of social networking tools. While indigenous social networking tools in countries such as Russia and China provide discriminators that can be used to assign a user to that particular region, it is difficult to replicate those discriminators in other regions due to the universal social landscape. An awareness of the strength and market share of tools in specific countries certainly enriches our knowledge of regional preferences; however, additional research on specific user behavior to include frequency of use, interaction types, and time spent with tools will deepen the understanding of regional biases and applications of social networking tools. We see that SNS sites can be used differently by various cultures when comparing the active Twitter audiences in Saudi Arabia and the United States, but no quantitative analysis or definitive metrics exist to trace these differences to a region.

User participation and interaction with specific social networking tools provide valuable input to the regional assignment of a user. However, we need to inject other variables to generate an informed assessment of where social media output comes from. Technical artifacts such as geotagging and location information obviously provide helpful contributions to enhance the fidelity of such assessments.

Research on culture's influence on communication offers a compelling case for integrating a cultural lens with cognitive and psychological perspectives into this problem set. Additional research on how cultural differences could be translated into queries that add context to an informed regional assignment would be helpful in resolving ambiguities. This work would likely require an analysis of the text contained in social posts. In addition, mobile device access is driving Internet use, which is also fueling the adoption of social networking tools, especially in developing countries. Further research on the mobile revolution's relationship with the adoption of social networking tools may offer another valuable element to enhancing the ability to connect users to a particular area.

References

URLs are valid as of the publication date of this document.

[Acar 2014]
Acar, Adam. *Culture and Social Media*. Cambridge Scholars Publishing, 2014.

[Acar 2013]
Acar, Adam. "Culture and Social Media Usage: Analysis of Japanese Twitter Users." *International Journal of Electronic Commerce Studies 4*, 1 (2013): 21-32.

[Alexa 2014]
Alexa. *Alexa homepage*. http://www.alexa.com (2014).

[Austin 2013]
Austin, Scott, "The Numbers Behind Tumblr." *Wall Street Journal Blog*. http://blogs.wsj.com/digits/2013/05/20/the-numbers-behind-tumblr/ (May 20, 2013).

[Beevolve 2012]
Beevolve. *An Exhaustive Study of Twitter Users Across the World*. http://www.beevolve.com/twitter-statistics/ (October 10, 2012).

[Caulderwood 2014]
Caulderwood, Kathleen. "Twitter is Exploding in Africa as Continent's Growing Middle Class Demands Gear." *International Business Times.* http://www.ibtimes.com/twitter-exploding-africa-continents-growing-middle-class-demands-adidas-gear-samsung-1575882 (April 24, 2014).

[Cosenza 2013]
Cosenza, Vincenzo. "World Map of Social Networks." *Vincos Blog.* http://vincos.it/world-map-of-social-networks/ (December 2013).

[Dubai School of Government 2013]
Dubai School of Government. *The 5th Arab Social Media Report*. http://www.dsg.ae/en/News/NewsDescription.aspx?NewsID=1361&PrimenuID=6&CatID=30&mnu=Cat1, 2013, http://www.bbc.co.uk/blogs/blogcollegeofjournalism/posts/Twitter-takes-off-in-Saudi-and-other-news-of-social-media-in-the-Arab-world- (June 23, 2013).

[Economist 2013]
The Economist. *Follow the Leader: How Presidents Tweet*. http://www.economist.com/news/americas/21583263-how-presidents-tweet-follow-leader (August 10, 2013).

[Economist 2012]
The Economist. *Press 1 for Modernity: One Business Where the Poorest Continent Is Miles Ahead*. http://www.economist.com/node/21553510 (April 28, 2012).

[eMarketer 2013]
eMarketer. *Social Networking Reaches Nearly One in Four Around the World*. http://www.emarketer.com/Article/Social Networking-Reaches-Nearly-One-Four-Around-World/1009976 (June 18, 2013).

[Essoungou 2010]
Essoungou, Andre-Michel. "A Social Media Boom Begins in Africa." *African Renewal* (December 2010): 3. http://www.un.org/africarenewal/magazine/december-2010/social-media-boom-begins-africa

[Facebook 2014a]
Facebook. *About Facebook page*." https://www.facebook.com/facebook?v=info (2014).

[Facebook 2014b]
Facebook. *Facebook Reports First Quarter 2014 Results*. http://investor.fb.com/releasedetail.cfm?ReleaseID=842071 (2014).

[GadgetZA 2014]
GadgetZA. "Netflix Dominates UK Data, WhatsApp Rules Africa." *Mail & Guardian.* http://mg.co.za/article/2014-05-17-netflix-dominates-uk-data-whatsapp-rules-africa (May 17, 2014).

[Ghedin 2013]
Ghedin, Guido. "The Story of Mixi in Japan: The Rise, the Fall, and the Facebook Takeover." *Digital in the Round Blog*. http://www.digitalintheround.com/japan-mixi-facebook/ (April 3, 2013).

[Gunn 2013]
Gunn, Paul. "Social Media Usage: A Focus on Poland," *Bloom Worldwide*. http://www.bloomworldwide.com/blog/do-polish-people-use-social-media-differently-to-the-rest-of-europe/ (April 25, 2013).

[Hofstede Centre 2014]
The Hofstede Centre, *Hofstede Centre homepage*. http://geert-hofstede.com/dimensions.html (2014).

[Jidenma 2014]
Jidenma, Nmachi. *How Africa's Mobile Revolution Is Disrupting the Continent*. http://edition.cnn.com/2014/01/24/business/davos-africa-mobile-explosion/ (January 24, 2014).

[Kemp 2014]
Kemp, Simon. "Social, Mobile, and Digital in Europe in 2014." *We Are Social.* http://wearesocial.net/blog/2014/02/social-digital-mobile-europe-2014/ (February 5, 2014).

[Kermeliotis 2012]
Kermeliotis, Ted. *Mxit: South Africa's Facebook Beater*. http://www.cnn.com/2012/11/07/tech/mxit-mobile-social-network/ (November 9, 2012).

[Kosner 2013]
Kosner, Anthony. *Forbes Blog*.
http://blogs-images.forbes.com/anthonykosner/files/2013/01/
Screen-Shot-2013-01-25-at-10.13.36-PM.jpg (January 25, 2013).

[Li 2014a]
Li, Zoe. *More than 10 Million Core Users Give Value to Weibo Ahead of IPO*. http://edition.cnn.com/2014/04/10/business/china-weibo-user-base/ (April 11, 2014).

[Li 2014b]
Li, Junheng. *Tencent WeChat and Sina Weibo*." http://www.forbes.com/sites/junhli/2014/04/16/tencent-wechat-and-sina-weibo-the-frenemies-of-the-chinese-mobile-space/ (April 16, 2014).

[Lunden 2014]
Lunden, Ingrid. *Instagram is the Fastest Growing Social Site Globally, Mobile Devices Rule Over PCs for Access*. http://techcrunch.com/2014/01/21/instagram-is-the-fastest-growing-social-site-globally-mobile-devices-rule-over-pcs-for-social-access/ (January 21, 2014).

[McNaughton 2012]
McNaughton, Marissa. *Developing Countries See Rapid Social Networking Growth*. http://therealtimereport.com/2012/01/06/developing-countries-see-rapid-social networking-growth/ (January 6, 2012).

[Miller 2014]
Miller, Claire. *The Plus in Google+? It's Mostly for Google*. http://www.nytimes.com/2014/02/15/technology/the-plus-in-google-plus-its-mostly-for-google.html?_r=0 (February 14, 2014).

[Mxit 2014]
Mxit. *About Mxit*. http://get.mxit.com/about/ (2014).

[Nelson 2014]
Nelson, Jennifer. *Africa's Unique Needs for Mobile Only News Products*.
http://www.rjionline.org/news/2010-2011-reynolds-fellow-journeys-africa-learn-about-continents-unique-needs-mobile-only-news- (February 3, 2014).

[Pew Research Center 2014]
Pew Research Center. *Social Networking Fact Sheet*.
http://www.pewinternet.org/fact-sheets/social networking-fact-sheet/ (January 2014).

[Radcliffe 2013]
Radcliffe, Daniel. *Twitter Takes Off in Saudi*. http://www.bbc.co.uk/blogs/blogcollegeofjournalism/posts/
Twitter-takes-off-in-Saudi-and-other-news-of-social-media-in-the-Arab-world- (August 1, 2013).

[Simcott 2014]
Simcott, Richard. *Social Media Fast Facts: Latin America*. http://www.socialmediatoday.com/content/social-media-fast-facts-latin-america (April 3, 2014).

[Simply Zesty 2012]
Simply Zesty. "LinkedIn Global Expansion Grows; 25 Million Users in Asia -Pacific Region Alone." *Simply Zesty Blog.* http://www.simplyzesty.com/Blog/Article/February-2012/LinkedIn-Global-Expansion-Grows;-25-Million-Users-in-Asia-Pacific-Region-Alone February 2012).

[Shapshak 2012]
Shapshak, Toby. *Africa Not Just a Mobile-First Continent – It's Mobile Only*. http://edition.cnn.com/2012/10/04/tech/mobile/africa-mobile-opinion/ (October 4, 2012).

[Sharrock 2013]
Sharrock, Justine, "How Facebook Plants to Make Us All Get Along." http://www.buzzfeed.com/justinesharrock/how-facebook-plans-to-make-us-all-get-along (January 31, 2013).

[Smith 2014]
Smith, Aaron. *Six New Facts About Facebook*. http://www.pewresearch.org/fact-tank/2014/02/03/6-new-facts-about-facebook/ (February 3, 2014).

[Smith 2013]
Smith, Cooper. *These are the Most Twitter-Crazy Countries in the World, Starting with Saudi Arabia?* http://www.businessinsider.com/the-top-twitter-markets-in-the-world-2013-11 (November 7, 2013).

[Socialbakers 2012]
Socialbakers. *The 20 Most Interesting Social Networks.* http://www.socialbakers.com/resource-center/808-article-the-20-most-interesting-social-networks (August 29, 2012).

[Tredger 2012]
Tredger, Chris. *Top African Social Networks*. http://www.itnewsafrica.com/2012/05/top-african-social-networks/ (May 31, 2012).

[Wall 2014]
Wall, Matthew. *Africa's Mobile Boom Powers Innovation Economy*. http://www.bbc.com/news/business-28061813 (June 30, 2014).

[Wang 2011]
Wang, Y.; Norice, G.; & Cranor, L. F. (2011). "Who Is Concerned About What? A Study of American, Chinese, and Indian User's Privacy Concerns on Social Network Sites," 146-153. *Trust 2011*. Springer-Verlag, 2011.

[Washington 2013]
Washington, Erin. "Growing Social Media: Usage in Asia vs. the US." *Growing Social Media.* http://growingsocialmedia.com/global-social-media-usage-asia-vs-us/ (September 25, 2013).

[We Are Social 2014]
We Are Social. *European Digital Landscape 2014*. http://147.102.16.219/demo1/attachments/124_european%20digital%20landscape%202014.pdf (2014).

[Yang 2013]
Yang, J.; Wen, Z.; Adamic, L. A.; Ackerman, M. S.; & Lin, C. Y. "Collaborating Globally: Culture and Organizational Computer Mediated Communications," Paper 3. *ICIS 2011 Proceedings.* (December 5, 2011). http://aisel.aisnet.org/icis2011/proceedings/eastmeetswest/3

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13. ABSTRACT (MAXIMUM 200 WORDS)

Social networking services (SNSs) empower users to communicate, connect, and engage with others across the Internet. These tools have exploded in use worldwide. This paper explores the regional use of these tools to determine if participation with a subset of SNSs can be applied to identify a user's country of origin. A better understanding of regional SNS behavior provides a more comprehensive profile of country-specific users, supporting computer network defense (CND) efforts and computer network attacks (CNA) attribution. The conclusions are as follows:

- Existing open source reporting yields an understanding of the market penetration of social networking tools for various regions and countries.
- Preferences for social networking tools have become somewhat universal. Irrespective of location, users are gravitating towards the same tools.
- The native social networking services of countries in Northern Asia and Eastern Europe have remained relevant. These tools can be leveraged as discriminators to resolve a user's location.
- Reporting provided evidence to suggest that mobile devices influence SNS selection and promote social networking adoption.
- Cultural factors provide insights into the regional usage of social networking tools, but additional research and quantitative analysis are required to add fidelity to the employment of cultural indicators in deriving a user's country of origin.
- Which social networking tools are used is only part of the equation when resolving a user's location. Other variables should be incorporated to create an informed assessment of the social media output's geographic origin.

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