

What is h-Index?

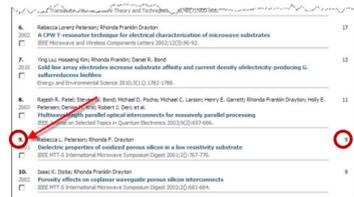
“A scientist has index h if h of his/her N_p papers have at least h citations each, and the other $(N_p - h)$ papers have no more than h citations each.”

-- J.E. Hirsch, in “An index to quantify an individual’s scientific research output.”

Pro: Simultaneously measures quality and quantity of scientific output

Con: Completely dependent on the data source used to list papers and to count citations to those papers.

Calculating h-Index

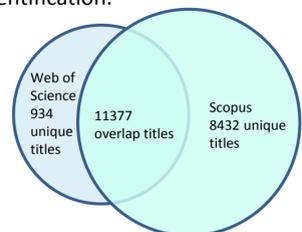


- Sort all your publications in descending order by how many times they’ve been cited.
- Go down the list until the last record where the number of times cited is greater than or equal to the count of the item on the list.
- The number of the item on the list is your h-index.

Data Sources

Any database that provides both citation information by author and “cited by” counts for those citations can be used to calculate h-index. The most common databases used for this purpose in Science and Technology are Web of Knowledge (WoK), Scopus, and Google Scholar.

Results are affected by the scope of the database (titles, years, subjects, publication types), the accuracy of the database’s Cited By algorithm, and the accuracy of author identification.



Analysis from Academic Database Assessment Tool
Center for Research Libraries (adat.crl.edu)
Scopus updated May 2012, Web of Science updated August 2012.

Purpose of the Study

At the University of Minnesota, we’ve noticed that more faculty members are asking their liaison librarians about h-index and other productivity measures. Researchers are also becoming more aware of how they appear to potential collaborators who find them online. By comparing h-index calculations and citation counts in three commonly used databases, librarians can make the point that researchers must take the time to review their online presence in any database potential collaborators might use.

Data Collection

For each of the 76 full time Associate Professors in the College of Science & Engineering in Spring 2013:

Google Scholar

- Searched by author name for profile.
- If found, recorded count of citations and h-index.

Scopus

- Searched using Author Search for author last name/first initial and affiliation of University of Minnesota Twin Cities.
- Recorded count of citations and h-index.
- When multiple records were found, used only the record with the most associated citations. Tools are provided to allow authors to merge their records.
- Note that Scopus only uses articles published since 1996 to calculate h-index.

Web of Knowledge

- Searched using Author Search for last name and first initial and affiliation with the University of Minnesota.
- Ran Citation Report on initial result set and recorded count of citations and h-index.
- WoK was the most likely of the three to result in inaccurate initial sets, but tools are provided to allow authors to add items to their ResearcherID publication list.

Example

Nicholas Hopper, Computer Science & Engineering

Database	Result Count	h-index
Google Scholar	86	21
Scopus	42	9
Web of Knowledge	8	3

Why is the Google Scholar count so much higher than the others?

- Google Scholar pulls from a wider range of sources: journal and conference proceeding publishers, institutional repositories, departmental and author websites.
- Because all the data collection is done automatically, it isn’t unusual for a Google Scholar profile to contain multiple copies of the same article. The profile owner can merge multiple instances of the same article.

Title / Author	Cited by	Year
A secure human-computer authentication scheme M Blum, NJ Hopper Technical report	2	2000
A secure human-computer authentication scheme NJ Hopper, M Blum	63	2000

Technical reports aren’t indexed by WoK or Scopus, but are often cited in engineering and computer science.

Different author order, so not merged by Google Scholar

What is Google Scholar missing that Scopus has?

- Two papers from Lecture Notes in Computer Science
- Two Message from the Program Chairs from Lecture Notes in Computer Science
- Two papers from the Proceedings of the ACM Conference on Computer & Communications Security

Why is the Scopus count so much higher than Web of Knowledge?

- Scopus includes many more conference proceedings than Web of Knowledge.

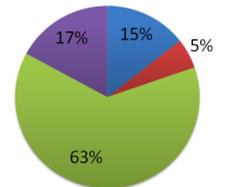
Chan-Tin, E., Heorhiadi, V., Hopper, N., Kim, Y.	2011	ACM Transactions on Information and System Security 14 (3), art. no. 27	2
Mohaisen, A., Tran, H., Hopper, N., Kim, Y.	2011	Proceedings - International Conference on Distributed Computing Systems, art. no. 5961381, pp. 154-159	1

Journal from ACM. Indexed by both Scopus and WoK.

IEEE conference proceeding. Indexed by Scopus but not WoK.

Results

Source for Highest h-index



- Google Scholar h-index was highest for all 11 faculty members who had a Google Scholar profile.
- Four faculty members, all from Math, had **no record** in any of the three databases
- Scopus works well for most science and engineering fields, but papers published before 1996 are not used to calculate h-index.

Recommendations

Researchers can ensure that their online presence reflects their work and scholarly contribution by taking the time to create or review their profiles in databases where potential collaborators are likely to look.

Librarians can assist by providing step-by-step instructions on the most efficient way to set up and refine profiles in each high-use database in the researcher’s field.

Sample Workflow for University of Minnesota faculty

- Scopus**
 - Most U of M researchers in Science and Engineering will have a Scopus Author ID
 - Search Scopus for your name and record your Author ID
 - If you find more than one Author record for yourself, request that they be merged
- ORCID**
 - ORCID.org is a publisher-agnostic ID and web presence site
 - Use your Scopus Author ID to add publications automatically to your ORCID account
- WoK**
 - Search for yourself. If you find citations, set up a Researcher ID account
 - Import information from ORCID
 - Add citations that are in WoK but not yet associated with your Researcher ID and synchronize to ORCID
- Google Scholar**
 - Set up a profile associated with your Google account
 - Use your Researcher ID and ORCID accounts, plus your CV to make sure all publications are added
- Experts**
 - Publications for your Experts@Minnesota profile come from Scopus, but may not be there if you’ve just updated your Scopus profile
 - Add research interests and keywords
 - Add links to your CV and faculty web page