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Social media research: A scientometric assessment of world publications output during 2001–2014

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ABSTRACT

The paper examines world publications output on social media research (46354) published during 2001–2014. The publications data, sourced from Scopus database, averaged annual 14.61% growth. The paper profiles top 25 most productive organizations that accounted for 12.46% world share, and top 25 most productive authors that accounted for 2.34% world share on indicators such as average productivity, citations per paper, h-index, and share of international collaborative publications during 2001–2014. The distribution of world output by country of publication is highly skewed. The top 15 most productive countries account for bulk of the world output (82.40%). The USA has emerged as the world leader both in its world share and citations impact of social media research output. Blogs, among social media sites, accounted for the largest publication share 27.45%, followed by Facebook (16.75%), Twitter (15.86%), Wikipedia (10.58%), YouTube (7.24%), Flickr (3.94%), MySpace (1.73%), LinkedIn (1.21%), etc., during 2001–2014. Computer science accounted for the highest publications share (55.22%) of world publications output on social media, followed by social sciences (26.55%), engineering (13.52%), medicine (10.14%), business, management and accounting (8.72%), arts and humanities (5.95%), psychology (3.68%), etc., during 2001–2014. The top 30 most productive journals, which reported social media research during 2001–2014, accounted for 6.46% world share. A total of 266 were discovered as highly cited papers in social media research (0.57% world share), each was cited 100 or more times since publication till February 2015. Together these highly cited papers accounted 57462 citations, with an average of 216 citations per paper.

Keywords: Bibliometrics, publications, scientometrics, social media, social media networks, social media sites

INTRODUCTION

Social media has invaded our lives, empowered people with new pervasive communication tools capable of creating big social impact. Little by little social media has been widening facilities for communication with the rest of the world. Within a decade, social media has become one of the most powerful media sources for news updates, online collaboration, networking, viral marketing, and entertainment. It is increasingly difficult to ignore its potential in our day to day life. For many organizations, social media has become a primary channel to engage, listen, and communicate with a variety of stakeholders from customers to employees to suppliers and competitors. The contemporary interest in social media within the academic, public, and business circles has been driven largely by the rise of social media platforms, such as Twitter, Facebook, and YouTube. Social media' stance toward distributing data is relatively open, and it is this

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stance that is driving its penetration with astonishingly fast rate on the web.

Individuals produce data at an unprecedented rate by interacting, sharing, and consuming content through social media. Social media collects the data in a structured and unstructured way, which contains sentiments and opinion of users and can be effectively processed using data mining techniques for achieving the meaningful results. Using social media data, we can classify the type of users and analysis of their posted data on the social websites. Machine learning algorithms are good at text classification which can be used to extract meaningful data from these websites.

Currently, scholars from a number of disciplines of sociology, communication, anthropology, media studies, library and information science, and cultural studies are using social media data and techniques as a part of their research practices. Social media is slowly evolving as a discipline of study with its own thematic areas of study, a community of scholars, courses in the universities, and within its unique publishing channels, etc.

Social media continues to grow apace around the world too, with active user accounts now equating to roughly 29% of the world's population. Monthly active user figures as on January 2015, for the most active social network in each country, add up to almost 2.08 billion – a 12% increase since January 2014. The mobile usage of social networks continues to grow all over the world, with at least 1.65 billion active mobile social accounts in January 2015. Facebook continues to dominate the global social media landscape, claiming 1.366 billion active users in January 2015, followed by Facebook Messenger (0.500 billion), LinkedIn (0.347 billion). Google Plus (0.343 billion), Instagram (0.300 billion), Twitter (0.284 billion), etc.[1]

Social media are interactive platforms where content is created, distributed, and shared by individuals on the web. Social media according to Kaplan and Haenlein is defined as "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0 for the creation and exchange user-generated contents." Social media websites and applications allow users to create and exchange user-oriented content whereby people talk, share information, participate, and network through technologies such as blogs and social networking sites.[2]

Before the term Web 2.0 was created in 1999, internet pages featured mostly static content such as text and graphics and websites operated on Web 1.0 technologies; website hosts and owners were the primary content creators. Online information targeted a mostly passive audience that received rather than contributed content. However, with the introduction of Web 2.0 internet technologies around the turn of 21st century, social media venues such as blogs began to allow users to interact and collaborate with each other in virtual communities. This more open, shared method of social media dialog contrasted significantly with the top-down approach that characterized the earlier years of web. Specifically, social media began meeting the characteristics of Web 2.0 websites, providing a rich user experience, dynamic content, scalability, openness, and collective intelligence. Nevertheless, social media has grown rapidly in the U.S and around the world due to its blending of technology and social interaction for the creation of value.[2]

The first recognizable social media site, SixDegrees was created in 1997. It enabled users to upload a profile and make friends with other users. In 1999, the first blogging site became popular creating a social media sensation that is still popular today. After the invention of blogging, social media began to explode in popularity. Sites such as MySpace and LinkedIn gained prominence in the early 2000s, and sites such as Photobucket and Flickr facilitated online photo sharing. YouTube came out in 2005, creating an entirely new way for people to communicate and share with each other across great distances. By 2006, Facebook and Twitter both became available to users throughout the world. These sites remain some of the most popular social networks on the internet. Other sites such as Tumblr, Spotify, Foursquare, and Pinterest began popping up to fill specific social networking niches.[3]

Social media can take many different forms including internet forums, weblogs, social blogs, wikis, podcasts, pictures, videos, rating, and bookmarking. Technologies include blogs, picture-sharing, vlogs, wall postings, E-mail, instant messaging, music sharing, crowdsourcing, and voice over IP, to name a few. Many of the social media services can be integrated via social network aggregation platforms such as MyblogLog and Plaxo. Examples of social media applications, social media sites include: (a) Communication- (i) Blogs-bloggers, Live Journal, and Open Dairy (ii) Micro-blogging/Pressure Applications – Twitter and Plurk (iii) Social Networking – Facebook, LinkedIn, MySpace, and Orkut (iv) Social Networking Aggregation – Nutshell Mail and (v) Events – Upcoming

and Eventful; (b) Collaboration – (i) Wikis – Wikipedia (ii) Social Bookmarking or Social Tagging – Delicious Good Reader (iii) Social News – Digg and Reddit and (iv) Opinion Sites – Epinions and Yelp; (c) Multimedia – (i) Photosharing – Flickr and Zoomr (ii) Video sharing – YouTube and Vimeo (iii) Livecasting – Upstream Tv and (iv) Audio and Music Sharing – Imeem and The Hype Machine; (d) Reviews and Opinions – Product Reviews – epinions.com and Q and A – Wiki Answers; and (e) Entertainment – (i) Media and Entertainment Platforms – Cisco Ees (ii) Virtual Worlds – Second Life and (iii) Game Sharing – Miniclip.[4]

Literature Review

So far, only a few studies have undertaken a quantitative assessment of world literature on social media research. Coursaris and Van Osch[5] examined the research productivity and citation impact of authors, institutions, and countries based on 610 peer-reviewed social media articles published between October 2004 and December 2011. Results indicate that research productivity is exploding and that several leading authors, institutions, countries, and a small set of foundational papers have since emerged. Social media as a domain displays limited diversity and is still heavily influenced by practitioners. The paper raises two fundamental challenges facing the social media domain and its future advancement, namely the lack of academic maturity and the Matthew effect. Gan and Wang[6] examine 646 journal publications on social media research under the subject category "Information Science and Library Science" and as indexed in Social Science Citation Index. The study analyzed research performance and trends by languages, characteristics, countries, journals, authorships, and author keywords. Keeping these studies in mind, the authors decided to undertake comparatively a more comprehensive study of world social media literature covering 14 years period from 2001 to 2014.

OBJECTIVES

The study undertakes comprehensive assessment of world social media research covering the period 2001–2014 to address the following objectives:

- To study the growth of world literature on social media research, the distribution of research output by top 15 most productive countries, and compare their performance on citation impact
- To study the distribution of world research output by broad subject areas, and analyze research activity on activity index indicator
- To study and compare publication productivity and citation impact of top organizations and authors
- To study the medium of communication and the characteristics of highly cited publications.

METHODOLOGY

The study sourced publications data on social media research, covering the period 2001–2014, from the Scopus database (http://www.scopus.com). For this purpose, a search string was formulated using a number of significant keywords (as shown in the search string given below) in "title, abstract, and keyword" tag and restricting search period to 2001–2014 in "date range tag." The search string was further restricted to 15 top most productive countries in "country tag" to collect their publication data stats country by country. Further, the search string was restricted to "subject area tag," "country tag," "source title tag," "journal title name," and "affiliation tag" to get publications stats by subject, collaborating countries, organization, author-wise and journal-wise, etc. For citation data, citation window was limited to three publication years (publications during 2004–2012), to two publication years (publications of 2013) and to one publication year (publications of 2014). In addition, citations data were collected for total publication output during 2001–2014 from date of publications till the end February 2015.

(((TITLE-ABS-KEY ["social media"] OR TITLE-ABS-KEY ("social medium" or "social network site*") OR TITLE-ABS-KEY ["social networking site*" or "online social network"]) AND PUBYEAR >2000 AND PUBYEAR < 2015) or ((TITLE-ABS-KEY [facebook] OR TITLE-ABS-KEY (Twitter or Wikipedia or foursquare) OR TITLE-ABS-KEY [linkedin or myspace or "google plus"] OR TITLE-ABS-KEY (instagram or pinterest or FLICKR) OR TITLE-ABS-KEY ["academia.edu" or "researchgate"] OR TITLE-ABS-KEY ("you tube" or "youtube") OR TITLE-ABS-KEY [slideshare]) AND PUBYEAR >2000 AND PUBYEAR < 2015) or ((TITLE-ABS-KEY ["blog" or "blogs"] OR TITLE-ABS-KEY ("blogging" or "bloggers") OR TITLE-ABS-KEY ["weblog" or "microblog"]) AND PUBYEAR > 2000 AND PUBYEAR <2015)).

ANALYSIS

The annual world publications output in social media research expanded from 3 in 2001 to 2223 in 2008 and to 9105 publications in 2014, logging average 14.61%

annual growth. The cumulative septennial world output expanded from 2595 during 2001–2007 to 43759 during 2008–2014, logging 1586.28% septennial growth [Table 1]. Of the total world publication output (46354), 44.76% appeared as conference papers, 38.83% as articles, 3.49% as reviews, 2.74% as book chapters, 2.55% as conference reviews, and 1.86% as notes and the rest as articles in press, editorials, short surveys, books, letters, and erratum during 2001–2014.

Citation Impact of Top 15 Most Productive Countries

A total of 142 countries contributed to social media research during 2001–2014. The distribution of publications output by publication rate revealed that in 14 years 103 countries contributed 1–100 papers each, 28 countries from 101 to 1000 papers each, 7 countries from 1001 to 2000 papers each, 1 country from 2001 to 3000 papers, 2 countries from 3001 to 4000 papers each, and 1 country 15001–16000 papers during 2001–2014. Among the top 15 most productive countries, the United States contributed the largest publication share (32.40%), followed far behind by China (8.09%); the United Kingdom (7.67%); Germany (4.94%); Australia (4.30%); Canada, Spain, and Japan (from 3.04% to 3.55%); Italy, Taiwan, France, India, The Netherlands, and South Korea (from 2.06% to 2.58%); and Singapore (1.70%). The top 15 most productive countries together contributed 82.40% share to the world output on social media during 2001–2014. The citation impact registered by the United States was the largest (7.44), followed by the United Kingdom (5.66), The Netherlands (5.59), Canada (5.46), Germany (5.31), France (5.16), Singapore (4.51), South Korea (4.46%), Italy (4.05), Spain (3.94), Australia (3.81), Taiwan (3.51), China (2.60), Japan (2.57), and India (1.85) during 2001–2014 [Table 2].

Table 1: Annual publications output in social media research, 2004-2014

Year	Number of publications
2001	3
2002	19
2003	41
2004	95
2005	309
2006	696
2007	1432
2008	2223
2009	3142
2010	4661
2011	6293
2012	8294
2013	10,041
2014	9105
Total	46,354

Subject-wise Distribution of Research Output

The world output on social media research covering the period 2001–2014 was distributed by ten subject sub-fields (as reflected in Scopus database classification). The subject-wise distribution revealed that computer science accounted for the largest share (55.22%) followed by social sciences (26.55%), engineering (13.52%), medicine (10.14%), business, management, and accounting (8.72%), arts and humanities (5.95%), psychology (3.68%), etc., The septennial research activity, as reflected in activity index, went up in six disciplines, i.e. computer science, social sciences, medicine, arts and humanities, psychology, and decision sciences, – but in contrast, it went down in four disciplines, i.e., engineering, business, management and accounting, economics, econometrics, and finance during septennial periods 2001–2007 to 2008–2014 [Table 3].

Distribution of Publications Output by Social Media Site

Blogs accounted for the largest share (27.45%) in the total world publications output on social media research, followed by Facebook (16.75%), Twitter (15.86%), Wikipedia (10.58%), YouTube (7.24%), Flickr (3.94%), MySpace (1.73%), LinkedIn (1.21%), and others <1% during 2001–2014. Comparatively, citation impact by MySpace literature was the largest (14.14 citations per paper) followed by Orkut (13.80), Flickr (6.28), Wikipedia (5.77), Facebook (5.33), YouTube (4.79), Blogs (4.55), LinkedIn (3.59), Foursquare (3.00), Twitter (1.79), ResearchGate (1.30), Academia.Edu (1.20), Slideshare (1.00), Pinterest (0.80), and Instagram (0.54) during 2001–2014 [Table 4 and Figure 1]. The annual publications output distributed by social media sites and by country of publication of research content are shown in Tables 5 and 6.

Most Significant Keywords

In terms of significant keywords, online social network was seen as the most significant keyword in terms of number of publications it retrieved (10395), followed by social media (9605), social network (6076), internet (6352), Facebook (3495), Wikipedia (2973), blogs (2535), world wide web (2524), Twitter (2041), data mining (1997), information retrieval (1956), websites (1922), Web 2.0 (1684), information system (1520), YouTube (1279), blogging

Table 2: Citation profile of top 15 most productive countries in social media research, 2001-2014

Name of the country	Number of publications				TC	ACPP	Share of world papers
	2001-2004	2005-2009	2010-2014	2001-2014	2001-2014	2001-2014	2001-2014
USA	55	2479	12,481	15,025	111,775	7.44	32.4
China	3	389	3358	3750	9757	2.60	8.09
The United Kingdom	8	557	2990	3555	20,105	5.66	7.67
Germany	3	402	1883	2288	12,142	5.31	4.94
Australia	1	296	1697	1994	7595	3.81	4.30
Canada	8	222	1416	1646	8988	5.46	3.55
Spain	0	176	1281	1457	5747	3.94	3.14
Japan	6	312	1091	1409	3617	2.57	3.04
Italy	2	177	1019	1198	4847	4.05	2.58
Taiwan	2	179	901	1082	3800	3.51	2.33
France	3	164	908	1075	5547	5.16	2.32
India	1	92	899	992	1833	1.85	2.14
The Netherlands	1	72	816	989	5527	5.59	2.13
South Korea	0	132	823	955	4257	4.46	2.06
Singapore	0	121	665	786	3542	4.51	1.70
World total	158	7802	38,394	46,353			

TC=Total citations, ACPP=Average citation per paper

Table 3: Subject-wise break-up of world's publications in social media research, 2001-2014

Subject	Number of papers			Activity index		Percentage of share of word output
	2001-2007	2008-2014	2001-2014	2001-2007	2008-2014	2001-2014
Computer science	1326	24,271	25,597	92.53	100.4	55.22
Social sciences	649	11,659	12,308	94.19	100.3	26.55
Engineering	492	5773	6265	140.3	97.61	13.52
Medicine	107	4593	4700	40.67	103.5	10.14
Business, management, and accounting	234	3808	4042	103.4	99.8	8.72
Arts and humanities	57	2702	2759	36.9	103.7	5.95
Psychology	26	1681	1707	27.21	104.3	3.68
Decision sciences	73	1577	1650	79.03	101.2	3.56
Biochemistry, genetics, and molecular biology	200	644	844	423.3	80.83	1.82
Economics, econometrics, and finance	88	756	844	186.2	94.89	1.82
Total of the world	2595	43,759	46,354			

Table 4: Distribution of publications on different social media sites during 2001-2014

Type of social media site	TP	TC	ACPP	TP (%)
Blogs	12,726	57,853	4.55	27.45
Facebook	7765	41,424	5.33	16.75
Twitter	7352	13,135	1.79	15.86
Wikipedia	4906	28,315	5.77	10.58
YouTube	3354	16,062	4.79	7.24
Flickr	1828	11,482	6.28	3.94
MySpace	801	11,328	14.14	1.73
LinkedIn	559	2007	3.59	1.21
Fouresquare	408	1226	3.00	0.88
Orkut	109	1504	13.8	0.235
Instagram	105	57	0.54	0.227
Pinterest	97	78	0.80	0.209
ResearchGate	20	26	1.30	0.043
Academia.Edu	10	12	1.20	0.022
Slideshare	1	1	1.00	0.002
World Total	46,354			

TP=Total papers, TC=Total citations, ACPP=Average citation per paper

(1208), online systems (1249), knowledge management (1181), artificial intelligence (1101), search engines (1077), natural language processing system (1059), information technology (1011), micro-blog (1011), e-learning (714), information dissemination (901), human-computer interactions (644), information management (637), bloggers (339), Flickr (246), weblog (175), blogosphere (156), LinkedIn (88), MySpace (53), Foursquare (46), Instagram (24), Pinterest (23), Orkut (11), etc.

Scientometric Profile of Top 25 Organizations

The top 25 most productive organizations in social media research together contributed 5776 publications, and they accounted for 12.46% share of the world output published during 2001–2014. The top 10 organizations contributed productivity above the average of (231.04 papers) per organization: Carnegie Mellon University, USA

(373 papers), Tsinghua University, China (322 papers), National University of Singapore (308 papers), University of Maryland, USA (280 papers), Pennsylvania State University, USA and Arizona State University, USA (278 papers each), Microsoft Research, USA (266 papers), Indiana University, USA (264 papers), University of Texas at Austin, USA (240 papers), and University of Amsterdam, The Netherlands (237 papers).

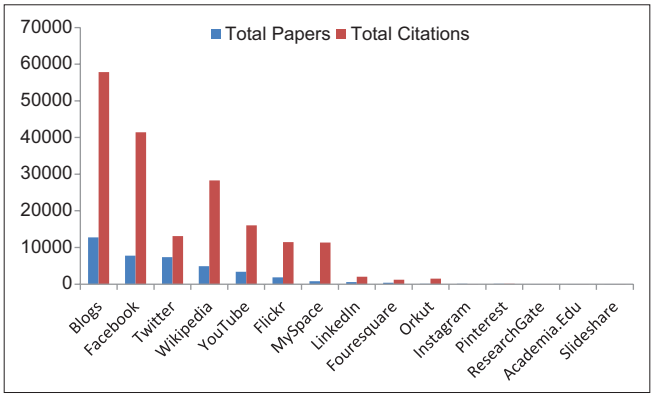

Figure 1: Distribution of Publications by Social Media Sites, 2001–2014

Eight organizations registered citation impact above the average of 92.4 citations per paper: Michigan State University, USA (9.24), University of California, Berkley, USA (28.66), Cornell University, USA (21.37), Stanford University, USA (13.80), University of Texas at Austin, USA (11.62), University of Maryland, USA (11.25), University of California, Irvine, USA (10.56), and University of Illinois at Urbana – Champaign, USA (9.49).

Ten organizations scored h-index above the average score of 21: Carnegie Mellon University, USA (31), University of Maryland, USA (29), Cornell University, USA (28), University of California, Berkley, USA and Stanford

Table 5: Annual growth of world publications by leading social media sites, 2001-2014

Social media site name	Number of publications										
	2005-2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Blogs	12,726	246	502	842	1095	1235	1631	1674	1812	1987	1576
Facebook	7765	2	11	56	204	388	669	1131	1614	1922	1768
Twitter	7352	3	3	10	35	189	599	1039	1547	2067	1852
Wikipedia	4906	30	113	280	451	582	692	706	725	732	589
Foursquare	408	4	4	4	2	9	23	56	95	117	89
LinkedIn	559	1	1	5	13	35	52	64	118	137	132
YouTube	3354	1	11	103	186	293	396	510	576	696	582
ResearchGate	20						1	1	6	12	
Academia.Edu	10							1	1	3	5
Orkut		3	4	5	6	15	20	18	14	13	11
Flickr	1828	1	24	88	136	227	276	277	298	277	223
MySpace	801	4	29	74	116	141	150	114	82	58	31
Instagram	105						2	1	8	27	67
Pinterest	97							1	17	40	39
Slideshare	24			1	2	3	3	2	2	5	6

Table 6: Contribution of leading countries by seven major social media sites, 2001-2014

Name of the country	Number of publications						
	Blogs	Facebook	Twitter	Wikipedia	YouTube	Flickr	MySpace
USA	3553	2819	2544	1249	1204	500	364
China	1474	241	484	378	243	304	21
The United Kingdom	904	548	548	265	269	154	74
Germany	383	327	327	506	162	169	21
Australia	516	364	282	146	171	55	45
Canada	413	271	247	167	167	44	30
Spain	360	213	290	341	90	87	4
Japan	512	99	397	236	67	68	9
Italy	252	209	177	233	91	75	12
Taiwan	489	253	82	76	45	30	9
France	227	150	155	227	95	98	13
India	307	180	222	133	85	36	16
World total	12,726	7765	7352	4906	3354	1828	801

University, USA (27 each), University of Texas at Austin, USA and University of Illinois at Urbana – Champaign, USA (25), Pennsylvania State University, USA and Microsoft Research, USA (24 each), and University of Washington, Seattle, USA (23).

Nine organizations contributed international collaborative share of papers above the average of (26.14%): National University of Singapore (53.57%), Tsinghua University, China (43.17%), Peking University, China (41.15%), IBM J Watson Research Center, USA (36.67%), Nanyang Technological University, Singapore (34.65%), University of Toronto, Canada (34.53%), City University of Hong Kong (30.16%), University of California, Irvine, USA (28.65%), and University of Amsterdam, The Netherlands (27.85%) during 2001–2014 [Table 7].

Scientometric Profile of Top 25 Authors

The top 25 most productive authors together contributed 1084 publications in social media research, and they accounted for 2.34% share of the world output during 2001–2014. Of the total authors, nine contributed above the average productivity of 43.36 per organization: M. De Rijke (73 papers), H. Liu (68 papers), M. Thelwall (63 papers), E. P. Lim (49 papers), G. Weikum (47 papers), A. Sun and K. Lerman (46 papers each), F. Abel (45 papers), and W. Nejdl (44 papers) during 2001–2014.

Seven authors registered citation impact above the average 13.80 citations per paper: C. Lampe (79.50), J. Leskovec (44.40), M. Naaman (34.60), G. Weikum (24.80), F. Benevenuto (18.10), M. Thelwall (17.20), and C. Faloutsos (14.60).

Thirteen authors posted h-index above the average of 9.92 score: M. Thelwall (19), J. Leskovec (15), G. Weikum (14), F. Benevenuto (13), M. Naaman and J. Han (12 each), H. Liu and M. De Rijke (11 each), E. P. Lim, H. Sundaram, J. Tang, and A. Sun (10 each).

Eleven authors contributed international collaborative papers above the average share of 29.34%: J. Weber (83.33%), T. S. Chua (69.77%), J. Tang (66.67%), F. Abel

Table 7: Scientometric profile of top 25 most productive organizations in social media, 2001-2014

Name of the organizations	TP	TC	ACPP	HI	ICP	ICP (%)
Carnegie Mellon University, USA	373	3357	9.00	31	96	25.74
Tsinghua University, China	322	1205	3.74	20	139	43.17
National University of Singapore	308	1009	3.28	17	165	53.57
University of Maryland, USA	280	3149	11.25	29	38	13.57
Pennsylvania State University, USA	278	2500	8.99	24	49	17.63
Arizona State University, USA	278	1405	5.054	19	42	15.11
Microsoft Research, USA	266	2207	8.297	24	51	19.17
Indiana University, USA	264	1919	7.2689	21	68	25.76
University of Texas at Austin, USA	240	2790	11.625	25	38	15.83
University of Amsterdam, The Netherlands	237	1457	6.1477	21	66	27.85
Stanford University, USA	223	3077	13.798	27	50	22.42
University of Toronto, Canada	223	1534	6.8789	19	77	34.53
University of Illinois at Urbana-Champaign, USA	214	2030	9.486	25	51	23.83
Nanyang Technological University, Singapore	202	762	3.7723	16	70	34.65
Cornell University, USA	202	4317	21.371	28	47	23.27
University of Tokyo, Japan	197	1057	5.3655	12	26	13.2
Peking University, China	192	580	3.0208	15	79	41.15
University of Washington, Seattle, USA	191	1444	7.5602	23	37	19.37
City University of Hong Kong	189	1184	6.2646	19	57	30.16
Beijing University of Posts & Telecommunications	187	232	1.2406	7	34	18.18
University of California, Berkley, USA	185	5303	28.665	27	34	18.38
Michigan State University, USA	184	6953	37.788	21	33	17.93
Queensland University of Technology, Australia	183	758	4.1421	13	46	25.14
IBM J Watson Research Center, USA	180	1277	7.0944	20	66	36.67
University of California, Irvine, USA	178	1880	10.562	19	51	28.65
Total of 25 organizations	5776	53,386	9.24	21	1510	26.14
Total of the world	46,354					
Share of 25 organizations in world total	12.46					

TP=Total papers, TC=Total citations, ACPP=Average citation per paper, HI=H-index, ICP=International collaborative papers

(62.22S%), F. Benevenuto (48.72%), J. Luo (47.37%), C. Faloutsos (45.71%), M. Thelwall (39.68%), H. Chen (34.15%), Y. Yu (29.34%), and G. Weikum (29.79%) during 2001–2014 [Table 8].

Medium of Communication

Among various media sources used to report social media research during 2001–2014, journals alone accounted for 21015 publications (45.34% share). The top 30 most productive journals contributed from 47 to 375 papers each and together they contributed 14.25% share (2994 papers) of the total journal publications output on social media research during 2001–2014 [Table 9].

Highly Cited Papers

Of the total publications output (46354) on social media research covering the period 2001–2014, only 266 (0.57%) were discovered as highly cited papers; each such paper was cited 100 or more times since their publication till February 2015. Among 266 highly cited papers, 187 were cited 100–200 times, 68 were cited from 201 to 500 citations, 6 papers were cited 501–1000 times, 4 were cited from 1001 to 2000 times, and 1 paper was cited above 2000 times. These 266 highly cited papers together accounted for 57462 citations, averaging 216.02 citations per paper. Of the 266 highly cited papers, 146 appeared as articles, 100 as conference papers, 14 as reviews, 4 as books, 1 as editorial, and 1 as a short survey. Among 266 high cited papers, 140 appeared as single-institution papers (zero collaboration), 89 as multi-institutional with national collaboration, and 37 as multi-institutional with international collaboration. Among the countries that contributed to 266 highly cited papers, the largest number (173) was from the United States, followed by the U.K. (23); Germany (21); Canada (14); The Netherlands (9); Spain (7); Australia and France (5 each); South Korea, Hong Kong, Switzerland, and Israel (4 each), Japan, Brazil, Austria and Ireland (3 each); Italy, Taiwan, Singapore, and Turkey (2 each); India, Finland, Greece, Sweden, Belgium, and South Africa (1 each), etc. Of the 162 highly cited papers that appeared in 84 journals, the largest

Table 8: Scientometric profile of top 25 most productive organizations in social media, 2001-2014

Name of the author	Affiliation of the author	TP	TC	ACPP	HI	ICP	ICP (%)
M De Rijke	University of Amsterdam, The Netherlands	73	366	5.01	11	12	16.44
H. Liu	Arizona State University, USA	68	488	7.18	11	7	10.29
M. Thelwall	University of Wolverhampton, U.K.	63	1086	17.2	19	25	39.68
E .P. Lim	Singapore Management University	49	653	13.3	10	13	26.53
G. Weikum	Max Planck Institute for Computer Science, Saarbrucken, Germany	47	1167	24.8	14	14	29.79
A. Sun	Nanyang Technological University, Singapore	46	330	7.17	10	11	23.91
K. Lerman	University of Southern California, Columbia, SC, USA	46	304	6.61	8	4	8.696
F. Abel	Delft University of Technology, The Netherlands	45	190	4.22	7	28	62.22
W. Nejdl	University of Hannover, Germany	44	192	4.36	8	6	13.64
T.S. Chua	National University of Singapore	43	344	8	8	30	69.77
J. Han	University of Illinois at Urbana–Champaign, USA	43	415	9.65	12	9	20.93
J. Weber	Yahoo Research Laboratory, Barcelona, Spain	42	161	3.83	6	35	83.33
F. Benevenuto	Federal University of Minas Gerais, Brazil	39	705	18.1	13	19	48.72
J. Leskovec	Carnegie Mellon University, USA	38	1687	44.4	15	5	13.16
H. Chen	University of Arizona, USA	41	215	5.24	7	14	34.15
J. Luo	Kodak Research Lab, USA	38	398	10.5	9	18	47.37
M. De Choudhury	Arizona State University, USA	37	262	7.08	9	4	10.81
J. Tang	Tsinghua University, China	36	344	9.56	10	24	66.67
C Lampe	Michigan State University, USA	37	2942	79.5	12	2	5.405
C.Faloutsos	Carnegie Mellon University, USA	35	510	14.6	8	16	45.71
M. Naaman	Yahoo Research, Berkeley, USA	35	1210	34.6	12	2	5.714
Y. Yu	Shanghai Jiao Tong University, China	35	216	6.17	8	11	31.43
C.C. Yang	Chinese University of Hong Kong	35	72	2.06	4	4	11.43
J. Caverlee	Texas A & M University, USA	35	287	8.2	7	1	2.857
H. Sundaram	Arizona State University, USA	34	452	13.3	10	4	11.76
Total of 25 authors		1084	14,996	13.8	9.92	318	29.34
Total of the world		46,354					
Share of 25 authors in world output		2.34					

TP=Total papers, TC=Total citations, ACPP=Average citation per paper, HI=H-index, ICP=International collaborative papers

Table 9: Top 30 most productive journals contributing to social media research during 2004-2013

Name of the journal	Count of papers
Computers in Human Behavior	375
First Monday	215
Journal of Medical Internet Research	192
Cyberpsychology Behavior, and Social Networking	172
PLOS One	165
Information, Communication, and Society	153
Public Relations Review	142
New Media and Society	138
Proceedings of the ASIST Annual Meeting	135
Journal of Computer Mediated Communication	113
Journal of American Society for Information Science and Technology	100
Multimedia Tools and Applications	90
Expert Systems and Applications	90
IEEE Transactions on Multimedia	67
Communications of the ACM	65
Computers and Education	64
Decision Support Systems	64
Nature	62
International Journal of Web Based Communities	59
Social Science Computers Review	57
Online Information Review	56
Lancet	55
Professional De La Informacion	53
American Behavioral Scientist	53
Journal of Computational Information Systems	53
Journal of Information Technology and Politics	52
British Journal of Educational Technology	52
Worldwide Web	52
IEEE Intelligent Systems	50
Australasian Journal of Educational Technology	47
Total of 30 Journals	2994
Total publications in journals of the world	21,015

16 papers appeared in the Journal of Computer Mediated Communications, followed by Computers in Human Behavior (12), New Media and Society (7), Journal of American Society for Information Science and Technology (6), Cyberpsychology and Behavior, Communications of the ACM and Communication and Education (5 each), Web Semantics, Pediatrics, First Monday, Business Horizon, Science, Journal of Applied Development Psychology and International Journal of Human-Computer Studies (3 each), Information, Communication and Society, Learning, Media and Technology, IEEE Transaction on Multimedia, Nature, Journal of Medical Internet Research, PLOS One, Journal of Service Research, Journal of Marketing, Tourism Management and Journal of General Internal Medicine (2 each). The remaining 68 journals published 1 paper each. Around 439 institutions participated in these highly cited papers. The publication productivity averaged to 1.65 paper per institution (with 152 papers by 1 organization, 78 papers by 2 organizations, 24 papers by 3 organizations, 6 papers by 4 organizations, 2 papers each by 5 organizations, and 1 paper each by 40 organizations). Among the significant organizations, the largest number of papers (11 each) were from Stanford University, Cornell University, and Yahoo Research Labs from USA, followed by University of Texas at Austin, USA (8 papers), Carnegie Mellon University, USA (7 papers), University of Maryland, USA and University of California, Berkley (6 papers each), University of Illinois, USA and Northwestern University, USA (4 papers each), University of Toronto, Canada, University of Amsterdam, The Netherlands, Columbia University in the City of New York, IBM Research, USA, University of California, Irvine, USA and University of Southern California, USA (3 papers each), etc.

A total of 816 authors participated in publishing highly cited papers, averaging 3.07 authors per paper. Seventy-six papers were contributed by 2 authors each, 69 papers by 3 authors each, 48 papers by 1 author each, 36 papers by 4 authors each, 16 papers by 5 authors each, 9 papers by 7 authors each, 5 papers by 6 authors each, 3 papers by 9 authors each, 2 papers by 11 authors each, and 1 paper each by 15 and 28 authors). Among the top authors contributing the largest number of papers (8 each) were D. Boyd and J. Leskovec, followed by N. B. Elison and J. Kleinberg (6 papers each), M. Thelwall, C. Lampe, and M. Naaman (5 papers each), M. Cha, L. Backstrom (3 papers each), X. S. Hua, C. Castillo, Zhao (2 papers each), etc., A list of top 10 highly cited papers are depicted in Table 10.

SUMMARY

The total world output on social media research covering the period 2001–2014 cumulated to 46354 publications, logging average annual 14.61% growth. A total of 142 countries participated in social media research during 2001–2014. The distribution publications output is skewed; the top 15 most productive countries accounted for the bulk share 82.40% to the world output. The USA is the world leader in social media research, accounting for the largest share (32.40%). The remaining top 14 countries are China (8.09%); the United Kingdom (7.67%); Germany (4.94%); Australia (4.30%); Canada, Spain, and Japan (from 3.04% to 3.55%); Italy, Taiwan, France, India, The Netherlands, and South Korea (from 2.06% to 2.58%); and Singapore (1.70%). The USA is also the world leader for its quality output in this area registering the largest citation impact (7.44 citations per paper), followed by the

Table 10: Top 10 highly cited papers on social media research, 2001-2014

Name of authors	Title of the paper	Source of publications	Number of citations
Boyd, D.M., Ellison, N.B	Social network sites: Definition, history, and scholarship (article)	Journal of Computer-Mediated Communication, 2007, 13 (1), 210-230	2780
Ellison, N.B., Steinfield, C., Lampe, C	The benefits of facebook "friends:" Social capital and college students use of online social network sites (article)	Journal of Computer-Mediated Communication, 2007, 12 (4), pp. 1143-1168	1729
Pang, B., Lee, L.	Opinion mining and sentiment analysis (article)	Foundations and Trends in Information Retrieval, 2008, 2 (1-2), pp. 1-135	1371
Kaplan, A.M., Haenlein, M	Users of the world, unite! The challenges and opportunities of Social Media (article)	Business Horizons, 2010, 53 (1), pp. 59-68	1194
Kwak, H., Lee, C., Park, H., Moon, S.	What is Twitter, a social network or a news media? (conference paper)	Proceedings of the 19th International Conference on World Wide Web, WWW '10, 2010, pp. 591-600	850
Wales, J.	Internet encyclopedias go head to head (short survey)	Nature, 2005, 438 (7070), 900-901	648
Bizer, C., Lehmann, J., Kobilarov, G., *et al*.	DBpedia - A crystallization point for the Web of Data (article)	Journal of Web Semantics, 2009, 7 (3), pp. 154-165	571
Java, A., Song, X., Finin, T., Tseng, B.	Why we Twitter: Understanding microblogging usage and communities (conference paper)	Joint Ninth WebKDD and First SNA-KDD 2007 Workshop on Web Mining and Social Network Analysis, pp. 56-65	529
Sakaki, T., Okazaki, M., Matsuo, Y.	Earthquake shakes Twitter users: Real-time event detection by social sensors (Conference Paper)	Proceedings of the 19th International Conference on World Wide Web, WWW '10, pp. 851-860	522
Mislove, A., Marcon, M., Gummadi, K.P., *et al*.	Measurement and analysis of online social networks (conference paper)	Proceedings of the ACM SIGCOMM Internet Measurement Conference, IMC, 2007, pp. 29-42	479

United Kingdom (5.66), The Netherlands (5.59), Canada (5.46), Germany (5.31), France (5.16), etc. Computer science, among various broad subjects, accounted for the largest publications share (55.22%), followed by social sciences (26.55%), engineering (13.52%), medicine (10.14%), business, management and accounting (8.72%), arts and humanities (5.95%), psychology (3.68%), etc. The septennial research activity as measured on activity index indicator went up in computer science, social sciences, medicine, arts and humanities, psychology and decision sciences, but it went down in engineering, business, management and accounting, economics, econometrics, and finance during septennial periods from 2001–2007 to 2008–2014. Blogs contributed the largest publication share (27.45%), followed by Facebook (16.75%), Twitter (15.86%), Wikipedia (10.58%), YouTube (7.24%), Flickr (3.94%), MySpace (1.73%), LinkedIn (1.21%), etc. Online social network was seen as the most significant search term; it accounted for the largest number of hits (10395) followed by social media (9605), social networks (6076), internet (6352), Facebook (3495), Wikipedia (2973), blogs (2535), world wide web (2524), Twitter (2041), data mining (1997), information retrieval (1956), websites (1922), Web 2.0 (1684), information system (1520), YouTube (1279), blogging (1208), etc., during 2001–2014.

The top 25 most productive organizations together contributed 12.46% share, registered average productivity of 231.01 per organization, average citation impact 9.24 citations per paper, average h-index of 21 score, and an average of share 26.14% international collaborative publications. The top 25 most productive authors contributed 2.34% share, registered an average productivity of 43.06 per author, average citation impact of 13.8 citations per paper, average h-index of 9.92 score, and average share of 29.34% international collaborative publications during 2001–2014. The top 30 most productive journals together contributed 14.25% share. Of the 46354 total world publications in social media research, only 266 papers (0.57%) were cited 100 or more times each since publication till February 2015. Together these highly cited papers accounted for 57462 citations, averaging 216.02 citations per paper. Of the total 266 highly cited papers, 140 were single-institution papers (zero collaboratives), 89 national collaborative papers, and 37 international collaborative papers. United States accounted for the highest number (173) of highly cited papers, followed by the U.K. (23), Germany (21), Canada (14), The Netherlands (9), Spain (7), Australia and France (5 each), and South Korea, Hong Kong, Switzerland, and Israel (4 each). Of the 266 highly cited papers, 146 appeared as articles, 100 as conference papers, 14 as reviews, 4 as books, 1 as editorial, and 1 as short survey. The 162 high cited papers have appeared in 84 journals, of which 16 appeared in the Journal of Computer Mediated Communications, followed by Computers in Human Behavior (12), New Media and Society (7), Journal

of the American Society for Information Science and Technology (6), etc.

CONCLUSION

The web first empowered the public with vast amounts of information, but social media gave something, even more powerful: Personal and professional connectivity as a way to connect friends and family online. Organizations quickly saw in it game-changing advantage for marketing, advertising, public care, and feedback. The social web can certainly help governments to run national programs much more effectively. Using this media, they can communicate within their own walls and also communicate with the public. They have a platform where they can get feedback and opinion, and also get into discussion and collaboration with the public on policies, programs, and schemes. For professional communities, social media can provide contents to keep up to date with current research, popular sciences covering broader issues of science policy, funding, publishing, and personal career development. Certain social media tools have become invaluable for professional networking either within subject fields or across different disciplines and professions. Actively participating in social media networks allows scientists to disseminate research findings quickly and effectively as well as raise their own profile, or of their research groups or of their parent institutions. More importantly, the interactive nature of the medium can be highly beneficial for scientists by offering them new perspectives on their own research through dialog with peers and nonpeers, and helping them to establish new collaborations.

In view of the benefits of social media to research, governments, and citizens, it is suggested that governments should consider using social media as a part of overall policy and communication mix in providing and promoting good governance, open up public access to government officials and policy makers, and create new ways of government working in partnership with public. Moreover, it is the time that researchers come up with a set of new indicators to effectively gauge the impact of new technologies and media on questions of social, economic, and political change.

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Conflicts of Interest

There are no conflicts of interest.

REFERENCES

1. Simon K. Digital, Social and Mobile Worldwide in 2015; 21 January, 2015. Available from: http://www.wearesocial.net/blog/2015/01/digital-social-mobile-worldwide-2015/. [Last accessed on 2015 Mar 10].
2. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of social media. Bus Horiz 2010;53:59-68.
3. Drew H. Complete History of Social Media: Then and Now. Available from: http://www.smallbiztrends.com/2013/05/the-complete-history-of-social-media-infographic.html.[Last accessed on 2015 Dec 15].
4. Bell D. The Social Media Handbook. Tebbo: Emereo Publishing; 2012. p. 514.
5. Coursaris CK, Van Osch W. A scientometric analysis of social media research (2004-2011). Scientometrics 2014;101:357-89.
6. Gan, Chunmei. A Bibliometric Analysis of Social Media Research from the Perspective of Library and Information Science. In. Li, Hongxiu, Mäntymäki, Matti, Zhang, Xianfeng , eds. Digital Services and Information Intelligence. 13th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2014, Sanya, China, November 28-30, 2014, Proceedings. Springer, 2014.23-32.