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# An Exploration of Mendeley Reader and Google Scholar Citation for Analysing Indexed Article

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**Abstract**— This paper aims to analyze the number of readers from the published articles of 100 Indonesian researchers in Mendeley reference management software. The list of Indonesian scientists is obtained from the webometrics ranking of scientists. We used the Application Programming Interface (API) of Mendeley to count the number of readers for each article in Mendeley and combine it with Google Scholar citation using the scrap method. We processed ten mostly cited articles that are indexed in the first page of the Google Scholar for each designated scientist. Furthermore, we used the Pearson method to analyze the correlation of the Mendeley readers count and the Google Scholar citation. The results show that they are correlated with a value of 0.266 according to the method of Pearson with  $N = 1000$ . Furthermore we found that many online Indonesian journals have no Digital Object Identifier (DOI) yet. Our evaluation of the publication results of 100 Indonesian researchers shows that authors who upload their scientific work on Mendeley, have higher citation number in Google Scholar, because their papers are widely available on the Internet.

**Keywords:** Mendeley, Google Scholar and Digital Object Identifier (DOI)

Online scientific publications are increasingly used both in higher education institutions and research institutes. They provide storage to store scientific publications institutional repository. Public can access scientific papers produced online.

This research supports the movement of the Open Access Initiative (OAI), which allows people to access scientific publication in the form of research report, journal, papers, conference, and paper chapters of a book or thesis (Farida et al., 2015).

The average number of citations given by articles published in a particular year, to papers published by someone in a period of  $\Delta t$  years before that year, is defined as the Author Impact Factor (AIF) (Pan & Fortunato, 2014). The articles cite by other academics or researchers will increase the citation number of the article. The increase of the number of researchers that refer to that paper, to cite it and to produce the new article published, would increase the impact of article cited (Hirsch, 2005).

Everyone can easily access the online publications anytime and anywhere. Mechanical engineers, nurses in hospital or other professions can access online publications using the Internet. For example, a nurse may have a particular interest to an article, because that article supports their professional conduct as a nurse. An article will be useful because it can be read and shared among peers, discussed via the internet, blogs, social media forum (Jason Priem & Hemminger, 2010). This means that the article has a good impact value.

Citation can only be done by researchers/academics who referred a particular article in a paper they write. The citation will add the value to the impact of an article. For example, a nurse only read a paper and use the information and they do not write a paper that cited the article (Mcfedries, 2012).

Networking and collaboration technology based on xml-based applications make more research activities grow rapidly. Researcher can search the references from the Internet using search engine. The application of the reference manager helps the author to set a list of references, using the web services technology. .

The initiation of the Open Archive Initiative accelerated the growth of the number of research publication in scientific journals. It also facilitated the tracking of the citation using Open Archives Initiative (OAI). A sample of an application that is widely used to write a scientific publication is Mendeley. Mendeley is a reference manager that can be used to organize the result a citation in an article (X. Li et al., 2012). This is similar to the applications such as Zotero or End Note. However, Mendeley is different from others application, as it provides service feature interaction with other user. The service communication interaction with the other user is similar to the feature on the social media application. Therefore Mendeley can be confidence as a social media network research (Haustein et al., 2014). Mendeley is the reference manager, which can be used to manage the references of a paper. The difference of the Mendeley to other research tools such as Zotero and End Note is that Mendeley used “social media”, function to create the network of authors. Mendeley is a the popular reference manager to manage of the references to produce scholarly article (X. Li et al., 2012; see also J Priem et al., 2012).

The following is some information about the research profile obtained from two search engines, i.e. Google Scholar and Microsoft Academic Search (MAS). Information about the profile of researchers in both search engines shows the number of articles indexed in the search engine, such as Google Scholar produces the article title, author and co-author, as well as the citation. An example of an author’s profile can be seen in figure 1.

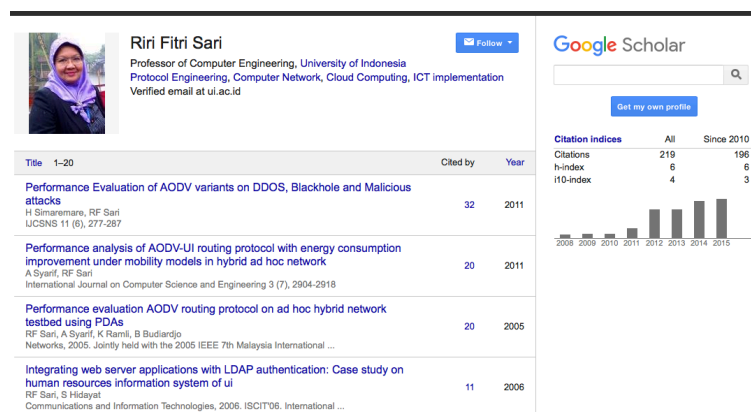


Figure 1. An example of an author’s profile from Google Scholar

In our experiment, we used Google Scholar, the reference manager Mendeley, the DOI Crossref, and Microsoft Academic Search (MAS). MAS is not used as the data in our experiment, but it is only an example of the general search engine in a scholarly community (Of et al., 2015).

## GOOGLE SCHOLAR AND MENDELEY

### A. Google Scholar

Google Scholar is a service from Google corporation to provide the search engine for the scholarly literature

from different disciplines and sources for example from: articles, theses, books, abstracts and court opinions and academic publishers, professional societies, online repositories, universities and other web sites (“About Google Scholar,” 2015).

### B. *Mendeley*

Mendeley is a dynamic global research collaboration platform that is helping academics improve their workflow and accelerate the pace of scientific discovery. Mendeley facilitates us to interact with other users, and communicate such in social media interaction. Mendeley let us to measure how many times the article is read by others.

## METHODOLOGY

The following steps has ben conducted in our experiment, to evaluate the number of reader of a paper in Mendeley and the citation number in Google Scholar.

Collecting a list of researchers of 100 Indonesian researchers from Webometrics ranks of scientists (<http://webometrics.info>).

- a. Obtaining the title of article of the list of the Google Scholar.
- b. Finding the DOI of all articles obtained from Crossref. The method used the API provided by the Crossref site. R language is used to create the script.
- c. Calculating the data reader to the article on the Mendeley API Query method using R language.
- d. Storing data and calculating the number of articles on GS and the number of readers of the article on Mendeley using MySql database.
- e. Displaying the results in a bar chart representation of the picture and the list of researchers using the PHP programming language and Apache webserver applications.
- f. Calculating the correlation of the reader of the article on Mendeley with the Google Scholar citation number, using Pearson Method.

The method of the Google Scholar scrapping is done by taking the first pages found in Google Scholar page of a particular name of researcher, and then the data obtained is then parsed.

We used scholar.py parsing application, to select the title of the article and the number of citations. Awk application used it is simple applications with an input such as the C language to process the word (Dougherty, Robbins, & Edition, 2014).

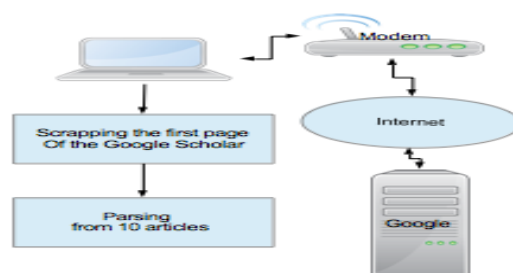


Figure 2. Scrapping method with *scholar.py* (Cristian, 2010)

The following is the output result from the Google scholar with an example first article of an author (Step a and b).

Title Performance Evaluation of AODV variants on DDOS, Blackhole and Malicious attacks

URL [http://paper.ijcsns.org/07\\_book/201106/20110642.pdf](http://paper.ijcsns.org/07_book/201106/20110642.pdf)

Year 2011

Citations 33

Versions 2

Cluster ID 11027664530493299936

PDF link [http://paper.ijcsns.org/07\\_book/201106/20110642.pdf](http://paper.ijcsns.org/07_book/201106/20110642.pdf)

Citations list [http://scholar.google.com/scholar?cites=11027664530493299936&as\\_sdt=2005&scioldt=0,5&hl=en](http://scholar.google.com/scholar?cites=11027664530493299936&as_sdt=2005&scioldt=0,5&hl=en)

Versions list [http://scholar.google.com/scholar?cluster=11027664530493299936&hl=en&as\\_sdt=0,5](http://scholar.google.com/scholar?cluster=11027664530493299936&hl=en&as_sdt=0,5)

Excerpt Summary This paper reviews security issues on Adhoc network and Ad hoc On-Demand Distance Vector (AODV) protocol. In Adhoc network, active attack ie DDOS, blackhole and malicious nodes attack can easily occur. These attacks can decrease the performance of ...

The next step of the process is shown below to provide the list of the articles of an author (Step c).

"Title", "Reader", "DOI", "Author"

"Performance evaluation AODV routing protocol on ad hoc hybrid network testbed using PDAs", "11", "10.1109/icon.2005.1635480", "Riri Fitri Sari"

" Integrating web server applications with LDAP authentication Case study on human resources information system of ui", "0", "10.1109/iscit.2006.340053", "Riri Fitri Sari"

"", "Riri Fitri Sari"

" An analytical model of A-MSDU scheme with enhanced Block ACK for IEEE 802.11 n networks", "0", "10.1109/icon.2012.6506572", "Riri Fitri Sari"

"Implementation of Web Ontology and Semantic Application for Electronic Journal Citation System", "8", "10.4304/jetwi.2.1.34-41", "Riri Fitri Sari"

" Performance comparison of active and non-active network-based multicast multirate congestion control protocols", "0", "10.1109/icon.2002.1033319", "Riri Fitri Sari"

"", "Riri Fitri Sari"

"Implementing web data extraction and making mashup with Xtractorz", "9", "10.1109/iadcc.2010.5422921", "Riri Fitri Sari"

"Consecutive group paging for LTE networks supporting machine-type communications services", "4", "10.1109/pimrc.2013.6666401", "Riri Fitri Sari"

" Secure AODV Routing Protocol Based on Trust Mechanism", "0", "10.1007/978-3-642-36169-2\_3", "Riri Fitri Sari"

"Performance Analysis of Session Initiation Protocol on Emulation Network using NIST NET", "5", "10.1109/icact.2007.358405", "Riri Fitri Sari"

" Face recognition for social media with mobile cloud computing", "0", "10.5121/ijccsa.2013.3102", "Riri Fitri Sari"

The next step (d, e, and f) provides the results of the three query processes that is stored in database and displayed via the website as shown in table 1.

Table 1. Comparison of the number of the article readers in Mendeley and the Google citation number for the first article found on Google Scholar)

No	Author	Mendeley Reader	Google Citation
1	Author 1 <sup>st</sup>	133	716
2	Author 2 <sup>nd</sup>	54	195
3	Author 3 <sup>rd</sup>	0	117

The evaluation result shows that author 1st and author 2nd are highly cited on Google Scholar, but not for author 3rd. Author 1st has profile on Google site, Author 2nd has profile on Mendeley, but author 3rd has profile on Research Gate. The availability of the profile on Mendeley, Google Scholar and Research Gate will affect the number of citation of an author. Therefore more feasibility and availability of author profile in different engines will be achieved when the profile is widely available.

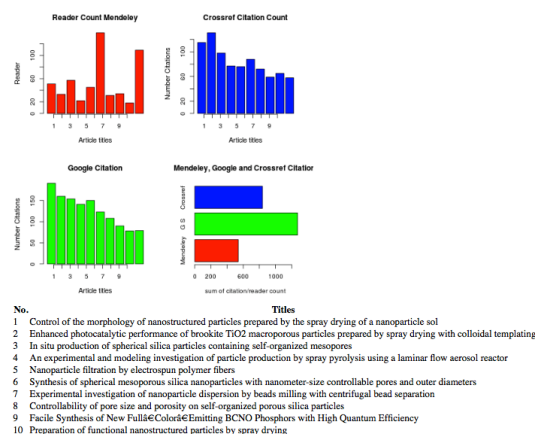


Figure 3. An example of the result of the comparison process for author 1<sup>st</sup>

## FINDING AND DISCUSSION

The results of the three steps stored at MySQL database can be seen from the processed result. We obtained 10 articles of each 100 Indonesian researchers from various fields on the web metrics list. We processed data 1000 article titles list of the number of readers in Mendeley, and the number of citations indexed in Google Scholar.

The result shows that an author who has an active account on Mendeley also has a high citations indexed in Google scholar, compared to researchers who do not have a Mendeley account. Mendeley use the Digital Object Identifier (DOI) to identify an article published. We found several article cited in Google Scholar but it has no reader on Mendeley, because the articles do not have DOIs. An unpublished article that has not been uploaded to Mendeley is less cited in Google Scholar.

Figure 4 shows the scatter plot of the Google Scholar and the number of readers in Mendeley for article published by 100 Indonesian scientists

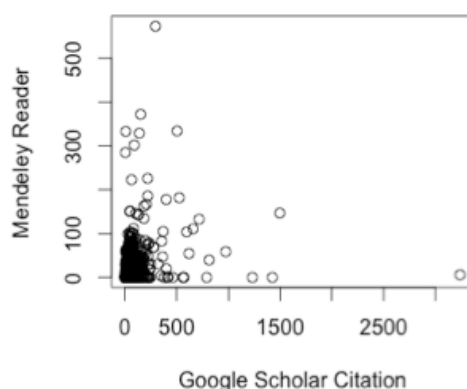


Figure 4. Scatter Plot of Mendeley reader number and Google scholar citation

## CONCLUSION

The number of readers of an article on Mendeley is correlated with the Google Scholar citation, with a value of 0.266 based on the Pearson Method correlation with  $N = 1000$ . This can be seen in Figure 9. We present the relationship and correlation between the number of readers from Mendeley and the citation number of articles on the Google Scholar. Mendeley helps author to provide their papers to public and delivered it to the search engines as well as functions as a reference manager.

It can be concluded that authors who upload their publications on Mendeley is cited more on Google Scholar.

In the future work, we will use the parameters provided by Scopus information using the provided APIs. We plan to provide the data representation of each researcher to be displayed on a complete web, search engine and provide the citation information.

Our application will motivate researchers to improve research performance.

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