Bibliometrics to Altmetrics: A Changing Trend

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Abstract *- Altmetrics include a much broader spectrum of measurements like citation counts, web based references, article views/downloads, social media mentions, news media mentions, etc. Traditional means of measuring the quality of new knowledge like the impact factor and h-index are being more effective and more meaningful through the addition of new, social media based altmetrics. altmetrics could reflect an alternative dimension of the research performance, close, perhaps, to science popularization and networking abilities, but far from citation impact. altmetrics are especially encouraging for research fields in the humanities that currently are difficult to study using established bibliometric methods. In this paper introduce altmetrics, their uses and its possible implications in libraries. The present study is based on review of published work in the field of altmetrics, bibliometrics and library and information Science.*

Keyword: Altmetrics, Social Media, Bibliometrics,Scientometrics

Introduction:

The statistical analysis of scientific literature began in 1917 by Cole and Eales in his study "History of Comparative anatomy". These studied the contributions in the field of anatomy by counting the number of publications produced by different countries. In 1923 the study was conducted by Hulme, entitled "Statistical Analysis of the history of Science" which analysis was based on the original entries in the seventeen sections of the "English International catalogue of Scientific Literature. In 1926, A.J. Lotka presented an analysis of the number of publication listed in chemical abstract (1907-1916) on frequency distribution of scientific productivity. After that Ziff law of word occurrence came in 1933 to describe the statistical distribution of word frequency on a hyperbolic curve. The concept of core journals was first coined by S.C. Bradford in 1934 which is popularly known by Bradford Law of Scattering. Bradford's Law serves as a general guideline to librarians in determining the number of core journals in any given field.In 1948 S.R Rangnathan coined the term Librametry. The term 'Bibliometrics' is just analogous to Ranganathan's Librametrics. Allan Pritchard was the first person who coined the term Bibliometrics in a paper published in 1969. He defines the term as "The application of mathematical and statistical method to book and other method of communication''. It denotes a new discipline where quantitative methods were employed to probe scientific communication process by measuring and analyzing various aspects of written documents. It became more popular during 1980s. Initially bibliometrics include the citation counts, journal citation reports and impact factors and immediacy impact factors for assessing the research impact. After few time they were followed by *g*-index, *h*-index etc. But now the research articles are available on Web as blogging, tweeting, posting, responding, linking, bookmarking, sharing, linking etc.

Altmetrics:

The Altmetrics (or alternative metrics) was a term aptly coined in a tweet by Jason Priem (co-founder of ImpactStory) in 2010. They are also mean to as an alternative to citation metrics. Altmetrics is a term to describe web-based metrics for the impact of scholarly material, with an emphasis on social media outlets as sources of data. Altmetrics measure the number of times a research output gets cited, tweeted about, liked, shared, bookmarked, viewed, downloaded, mentioned, favourited, reviewed, or discussed. It harvests these numbers from a wide variety of open source web services that count such instances, including open access journal platforms, scholarly citation databases, web-based research sharing services, and social media. Although altmetrics are often thought of as metrics about articles, they can be applied to people, journals, books, data sets, presentations, videos, source code repositories, web pages, etc.. It is usually based on data from the social web and online tools rely on e-content from publishers and other information providers. Research products can be shared and discussed on many different online platforms from blogs to Twitter and from Wikipedia to different reference managers and social network sites. Altmetrics not only cover just citation counts, but also other aspects of the impact of a work, such as how many data and knowledge bases refer to it, article views, download, or mentions in social media and news media; the concept of altmetrics is increasingly getting popular since the San Francisco DORA was made public in 2012.

Altmetric tools

- **Altmetrics.org**.: This free Web site is a central hub for information maintains links to new online tools for calculating impact research articles based on a variety of sources, creates a score and include an altmetrics 'manifesto' that argue to show that altmetrics can improve existing scholarly filters.
- **Altmetric.com**: It analyses the online impact of research articles based on a variety of sources, generates a score. It collects data about an individual article and supplies this data to publishers. The publisher, who can subscribe to various altmetric products, can store and present article-level metrics to their readers and the authors.
- **Plumx:** It is an impact dashboard created by Plum Analytics for collecting data from a particularly wide variety of sources like twitter, wikipedia, institutional repositories etc. It that provides information on how research output is being utilized, interacted with, and talked about around the world.
- **Impact Story:** It is a free open source web application that collects the data from a variety of sources related to a broader set of resources including preprints, datasets, presentation slides and other research output formats and easy to track wide range of research artifact. Researcher can create collections of materials through online identifiers, such as Google Scholar Profiles, DOIs, and PubMed IDs.
- **PLoS Article Level Metrics:** Public Library of Science (PLoS) has emerged as the leading open access journal repository, in part due to its high traditional impact factors. PLoS offers an alternative to traditional impact in the form of Article Level Metrics, which track the influence of individual PLoS articles, from times downloaded to mentions in social media and blogs. It tracks the influence of individual PLoS articles, from times downloaded to mentions in social media and blogs. Besides, internal article metrics, including comments, notes, and ratings can also be tracked. In addition, a signpost in the upper right provides summary metrics of citations, views, shares and bookmarks.
- **Publish or Perish:** Anne-Wil Harzing created Publish or Perish (PoP) to assist faculty looking for more diverse bibliometrics. It is a free and downloadable program

that harvests data from Google Scholar based on author names. Users can manually remove records to refine the data, similar to what is now offered by Google Scholar Citations. It can also calculate numerous metrics, including alternatives to the h-index, so it is up to users to explain such metrics to larger audiences.

- **ReaderMeter.** : It is also a free tool that has been created by Dario Taraborelli of the Wikimedia Foundation which is focused on readership not citation. It adapts two popular impact metrics for authors H-Index and the G-Index. With help of this metrics user can estimate impact on the basis of the consumption of scientific content by a population of readers. Readership data is obtained via the Mendeley API. It draws the data from Mendely but it is planning to integrate data from multiple reference management sites, such as CiteULike.

Scholarly peer networks

- **Social Science Research Network (SSRN):** It is an online article repository was founded in 1994 by Michael Jensen and Wayne Marr. SSRN allows academic papers and abstracts to be accessible worldwide. It is devoted to rapid dissemination of scholarly research in the social sciences and humanities. It provides a number of ways to promote an author's paper and is composed of a number of specialized research networks in each of the social sciences. Full papers and abstracts can be viewed on an individual author's page, on an institution page containing work of a school or faculty, or as part of subject matter e-journals. . It encompasses three key features: database of more than 400,000 abstracts, a large electronic paper collection, and 20 specialized subject networks through which registered users can promote their work and connect to free abstracts and articles and also a depository for academic scholarship. In May 2016, SSRN was bought from Social Science Electronic Publishing Inc. by Elsevier. In 2013, SSRN was ranked the top open-access repository in the world by Ranking Web of Repositories.
- **VIVO**: It is an open source semantic web application developed Cornell University in 2006. It is downloadable semantic Web application designed the discovery of research and scholarship across disciplines at that institution and is internationalized and available in many languages. It is powerful tool in collecting university-level research metrics. It Provide scholarly work of an institution, creating a profile for each scholar and including co-author and co-funded network visualizations, a map of science at the personal, departmental, or institutional level, and a capability map for inspecting the connections of scholars and concepts. Teaching, research and service are presented in structured detail suitable for analysis and research discovery.
- **Mendeley**: It is web based programme managing and sharing paper produced by Elsevier in 2008. It is a free reference manager and academic social network that can help organize research, discovering research data and collaborating online. It is focused on sharing bibliographic references and discussing in thematic groups. It combines a citation manager with a scholarly social network to create a comprehensive research portal.
- **Academia. edu**. It is a social networking website for academics, was launched in 2008 by Richard Price. It is a free online paper-sharing platform that encourages academics to increase their visibility and monitor research within and across its scholarly network. It provides a platform to academics can share papers, follow research in particular field, monitor their impact and also allow to academics create profile, up load their papers. Impact metrics for the site are similar to those offered by many blogs, and include profile. Views, document views, and country-based page traffic and also offers social interaction, ask a question tools for users.

- **Research Gate**: It is a social network site was launched in 2009 which allows uploading papers, taking part in discussions and following other researchers. It is the site that most indicators show at author level, going from social measurements (followers, following) and usage metrics (page view, document downloads) to bibliometric indicators (impact points, papers and citations). It also has private chat rooms where users can share data, edit shared documents, or discuss confidential topics and the site also features a research-focused job board.

General Resources

- **Google Scholar:** This free bibliographic database launched in 2004 by Google. It provides a simple way to broadly search for scholarly literature. It presents brief curriculum vitae where researchers list their publications indexed in Google Scholar with some bibliometric indicators. It offers search across many disciplines and sources: articles, theses, books, abstracts and court opinions, from academic publishers, professional societies, and online repositories and it also contains patent records, court cases, and legal documents etc. Google Scholar using a statistical model based on author and article metadata to identify relevant citations, the service offers the option of automatically adding new articles to users' public or private profiles. It contains citation references to books, journal articles, and other resources and also shows who has cited each work which helps user to trace patterns of research. A feature introduced in November 2013 allows logged-in users to save search results into the "Google Scholar library" a personal collection which the user can search separately and organize by tags.
- **Web of Knowledge:** It is an online subscription-based scientific citation indexing service in science, social science, humanities. It was produced by the Institute for Scientific Information (ISI), now maintained by Clarivate Analytics. Its introduction of the h-index in 1982. It provides quality literature through a unified platform that links a wide variety of content with one seamless search and containing multidisciplinary, high quality research information from the world's leading science, social sciences and arts and humanities journals. Its metrics include times cited, h-index, impact factor, Eigen factor, and field-based journal rankings. It contains information such as cited references, titles, authors, keywords, abstracts and other document details. Web of Science is a bibliographic database, but linking to the full-text of thousands of journals is available. Web of Knowledge includes Web of Science, for article and author queries, and Journal Citation Reports, for journal queries and connected through standard vocabulary, linked content and citation metrics from multiple sources.
- **SCImago Journal and Country Rank**: This is a free portal measure of scientific influence of scholarly journals that accounts not only the number of citations received by a journal but also the importance or prestige of the journals where such citations come from. Citation data is drawn from over 21,500 titles from more than 5,000 international publishers and country performance metrics from 239 countries worldwide. Its runs on Scopus data to calculate two metrics: SCImago Journal Rank (SJR) and Source Normalized Impact per Paper (SNIP), which compare directly to Web of Knowledge's Impact Factor. Journals can be compared or analyzed separately. Country rankings may also be compared or analyzed separately. Journals groped into 27 major thematic subject area and 313 special subject category. The SJR indicator based on Google Page Rank algorithm and provides an alternative to the impact factor.

- **Scopus:** This is a subscription database bibliographic database containing abstracts and citations for academic journal articles. It contains 20000 peer reviewed journals in science, social science, art, humanities and 22000 titles over 5000 publishers. It provides similar article, author, and journal-level metrics, but uses slightly different algorithms to calculate them. Metrics include standard options such as times cited and h-index, as well as original offerings like SJR and SNIP from SCImago. The Scopus offers to search both forward and backward from a particular citation would be very helpful to the users also offers author profiles which cover affiliations, number of publications and their bibliographic data, references, and details on the number of citations each published document has received.
- **Microsoft Academic:** It was launched in 2016 by Microsoft Research, is a free public search engine for academic publications and literature. It uses semantic search technology. Microsoft Academic employs advances in machine learning, semantic inference and knowledge discovery to help user to explore scholarly information in more powerful ways than ever before. It is display bibliographic information publications list, co-authors, keywords, affiliation, conference series and bibliometric indicators (citations and papers). It currently indexes over 150 million entities. The Academic Knowledge API offers information retrieval from the underlying database using REST endpoints for advanced research purposes.

Blogs and media

- **Citation Culture:** This blog is the creation of Paul Wouters, director of the Centre for Science and Technology Studies at Leiden University. Earlier this blog started in only in the natural sciences, but nowadays also researchers in the social sciences and in the humanities are confronted with these measures. This blog is dedicated to citation analysis, quantitative indicators, and evaluation at universities and in scientific research. Recent multipart posts have touched on topics, such as humanities bibliometrics and scholarly altmetrics.
- **Jason Priem's Web site:** J**.** Priem has emerged as one of the strongest advocates for altmetrics, and a champion for library involvement. His interests touch on a variety of altmetrics topics, including the future of scientific communication, the open data movement, and author's rights. As the emerging altmetrics landscape continues to move forward, expect Priem to be at the front.
- **Scholarly Kitchen:** The Scholarly Kitchen established in 2008 by Society of Scholarly Publishing to keep aware to new development in publishing and Suggest areas that need more input by identifying gaps in knowledge to their members and interested parties. Scholarly Kitchen is a moderated blog that presents ideas on current topics of scholarly publishing and communication. While not strictly focused on bibliometrics, many of the site's "chefs" boast expertise in the intersection between impact and publishing. The site also offers useful category filters such as "Metrics & Analytics," which includes more than 280 posts and counting.

Use of Altmetrics in Libraries: New knowledge is built on existing knowledge and academic libraries are the primary repositories of existing knowledge for the scholars whose work they support**.** Altmetrics are a natural extension of what libraries and librarians already do like tracking user behavior (like page clicks or downloads) to "spot trends and make informed decisions based on deep quantitative evidence" (Galligan & Dyas-Correia, 2013,) are activities that electronic resources librarians have engaged in for years. From the academic library perspective, this tool helps to develop the value of functionalities offered by

institutional repositories by having its most talked about institutional research available for legal and free download.

- **Collection Development:** Millions thousand per year are poured into building digital library technology: digitizing content and creating the open source infrastructure that supports countless researchers. But surprisingly, not much is known about how digital library collections are actually being used. Almetrics can help in collection development by providing an altmetric overlay for journal usage that will complement the standard COUNTER statistics provided by the publishers. This is what Mendeley currently does and is likely what Ebsco hopes to do and sell with Plum Analytics. Some of the "Metrics Plum already provides are 'established citations and usage as well as altmetrics:
  - **Capture**- Bookmarks, favorites on slideshare, followers on GitHub, groups in Mendeley, etc
  - **Mention**-Rreviews on Amazon, SourceForge, links from Wikipedia, comments on YouTube, etc.
  - **Social Media**-Tweets, shares, recommendations on Figshare, ratings on SourceForge, etc.
  - Citations through SCOPUS, Web of Science etc. and Usage downloads.

- **Institutional Support:** The use of altmetrics to measure researcher impact is also an activity in academic libraries that has gained interest in recent years. Altmetrics can make the libraries and librarians central in new educational role. Institutions are an intuitive platform that enables user to monitor the online activity surrounding academic research and helping researchers and institutions to understand and manipulate their own impact. Altmetric details pages provide authors an easily accessible, collated record of the online mentions and shares of their research. Users can browse all of the original posts and click through to view them at the source. Compare the online activity surrounding your institution's research with that of peer organizations. Use of altmetrics by publishers to identify recent trends, by funding/grant-making agencies for decision-making, and for promotion and tenure decisions.
- **Open access:** Open Access has played a major role in the development of altmetrics. Open access journal initiatives were the first to provide article-level metrics (like Public library of Science PLOS articles level metrics and Journal of Medical Internet Research JMIR) based on open data or open source systems Freely available services like ResearchGate, Figshare and F1000 (Faculty of 1000) are open repositories for all types of research output. It should also be noted that few altmetrics existed for e-books, mainly because they are generally much more substantial works containing many individual ideas and thus perhaps not the appropriate unit of analysis to which to apply current altmetrics.

Conclusions

Altmetrics is getting better reflection of social impact and outreach of scientific publications. In these days scholarly publishing has entered into an age where the print journals are slowly becoming obsolete, and new publication types emerge from open science communities on the internet. This development increases new publication type and channel as a supplement to the traditional academic evaluation based on article and citation counts. Altmetrics is fairly new, relatively unexplored and under-developed field. Alternative or rather complementary metrics are all metrics, which must welcome other attempts at measuring. These include customizing

sets of metrics for specific groups of users, recognizing that using multiple sources for determining influence is better than trying to find and use a single source, and identifying the correlations between existing, vetted, metrics and new ones.

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