First developed by Jorge E. Hirsch in the Proceedings of the National Academy of Sciences (PNAS) in November 2005, the H-index is a metric used to gauge an author’s scholarly impact based on productivity (number of publications) and impact factor (times cited).

The h-index is an author-level metric of based on the quantity and quality of an author’s works, that is, it is calculated based on the number of documents published and their impact or the number of times those documents have been cited by others.

It combines in a single number an author’s productivity (number of publications) and citation-based impact of those publications.

Is most commonly calculated on the single-author level, but it can be calculated for a research group (multiple authors), institution, subject area, or journal. Today, we’ll be looking at calculating an h-index for just a single author.

In its most basic sense, an author’s h-index means that of all the works an author has published, \( h \) articles were cited at least \( h \) times.

Advantages

- H-index minimizes the influence of the “one-hit wonder” or article that has been cited numerous times. It also reduces the influence of “highly or excessively productive” author, that is, an author with numerous publications to his/her name that have few or no citations.

- In other words, the total number of citations alone or the total number of publications alone do not hold sway over the h-index metric. The h-index strives to combine both into a single number that measures simultaneously the quality and quantity of an author’s output.

Limitations & Criticisms

- While the purpose of today’s session is not to get into the politics, good or bad, of the h-index, it is worth noting the limitations and criticism of it as a metric:

- It does not account for the typical number of citations in different fields. That means that while it is a simple whole number, the h-index cannot be compared across disciplines or different subjects. An h-index of 5 in the social sciences does not hold the same weight as a 5 in electrical engineering. An h-index must be considered within a narrow context, that is, only within a particular subject or field, which limits its value.

- The h-index does not consider the author’s placement in the authors’ list. In some disciplines, particularly the sciences, placement in the author’s list is significant, and the h-index does not account for that.
The h-index can be manipulated by self-citations, which can be especially bad in tools such as Google Scholar. Fortunately, the library tools I'll be showing you are equipped to filter out the influence of self-citations.

The h-index primarily takes into account traditional publishing venues, that is, the h-index measures mainly academic journal articles, in some cases proceedings papers, and to a lesser extent books. Alternative methods of publishing, including blogging and microblogging, annotations on existing works, and “raw science” like datasets and code are overlooked or ignored by the h-index.

H-index is considered a slow metric, that is, the h-index depends on peer-review, which takes considerable time in itself, and citations of an author’s works, which can take years. Newer authors who lack a large, historical repertoire of works from which to calculate an h-index fail to benefit from it as a metric. As stated in an article on altmetrics, metrics like the h-index “are narrow; they neglect impact outside the academy, and also ignore the context and reasons for citation.” http://altmetrics.org/manifesto/

- Demonstration of:
  - H-Index in Web of Science – Oldow J or Kehtarnavaz N
  - H-Index in SCOPUS – Oldow J or Kehtarnavaz N
  - Google Scholar – Kehtarnavaz, Nasser

- Brief Discussion of:
  - About Publish or Perish
    - Publish or Perish is a software program that retrieves and analyzes academic citations. It uses Google Scholar and Microsoft Academic Search to obtain the raw citations, then analyzes these and presents the following metrics:
      - Total number of papers and total number of citations
      - Average citations per paper, citations per author, papers per author, and citations per year
      - Hirsch’s h-index and related parameters
      - Egghe's g-index
      - The contemporary h-index
      - Three variations of individual h-indices
      - The average annual increase in the individual h-index
      - The age-weighted citation rate
      - An analysis of the number of authors per paper.
    - The results are available on-screen and can also be copied to the Windows clipboard (for pasting into other applications) or saved to a variety of output formats (for future reference or further analysis). Publish or Perish includes a detailed help file with search tips and additional information about the citation metrics.
o **What Publish or Perish is for**

- Publish or Perish is designed to empower individual academics to present their case for research impact to its best advantage. We would be concerned if it would be used for academic staff evaluation purposes in a mechanistic way.
- When using Publish or Perish for citation analyses, we would like to suggest the following general rule of thumb:
- If an academic shows good citation metrics, it is very likely that he or she has made a significant impact on the field.
- However, the reverse is not necessarily true. If an academic shows weak citation metrics, this may be caused by a lack of impact on the field, but also by one or more of the following:
  - Working in a small field (therefore generating fewer citations in total);
  - Publishing in a language other than English (LOTE - effectively also restricting the citation field);
  - Publishing mainly (in) books.
- Although Google Scholar performs better than the Web of Science in this respect, it is still not very good in capturing LOTE articles and citations, or citations in books or book chapters. As a result, citation metrics in the Social Sciences and even more so in the Humanities will always be underestimated as in these disciplines publications in LOTE and books/book chapters are more likely than in the Sciences.

- **AltMetrics** – see [http://altmetrics.org/manifesto/](http://altmetrics.org/manifesto/)

  - An alternative to citation metrics.
  - Crowdsourcer peer-review to expedite process. Can be a big bottleneck w/r/t H-Index.
  - “Altmetrics reflect the impact of the article itself, not its venue. Unlike citation metrics, altmetrics will track impact outside the academy, impact of influential but uncited work, and impact from sources that aren’t peer-reviewed.”