

Eugene to Altmetrics: A chase for virtual foot prints!

Satish S Munnolli^a and Shamprasad M Pujar^b

^aLibrarian Advanced Centre for Treatment, Research and Education in Cancer, Tata Memorial Centre Sector 22,
Kharghar, Navi Mumbai 410 210, India

Email: smunnolli@actrec.gov.in

^bDeputy Librarian Indira Gandhi Institute for Development Research Gen A K Vaidya Marg, Goregaon (E), Mumbai 400 065, India

Email: pujar@igidr.ac.in

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There is an increasing interest in science communication and promotion of new inventions in this deluge digital information age. The social media tools available on the Internet assist the promotion of science dramatically and the change is happening in real time models. Expansion of World Wide Web and newer technologies has improved the ways in which science is communicated and its evaluation techniques. The use of conventional metric tools gauges the impact of scholarly publications using citation and download counts. They are widely used to evaluate articles, authors and disciplines on publishers' platforms. These tools analyse the citation data in natural course of time and make them available over a period of time. 'Altmetrics' is a concept that addresses and measures the conversations happening in the virtual world in real time. The concept supports the prediction mechanism of possible citations for an article in future, if it gets cited in the social media. This paper attempts to create awareness about 'Altmetrics' among Indian scholars and takes a closer look at various features available in 'Altmetric Explorer' in order to gain insights of the rapidly changing science communication landscape.

Keywords: Altmetrics, Altmetric Explorer, Citation Impact

Introduction

There is a paradigm shift in publishing models right from the thought process of an individual's mind to its consumable format. The high growth in scholarly output in the last decade is probably the result of many related factors such as national scientific policies, government and private research funding, and other global developments across the world and it is more specific in fast emerging developing countries. The exponential growth of low cost and reliable Internet access in these emerging economies is enabling access to online materials as never before¹. The conventional models are retreating and online models are replacing them increasingly with high pace. Communication models in recent times have revolutionized the pattern of exchange of scientific thoughts and consumption of academic research. Focus of the day is its impact in the present generation society which is using social media specifically in the developed countries. The trend is catching up in India but, has impediments to reach and embrace the concept as there are several reasons in this developing zone.

Research output is evaluated in a number of ways by using various metric tools. One of the ways to analyse quality of research is to measure the number of times the work has been cited in literature. The 'citation' received by paper shows recognition of work in the specific domain by scientists in a similar discipline. The citations received by a paper helps to judge the quality of research paper and degree of acceptance. Another way of assessing the quality of work is based on the type of journal in which the paper is published. Such conventional measuring tools developed over the years supported scientists of the world to evaluate scientific output of both an institute as well as the individual scholar. All these conventional tools need reasonable time to compute and publish the data. In this measure of 'quality' of research many invisible factors viz., prestige of the journal, publishing history, frequency, editorial team, peer reviewing process, accessibility of the published article, impact, number of downloads, hits and many more are involved. However, these methods overlooked new scholarly forms like datasets,

software, and research blogs that fall outside of the scope of citable research objects².

In this age of real time models there is a demand for tools can address talks and discussion amongst academicians on articles that are just published or may be in the process of publishing in online version. There are plenty of applications viz., Twitter, Blogs, Facebook, ResearchGate, Mendeley, Wikipedia, Academia, CiteULike which are abundant in the social media. They are being used to discuss several issues happening around scholarly world. Scholars may discuss, annotate, recommend, refute, refer, comment, read, and teach a new finding before it ever appears in the formal citation registry. We need new mechanisms to create a subtler, higher resolution picture of the science system².

To expand the views and scope of traditional metrics a group of young scientists brought in a manifesto – ‘Altmetrics’⁴.

What is Altmetrics?

‘Altmetrics’ is a concept and term coined by Jason Priem, University of North Carolina-Chapel Hill, North Carolina, USA. It is a short form for ‘Alternative to Metrics’ or in other words it is an alternate to conventional metric tools. Altmetrics is the creation and study of new metrics based on social web for analyzing and informing scholarship. Altmetric tools capture the article level scholarly data that is shared in social media and measures the impact of content in real time basis and the data is presented with visual effects. Altmetrics aren’t citations, nor are they webometrics. They are relatively unstructured and closed.

The objective of altmetrics is to analyse impact and sharing of "raw science" like datasets, codes and experimental designs, "nanopublications" where the citable unit is an argument or passage rather than entire article and "widespread self-publishing" via blogging, microblogging, comments or annotations with scoring mechanism. Altmetrics are themselves diverse, help in measuring impact in this diverse scholarly ecosystem. In fact, altmetrics is essential to sift these new forms, since they’re outside the scope of traditional metric tools and filters. Diverse nature of altmetrics helps in measuring the aggregate impact of the research enterprise of the present day generation and assist in predicting its impact of conventional journals. [<http://altmetrics.org/manifesto/>]

How are Altmetric tools different from conventional metric tools?

Conventional metric tools - ‘Science Citations Index (SCI)’ of Institute of Scientific Information (now ‘Web of Science’ of Thomson Reuters) was the first citation indexing service introduced by Eugene Garfield in 1963. The SCI was used more as a tool to identify the impact of a journal with its computed component – ‘Impact Factor’. The Impact Factor is published once annually as a Journal Citation Report (JCR). This Impact Factor is primarily used to weigh and rank a journal within discipline. Later ‘Social Science Citation Index’ and ‘Arts and Humanities Citation Index’ were introduced by Thomson Reuters.

Scopus, a product of Elsevier was launched in November 2004 as an abstracting and indexing database covering Science-Technology-Medicine (STM). The source provides the citation count along with the list of papers that have cited the article in the database. The source has various analysis tools to measure the impact of research article and has options like h-index on the platform to evaluate a researcher. Citation counting measures are useful but take time and metrics like h-index are even slower than peer-reviewed. These are the two major organised commercial online sources available for the user community.

The SCImago Journal & Country Rank, a portal includes journals and country scientific indicators developed from the information available from Scopus database of Elsevier. These indicators are used to assess and analyze scientific domains, ranking of journals in several disciplines and ranking of countries for their research productivity. Whereas, the Eigenfactor tool aims to give a numerical indicator of the overall contribution of the journal to the literature. It is based on citations, and uses the Thomson Reuters Web of Science citation counts³.

Google Scholar is a free web search engine released in 2004 which indexes full text of scholarly literature along with citation counts and journal metrics across an array of publishing formats and disciplines. The data for indexing is fetched from various online sources that are held by various publishing bodies. Publish or Perish is an application software program that retrieves and analyzes academic citations. It uses Google Scholar’s back end data to obtain raw citations, and then analyzes the data to present citation metrics.

In the conventional style, to receive a citation count, an article needs considerable time from the day article is available on publisher's web site to another author referring to it and citing this paper in his paper. The cycle completes subject to second paper which has cited gets published in some other journal. There is time gap in the process and sometimes it take years because of a peer review procedure followed by journals.

Most of the above conventional tools count the citations cited by others in scholarly journals but, none of them cover the attention of these publications discussed in dynamic social media of the day.

In keeping with the changing times, scholars are increasingly shifting their everyday research activities on the web and use various applications that are easy to manage and accessible from anywhere. A large set of data is pooled and exchanged on these virtual applications and platforms. Online reference managers Zotero and Mendeley claim to store over 40 million articles (making them substantially larger than PubMed); as many as a third of scholars are on Twitter, and a growing number tend scholarly blogs. Young generation inadvertently referred as 'Google generation' has grown up with social networking and view-sharing as a way of life. They are becoming movers in research communities, ushering in the use of virtual networking as a standard knowledge sharing tool. The virtual networking norm is already set and is now providing opportunities for the development of new tools and techniques for measuring 'things to do with research. With this the list of possible assessment criteria is growing¹.

It is obvious, if anything is new, unique or important it gets noticed and shared, it's a human tendency. Present social media tools have enhanced the communication pattern of human expressions over the web at a rapid rate. It is also true to research communications. These new tools enabled authors to refer papers online and discuss the contents over virtual network. These instant thoughtful expressions of researchers are massive in numbers and have huge impact in measuring the quality of shared scholarly content.

To measure this rapid, virtual and invisible activity of scholarly conversations and to minimize the time gap of conventional metric applications 'Altmetrics tools' have emerged as new models and gaining popularity for their robust and real time computations capabilities. These tools identify and capture the

attention received by an article in social media and count them with scores.

Plum Analytics, CitedIn, PLoS Impact Explorer, ImpactStory, ReaderMeter, ScienceCard, PaperCritic, Altmetric Explorer and Crowdometer are few tools evolved on Altmetrics concept in recent times (<http://altmetrics.org/tools/>). It is difficult to isolate a single tool as each has its own niche value and focuses on specific groups in terms of data analyzed⁵. All these tools track and capture a wide range of research artifacts such as papers, datasets, slides, research codes, reader locations, citations, download counts, author identifiers, researcher IDs, feedbacks that are quantifiable from a set of trustworthy, proven virtual applications to derive a measurable data for quality. The data is made available with meaningful score, graphics and visual effects. 'Altmetric Explorer' is an application introduced in recent times. An attempt has been made here to explore some of its features.

Altmetric Explorer

'*Altmetric Explorer*' is a service product developed by a team of computer scientists based in the United Kingdom. Objective of the organization is to make article level metrics by using the conversations available in social and research networking sites. The altmetric score is a quantitative measure of the quality and quantity of attention that a scholarly article receives on the select social media.

For authors it's an interesting score to see the attention received for their articles. For scientists the score provides a means to identify most read recent papers that are interesting. For Publishers and Editors it's an indicator that shows the readership of their contents. [<http://www.altmetric.com>]

A typical front end of Altmetric Explorer looks like any search engine of an abstracting and indexing database (Fig. 1). It has two main sections, one at the left hand side of the screen which is a search panel with options such as keywords, journal, publisher, with digital object identifiers, options by MeSH terms of Medline and using PubMed search query. The front end with donuts displaying altmetric donut scores for articles.

Altmetric score of typical article is updated at least once in a day. It has three tags for display – Articles-wise, Activity-wise and Journal-wise. Each tag further has display options on the right hand side of the large panel. Hovering on each donut

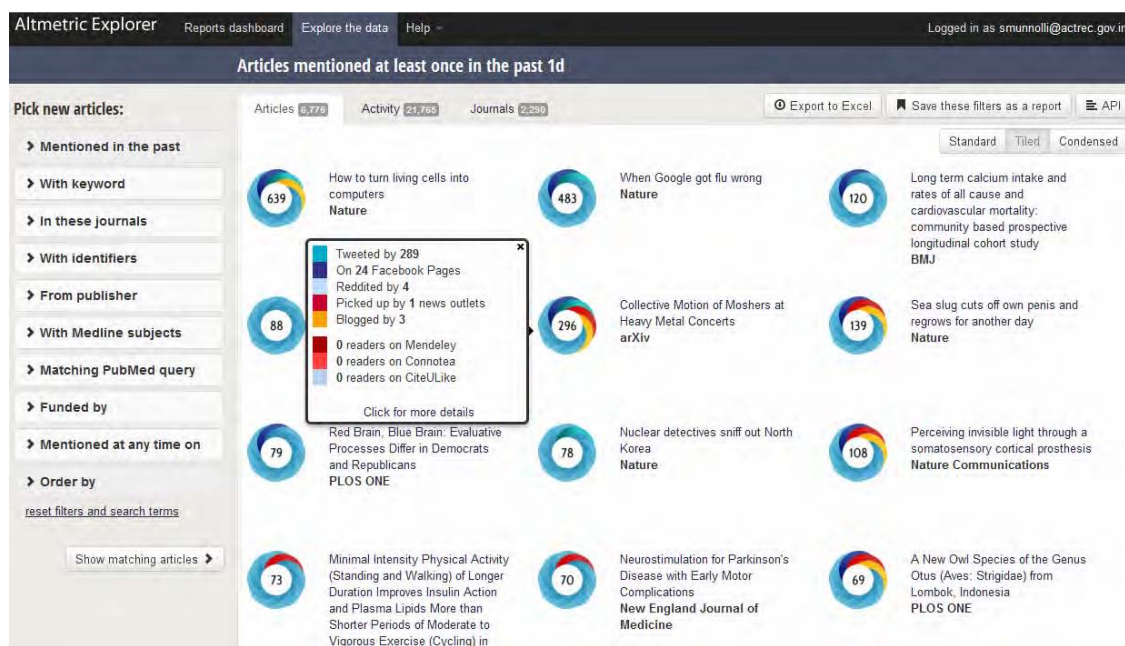


Fig. 1 — Screen shot of Altmetric Explorer

with mouse pointer displays the number of Altmetric score by each type of media. Top filter in the left panel has options to filter the results in last one day, three days, one week, one month and so on.

The colours surrounding each donut reflect the nature of sources mentioning the score viz., - blue for Twitter, yellow for blogs, and red for mainstream media sources and so on. Altmetric score on the donut give users a quick glance to assess which scholarly article has received the most attention. The activity pattern of a specific article by uploading their DOIs, PubMed IDs or arXiv IDs to the Explorer is a unique feature available on platform.

Journals tag on the large screen (Fig. 2A) enables to identify most tweeted journal in the past one day with total number of articles mentioned by networking community. Other option (Fig. 2B) enables one to see most discussed articles (with dense colour) in past six months on a spatial graph.

The search options with Boolean operators, export facility of the data on excel sheets, setting email alerts, filters by attention type; journal rankings are other features available on the platform.

The option of region-wise breakdown (Fig. 3) provides attention received from different geographic regions and type of users referring the article. Experience of using and understanding the attention

received for current scholarly literature on AE is an interesting feature.

Applications of Almetrics in the Scholarly world

'Altmetric' application tool is available for integration with online sources and also available on independent platform as 'Altmetric Explorer'.

Altmetric 'donut' graphic and different score badges (Fig. 4) of tool are available for publishers for integrating the code on journal sites. This enables authors and readers to see the attention received by an article directly on publishers' sites while referring the article.

At present, Altmetric Explorer is available as commercial model for publishers and for individuals it is available on trial. Integrated models of this tool on publisher's sites are visible at - Libertas Academica, QScience, Nature Publishing Group and Cambridge University Press.

Limitations of Almetrics

Altmetric tools definitely help fill the time gap but, there are many open questions unanswered that need to be addressed before these new tools really become alternate to judge the impact of work. For example, have they achieved the standards to measure the impact that the scientists really delve upon? Does a conversation count of a paper in a social

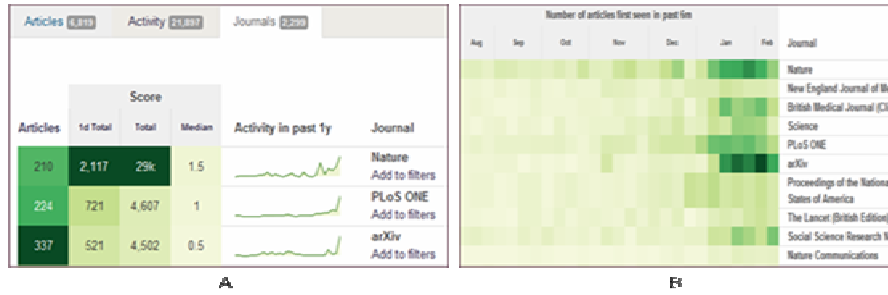


Fig. 2A & B — Journal scores received in past one day; Number of articles seen in past six months.

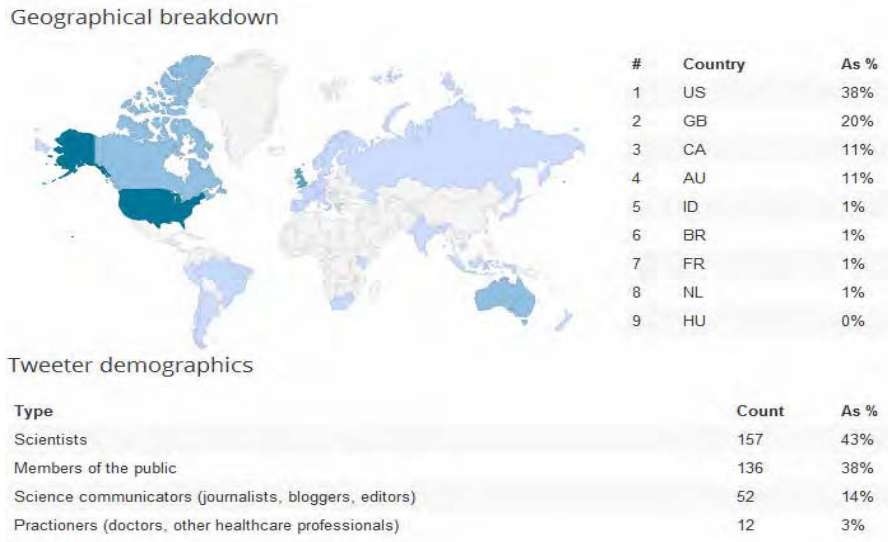


Fig. 3 — Demographic / User type attention received by an article

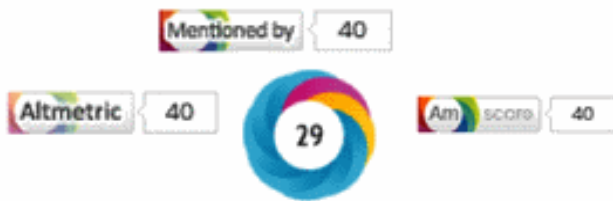


Fig. 4 — Altmetric badge types for publishers

network really imply impact? Altmetric manifesto states “researchers must ask if Altmetrics really reflect impact, or just empty buzz”. The concept is therefore in its infancy although these may provide insight into how such research ‘products’ have influenced the community and public, they lack authority and credibility as a performance measure, not in the least because it is easy to cheat by creating multiple accounts⁶.

Most of the existing Altmetric tools are not structured and provide hazy picture of computations. Criteria of quality measure to capture science

communication are not clear. Quality of the data used is a challenging component as social media services differ from one to another and counts for indicators are relatively easy to game and fabricate. Social media tools are looking for flashing news in real time. They may fade away with time and new applications and newer versions may emerge. Is there any end to this in this digital world?

Impact on developing countries

The open access journal models and national level consortia initiatives have exposed more scholarly information to scientific community in recent times. The trend of publishing scholarly information by Indian scientists in high ranked journals is increasing. There is a need to increase the pace of Indian scientific research output and also improve its quality compared with other developed and developing countries⁷.

Use of social media for general expression in the society is growing amongst younger generation.

But, the use of these applications for science communication is not visible in India. It's a new trend for many researchers in developing regions. The lower usage of these online tools could be infrastructure and awareness of applications tools. More over social media tools are blocked in many of the government organizations. Altmetric tools have great potential in the years to come and will assist in fostering the pace of research by knowing the papers that are discussed most amongst the scholarly community. In order to be relevant in the developing world, altmetric tools must be compatible with the less sophisticated publishing technologies employed by small publishers⁸.

Social media usage is more prominent in developed countries than in developing countries. In a situation like low or no usage of social media tools for science in developing countries applying such real time measuring tools to assess research output of scientist or institute is not justifiable.

Conclusion

In the chase of publishing papers in high ranking journals universities, research centres and academicians are facing tremendous pressure. The academic pressure has resulted in huge number of papers published in last two decades. The deluge of scholarly literature available on Internet is demanding filters to select most relevant and significant ones from the pool of search hits. In this fast moving digital world, conventional metrics such as citations or journal impact factors fail to address the quality and importance of new or current publications as they are computed based on the previously published data available years down the line.

The concept 'Altmetrics' has emerged as a new potential tool that counters the research that has been just published, most talked or discussed in social media with score. It provides scores according to the attention received in the community. However, acceptance of 'Altmetrics' as a tool to evaluate research by educational regulatory bodies, especially in developing countries like India may take time

owing to the existing practices, but it is likely to move forward in the days to come. The nature of computations followed in Altmetric tools assist in predicting the future of citations of any scholarly communication. The indicator on Altmeteric tool may act as catalyst and enhance the possibility of citing a scholarly literature in near future. The potential of Altmetric tools is that they support evaluation of niche areas of scholarly communications, that are just published or in process where as conventional metric tools fail to address this issue. This is one of the realistic applications of Altmetrics and weigh well while proposing new grants for the new projects. It is important to emphasize that while new 'Altmetric' tools are useful as alternatives to citation-based measure for some purposes and they are by no means a replacement. Instead, they should be deployed alongside one another, complementing each other's strengths.

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