

How to Calculate H-Index of Research Scholar

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Abstract

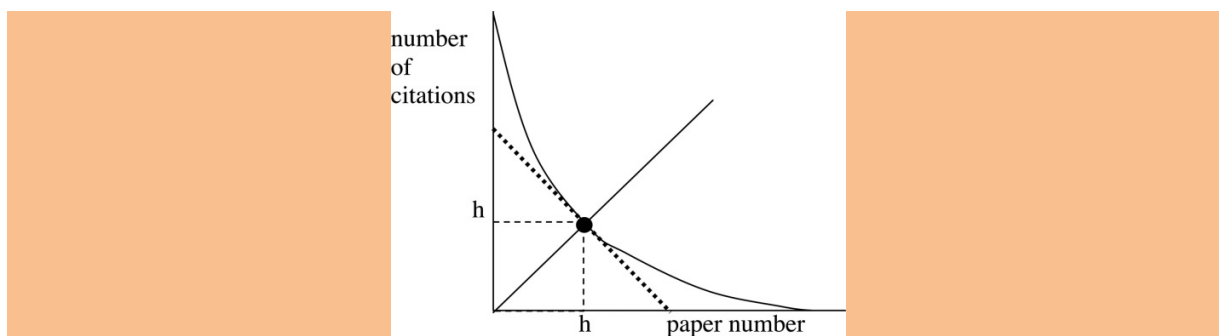
The aim of this research paper is to know how to calculate the h-index. This paper contains the detailed study on how to calculate the h-index and other indexes of scholar. It includes the role of h-index in the carrier of the faculty in the field of teaching.

Keywords— h-index, citation.

INTRODUCTION

The **h-index** is an index that tries to measure both the productivity and citation impact of the work of scholar. **Citation impact** can be measured in various ways. “One of the measures is citation count, which computes both the manipulation and impact of the cited work. That is called citation analysis or bibliometric Citation counts for:

- An individual research paper or article (how it was cited)
- An author (total number of citations, or average number of citation count per article or research paper)
- A journal (average number of citation count for the articles in the journal)”[1].



The h-index is basically based on the set of the mostly cited papers of the scholar and the number of citations that they have received from other publications. “The h-index can also be applied to the productivity and impact of a scholarly journal as well as a group of scientists, such as a department or university or country” [2]. The h-index was proposed by Jorge E. Hirsch, “a physicist at UCSD, as a tool for determining theoretical physicists’ relative quality in 2005” [3] and is sometimes called the *Hirsch index* or *Hirsch number* or *h-index*.

DEFINITION AND PURPOSE

The h-index is calculated on the behalf of the distribution of citations that have been received by a given publication of scholar. “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”[3]. “A research scholar with an index of h has published h papers each of which has been cited in other papers at least h times”[4]. Thus, the h -index shows both the number of publications and the number of citations per publication. It works well only for comparing work of scholar in the same field, citation conventions differ widely among different fields.

ROLE OF H-INDEX IN CAREER

Hirsch suggested for physicists, “a value for h of about 12 might be typical for advancement to tenure (Associate Professor) at major research universities. A value of about 18 could mean a full Professorship; 15–20 could mean a fellowship in the American Physical Society, and 45 or higher could mean membership in the United States National Academy of Sciences”[5].

The London School of Economics found that (full) professors in the social sciences had average h-indices ranging from 2.8 (in law) to 7.6 (in economics). On average across the disciplines, a full professor in the social sciences had an h-index of 4.9, whereas a senior lecturer (Associate Professor) had an h-index of 2.2 [6].

A systematic observation has been made on how academic recognition correlates with h -index over different institutions, nations and fields of studies. However, Hirsch estimates that after 20 years a "successful scientist" will have an h -index of 20, an "outstanding scientist" will have an h-index of 40, and a "truly unique" individual will have an h-index of 60. However, he points out that values of h will vary between different fields of education [7].

For the most highly cited scientists as per report of Project ACUMEN are below [8]

Rank	Name	Institution	h-index	Citations
1	Sigmund Freud	University of Vienna	251	367305
2	Graham Colditz	Washington University in St. Louis	249	217355
3	Eugene Braunwald	Brigham and Women’s Hospital; Harvard Medical School	232	250876
4	Michel Foucault	Collège de France	218	531709
5	Ronald C Kessler	Harvard University	214	204645
6	Pierre Bourdieu	Centre de Sociologie Européenne; Collège de France	210	383484
7	Robert Langer	Massachusetts Institute of Technology MIT	209	167773
8	Richard A Flavell	Yale University	197	145338
9	Gordon Guyatt	McMaster University	192	138831
10	Eric Topol	Scripps Research Institute	191	155672
430	Pratap Chandra Behera	University of Delhi	108	57880

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CALCULATION OF H-INDEX, A-INDEX, R-INDEX

The *h*-index can be manually calculated either by using citation databases or by using automatic tools. Subscription-based databases such as Scopus and the Web of Knowledge have their own automated calculators. Harzing's *Publish or Perish* program calculates the *h*-index based on Google Scholar entries. In July 2011 Google trailed a tool which allows research scholars to keep track of their own citations and also produces an *h*-index and an *i10*-index [9]. Each database is likely to create a different value of *h*-index for the same scholar, because of coverage of different databases [10]. A detailed study showed that the Web of Knowledge has highly strong coverage of journal publications, but poor coverage of high impact conferences. Scopus has better coverage of conferences, but poor coverage of publications prior to 1996. But in case of Google Scholar has the best coverage of conferences and most journals (not all), but when we include Scopus in our discussion, it has limited coverage of pre-1990 publications [11][12]. The exclusion of conference proceedings papers is a particular problem for scholars in computer science, where conference proceedings are considered an important part of the literature [13]. Google Scholar has been criticized for producing "phantom citations," including gray literature in its citation counts, and failing to follow the rules of Boolean logic when combining search terms [14].

1. CALCULATION OF H-INDEX

Table 1.1

Rank	Paper Name	Name No of Citing Papers
1	Paper1	25

$$h\text{-index} = 1$$

Table no. 1.1 show singlepaper, paper must be cited at least 25 times. Value of *h*-index of that paper is 1. For single paper *h*-index = 1, if No. of Citation ≥ 25

Table 1.2

Rank	Paper Name	Name No of Citing Papers
1	Paper1	3
2	Paper2	3
3	Paper3	2

$$h\text{-index} = 2$$

Table no. 1.2 show there are total 3 papers but 2 papers among 3 are cited at least 2 times that's why *h*-index=2

Table 1.3

Rank	Paper Name	Name N0 of Citing Papers
1	Paper1	15
2	Paper2	13
3	Paper3	10
4	Paper4	6
5	Paper5	3
6	Paper6	2

h-index = 4

Table no. 1.3 shows there are total 6 papers but 4 papers among 6 are cited at least 4 times that's why h-index=4

Table 1.4

Rank	Paper Name	No of Citing Papers	Rank	Paper Name	No of Cition Papers
1	Paper1	48	10	Paper10	48
2	Paper2	9	11	Paper11	21
3	Paper3	14	12	Paper12	14
4	Paper4	1	13	Paper13	13
5	Paper5	111	14	Paper14	4
6	Paper6	10	15	Paper15	10
7	Paper7	80	16	Paper16	8
8	Paper8	90	17	Paper17	91
9	Paper9	9	18	Paper18	19

h-index = 11

There are total 18 papers but 11 papers among 18 are cited at least 11 times that's why h-index=11

2. CALCULATION OF A-INDEX

The A-index was proposed by Jin (2006) as a modification of the *h-index*. The A-index is the average number of citations received by the *h* most cited papers, where *h* is the value of the *h-index*, as shown in Table 1.5.

Table 1.5

Rank	Paper Name	No of Citing Papers
1	Paper1	48
2	Paper2	21
3	Paper3	14
4	Paper4	13
5	Paper5	11
6	Paper6	10
7	Paper7	10
8	Paper8	9
9	Paper9	9
10	Paper10	8
11	Paper11	8
12	Paper12	5
13	Paper 13	4
14	Paper14	3

h-index = 9

$$A\text{-Index} = (48+21+14+13+11+10+10+9+9)/9$$

$$145/9=16.11$$

$$A\text{-index}=16.11$$

3. CALCULATION OF R-INDEX

The *R*-index was proposed by Jin et al. (2007). The *R*-index is the square root of the *h* most cited papers, where *h* is the *h*-index, as shown in Table 1.7.

Table 1.7

Rank	Paper Name	No of Citing Papers
1	Paper1	48
2	Paper2	21
3	Paper3	14
4	Paper4	13
5	Paper5	11
6	Paper6	10
7	Paper7	10
8	Paper8	9
9	Paper9	9
10	Paper10	8
11	Paper11	8
12	Paper12	5
13	Paper 13	4
14	Paper14	3

$$h\text{-index} = 9$$

$$R\text{-Index} = \sqrt{(48+21+14+13+11+10+10+9+9)}$$

$$\sqrt{(145)} = 12.04, R\text{-index} = 12.04$$

4. CALCULATION OF I10-INDEX

The **i10-index** showed the number of publications as an author has written that have at least ten citations from others. It was introduced by Google in July 2011. It is introduced as a part of their work on Google Scholar which is a search engine for academic and related research papers & articles.

Table 1.8

Sr.No.	Rank	Paper Name	No of Citing Papers
1	1	Paper1	48
2	2	Paper2	21
3	0	Paper3	3
4	3	Paper4	13
5	4	Paper5	11
6	5	Paper6	10
7	6	Paper7	10
8	0	Paper8	9
9	0	Paper9	9
10	0	Paper10	8
11	0	Paper11	8
12	0	Paper12	5
13	0	Paper 13	4
14	7	Paper14	30

$$i10\text{-index} = 7$$

CONCLUSIONS

Citations are the primary & basic means by which scientific findings are communicated. These recognize that citation serves the dual function of enabling verification of statements and acknowledging contributions. It plays a very important role in the carrier of the academic life. The scored we get through the citation, it shows the worth of the published research paper. It definitely encourages the academic life of the research scholars.

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