**SCIENCE CITATION INDEX**

A **citation index** is a kind of bibliographic index, an index of citations between publications, allowing the user to easily establish which later documents cite which earlier documents. A form of citation index is first found in 12th-century Hebrew religious literature. Legal citation indexes are found in the 18th century and were made popular by citators such as Shepard's Citations (1873). In 1960, Eugene Garfield's Institute for Scientific Information (ISI) introduced the first citation index for papers published in academic journals, first the *Science Citation Index* (SCI), and later the *Social Sciences Citation Index* (SSCI) and the *Arts and Humanities Citation Index* (AHCI). The first automated citation indexing was done by CiteSeer in 1997. Other sources for such data include Google Scholar and Elsevier's Scopus.

The **Science Citation Index** (**SCI**) is a citation index originally produced by the Institute for Scientific Information (ISI) and created by **Eugene Garfield**. It was officially launched in 1964. It is now owned by Clarivate Analytics (previously the Intellectual Property and Science business of Thomson Reuters). The larger version (**Science Citation Index Expanded**) covers more than 8,500 notable and significant journals, across 150 disciplines, from 1900 to the present. These are alternatively described as the world's leading journals of science and technology, because of a rigorous selection process.

The index is made available online through different platforms, such as the Web of Scienceand SciSearch. (There are also CD and printed editions, covering a smaller number of journals). This database allows a researcher to identify which later articles have cited any particular earlier article, or have cited the articles of any particular author, or have been cited most frequently. Thomson Reuters also markets several subsets of this database, termed "Specialty Citation Indexes", such as the **Neuroscience Citation Index**and the **Chemistry Citation Index**.

General-purpose, subscription-based academic citation indexes include:

* Web of Science by Clarivate Analytics (previously the Intellectual Property and Science business of Thomson Reuters)
* Scopus by Elsevier, available online only, which similarly combines subject searching with citation browsing and tracking in the sciences and social sciences.

Each of these offer an index of citations between publications and a mechanism to establish which documents cite which other documents. They are not open-access and differ widely in cost: Web of Science and Scopus are available by subscription (generally to libraries). In addition, CiteSeer and Google Scholar are freely available online.

Several open-access, subject-specific citation indexing services also exist, such as:

* INSPIRE-HEP: which covers high energy physics,
* PubMed: which covers life sciences and biomedical topics, and
* Astrophysics Data System: which covers astronomy and physics.

**H-INDEX**

The *h* index was proposed by J.E. Hirsch in 2005 and published in the *Proceedings of the National Academy of Sciences of the United States of America*. The h index is a quantitative metric based on analysis of publication data using publications and citations to provide *“an estimate of the importance, significance, and broad impact of a scientist’s cumulative research contributions*.”  According to Hirsch, the *h* index is defined as: “*A scientist has index h if h of his or her Np papers have at least h citations each and the other (Np – h) papers have ≤h citations each*.”

**How Calculated**: Number of papers (h) that have received at least *h* citations.

As an example, an *h* index of 10 means that among all publications by one author, 10 of these publications have received at least 10 citations each.

Hirsch argues that the *h* index is preferable to other single-number criteria, such as the total number of papers, the total number of citations and citations per paper. However, Hirsch includes several recommendations:

* A single number can never give more than a rough approximation to an individual’s multifaceted profile;
* Other factors should be considered in combination in evaluating an individual;
* There will be differences in typical *h* values in different fields, determined in part by the average number of references in a paper in the field, the average number of papers produced by each scientist in the field, and the size (number of scientists) of the field; and
* For an author with a relatively low *h* that has a few seminal papers with extraordinarily high citation counts, the *h* index will not fully reflect that scientist’s accomplishments.

Since Hirsch introduced the *h*index in 2005, this measure of academic impact has garnered widespread interest as well as proposals for other indices based on analyses of publication data such as the *g*index, *h (2)* index, *m* quotient, *r*index, to name a few.

Several commonly used databases, such as Elsevier’s *Scopus*, Clarivate Analytics’ *Web of Science*, and Google Scholar provide h index values for authors.

**Strengths of the *h* index**

* The*h* index is a metric for evaluating the *cumulative* impact of an author’s scholarly output and performance; measures quantity with quality by comparing publications to citations.
* The *h* index corrects for the disproportionate weight of highly cited publications or publications that have not yet been cited.
* Several resources automatically calculate the *h*index as part of citation reports for authors.

**Shortcomings of the *h* index**

* The *h* index is a metric to assess the entire body of scholarly output by an author; not intended for a specific timeframe.
* The *h*index is insensitive to publications that are rarely cited such as meeting abstracts and to publications that are frequently cited such as reviews.
* Author name variant issues and multiple versions of the same work pose challenges in establishing accurate citation data for a specific author.
* The *h* index does not provide the context of the citations.
* The *h* index is not considered a universal metric as it is difficult to compare authors of different seniority or disciplines. Young investigators are at a disadvantage and academic disciplines vary in the average number of publications, references and citations.
* Self-citations or gratuitous citations among colleagues can skew the *h* index.
* The *h* index will vary among resources depending on the publication data that is included in the calculation of the index.
* The *h* index disregards author ranking and co-author characteristics on publications.

**IMPACT FACTOR**

The **impact factor** (**IF**) or **journal impact factor** (**JIF**) of an academic journal is a scientometric index that reflects the yearly average number of citations that articles published in the last two years in a given journal received. It is frequently used as a proxy for the relative importance of a journal within its field; journals with higher impact factors are often deemed to be more important than those with lower ones.

The impact factor (IF) is frequently used as an indicator of the importance of a journal to its field. It was first introduced by **Eugene Garfield**, the founder of the Institute for Scientific Information. Although IF is widely used by institutions and clinicians, people have widespread misconception regarding the method for calculating the journal IF, its significance and how it can be utilized. The IF of a journal is not associated to the factors like quality of peer review process and quality of content of the journal, but is a measure that reflects the average number of citations to articles published in journals, books, thesis, project reports, newspapers, conference/seminar proceedings, documents published in internet, notes, and any other approved documents (by Indian Council of Medical Research or similar body).

Impact factor is commonly used to evaluate the relative importance of a journal within its field and to measure the frequency with which the “average article” in a journal has been cited in a particular time period. Journal which publishes more review articles will get highest IFs. Journals with higher IFs believed to be more important than those with lower ones. According to Eugene Garfield “impact simply reflects the ability of the journals and editors to attract the best paper available.” Journal which publishes more review articles will get maximum IFs.

Impact factor can be calculated after completing the minimum of 3 years of publication; for that reason journal IF cannot be calculated for new journals. The journal with the highest IF is the one that published the most commonly cited articles over a 2-year period. The IF applies only to journals, not to individual articles or individual scientists unlike the “H-index.” The relative number of citations an individual article receives is better evaluated as “citation impact.” In a given year, the IF of a journal is the average number of citations received per article published in that journal during the 2 preceding years. IFs are calculated each year by Thomson scientific for those journals that it indexes, and are published in Journal Citation Reports

(<http://www.thomsonreuters.com/products_services/science/science_products/a-z/journal_citation_reports/>).

For example, if a journal has an IF of 3 in 2008, then its papers published in 2006 and 2007 received three citations each on average in 2008. The 2008 IFs are actually published in 2009; they cannot be calculated until all of the 2008 publications have been processed by the indexing agency (Thomson Reuters). The IF for the biomedical journals may range up to 5-8%. The IF of any journal may be calculated by the formula;

2019 impact factor =A/B

Where A is the number of times articles published in 2017 and 2018 were cited by indexed journals during 2019. B is the total number of citable items like articles and reviews published by that journal in 2017 and 2018.

The calculation of IF for the journal where in a person has published articles is a contentious issue. Nevertheless, this have been already warned; “misuse in evaluating individuals” because there is “a wide variation from article to article within a single journal” therefore, “In an ideal world, evaluators would read each article and make personal judgments,” said by Eugene Garfield.

**EIGEN FACTOR**

The **Eigenfactor** came out of the **Metrics Eigenfactor Project** in 2008, a bibliometric research project conducted by Professor **Carl Bergstrom** and his laboratory at University of Washington.

The **Eigenfactor Score** measures the number of times articles from the journal published in the past five years have been cited in the **Journal Citation Reports (JCR)** year.

Like the Impact Factor, the Eigenfactor Score is essentially a ratio of number of citations to total number of articles. However, unlike the Impact Factor, the Eigenfactor Score:

* Counts citations to journals in both the sciences and social sciences.
* Eliminates self-citations. Every reference from one article in a journal to another article from the same journal is discounted.
* Weights each reference according to a stochastic measure of the amount of time researchers spend reading the journal.

Eigen factor scores and Article Influence scores are calculated by eigenfactor.org, where they can be freely viewed. The Eigen factor score is intended to measure the importance of a journal to the scientific community, by considering the origin of the incoming citations, and is thought to reflect how frequently an average researcher would access content from that journal. However, the Eigen factor score is influenced by the size of the journal, so that the score doubles when the journal doubles in size (measured as number of published articles per year). The Article Influence score measures the average influence of articles in the journal, and is therefore comparable to the traditional impact factor.

The Eigen factor approach is thought to be more robust than the impact factor metric, which purely counts incoming citations without considering the significance of those citations. While the Eigen factor score is correlated with total citation count for medical journals, these metrics provide significantly different information. For a given number of citations, citations from more significant journals will result in a higher Eigen factor score.

Originally Eigenfactor scores were measures of a journal's importance; it has been extended to author-level. It can also be used in combination with the *h*-index to evaluate the work of individual scientists.

**i10-INDEX**

Created by Google Scholar and used in Google's My Citations feature.

i10-Index = the number of publications with at least 10 citations.

This very simple measure is only used by Google Scholar, and is another way to help gauge the productivity of a scholar.

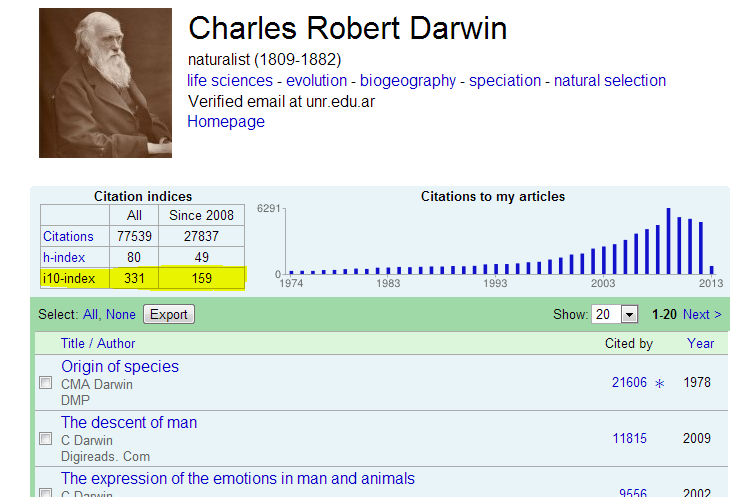
**Advantages of i10-Index**

* Very simple and straightforward to calculate
* My Citations in Google Scholar is free and easy to use

**Disadvantages of i10-Index**

* Used only in Google Scholar

Here is a screenshot of a Google Scholar My Citations page for Charles Darwin (you can see the i10-Index highlighted in the small table):



**MAJOR JOURNAL SEARCH ENGINES**

Academic search engines have become the number one resource to turn to in order to find research papers and other scholarly sources. While classic academic databases like **Web of Science** and **Scopus** are locked behind pay walls, Google Scholar and others can be accessed free of charge. In order to help you get your research done fast, we have compiled the top list of academic search engines.

**1. Google Scholar**

Google Scholar is the clear number one when it comes to academic search engines. It's the power of Google searches applied to research papers and patents. It not only let's you find research papers for all academic disciplines for free, but also often provides links to full text PDF file.

* Coverage: approx. 200 million articles
* Abstracts: only a snippet of the abstract is available
* Related articles: ✔
* References: ✔
* Cited by: ✔
* Links to full text: ✔
* Export formats: APA, MLA, Chicago, Harvard, Vancouver, RIS, BibTeX

Google Scholar: fast, free and contains millions of research papers

**2. Microsoft Academic**

It's Microsoft answer to Google Scholar. **Microsoft Academic** takes a different approach and generates for each paper that is indexed an overview page that allows to easily explore top citing articles and references of the article.

* Coverage: approx. 210 million articles
* Abstracts: ✔
* Related articles: ✔
* References: ✔
* Cited by: ✔
* Links to full text: ✔
* Export formats: APA, MLA, BibTeX

Microsoft Academic: the 2018 update comes with brand new design and functionality

**3. BASE**

**BASE** is hosted at Bielefeld University in Germany and that's where it name stems from (**B**ielefeld **A**cademic **S**earch **E**ngine).

* Coverage: approx. 136 million articles (contains duplicates)
* Abstracts: ✔
* Related articles: ✘
* References: ✘
* Cited by: ✘
* Links to full text: ✔
* Export formats: RIS, BibTeX

BASE: combines the entries from thousands of institutional repositories in one place

**4. CORE**

CORE is an academic search engine dedicated to open access research papers. For each search result a link to the full text PDF or full text web page is provided.

* Coverage: approx. 136 million articles
* Abstracts: ✔
* Related articles: ✔
* References: ✘
* Cited by: ✘
* Links to full text: ✔ (all articles in CORE are open access)
* Export formats: BibTeX

CORE: the best is that all those 135+ million papers can be accessed for free

**5. Science.gov**

Science.gov is a fantastic resource as it bundles and offers free access to search results from more than 15 U.S. federal agencies. There is no need any more to query all those resources separately!

* Coverage: approx. 200 million articles and reports
* Abstracts: ✔
* Related articles: ✘
* References: ✘
* Cited by: ✘
* Links to full text: ✔ (available for some databases)
* Export formats: APA, MLA, RIS, BibTeX (available for some databases)

**6. Semantic Scholar**

Semantic Scholar is the new academic search engine on the internet. It's mission is to provide more relevant and impactful search results using AI powered algorithms that find hidden connections and links between research topics.

* Coverage: approx. 40 million articles
* Abstracts: ✔
* Related articles: ✔
* References: ✔
* Cited by: ✔
* Links to full text: ✔
* Export formats: APA, MLA, Chicago, BibTeX

Semantic Scholar: AI-powered paper search to find you the one you are looking for

**COPYRIGHT ACT**

**Copyright**

Indian copyright law is at parity with the international standards as contained in TRIPS. The (Indian) Copyright Act, 1957, pursuant to the amendments in 1999, 2002 and 2012, fully reflects the Berne Convention for Protection of Literary and Artistic Works, 1886 and the Universal Copyrights Convention, to which India is a party. India is also a party to the Geneva Convention for the Protection of Rights of Producers of Phonograms and is an active member of the World Intellectual Property Organization (WIPO) and United Nations Educational, Scientific and Cultural Organization (UNESCO).

**"Work" protected in India**

Under the Copyright Act, 1957 the term "work" includes an artistic work comprising of a painting, a sculpture, a drawing (including a diagram, a map, a chart or plan), an engraving, a photograph, a work of architecture or artistic craftsmanship, dramatic work, literary work (including computer programmes, tables, compilations and computer databases), musical work (including music as well as graphical notations), sound recording and cinematographic film.

In order to keep pace with the global requirement of harmonization, the Copyright Act, 1957 has brought the copyright law in India in line with the developments in the information technology industry, whether it is in the field of satellite broadcasting or computer software or digital technology. The amended law has also made provisions to protect performer's rights as envisaged in the Rome Convention.

**Registration of Copyright**

In India, the registration of copyright is not mandatory as the registration is treated as mere record of a fact. The registration does not create or confer any new right and is not a prerequisite for initiating action against infringement. The view has been upheld by the Indian courts in a catena of judgments.

**Need for Registration of Copyright**

The awareness of Intellectual Property (IP) Laws is considerably low among the enforcement authorities in India, and most of the IP litigation is confined to metropolitan cities. Despite the fact that the registration of copyright is not mandatory in India and is protectable through the International Copyright Order, 1999, it is advisable to register the copyright as the copyright registration certificate is accepted as a "proof of ownership" in courts and by police authorities, and acted upon smoothly by them.

**Enforcement of Copyright in India**

The law of copyright in India not only provides for civil remedies in the form of permanent injunction, damages or accounts of profits, delivery of the infringing material for destruction and cost of the legal proceedings. etc. but also makes instances of infringement of copyright, a cognizable offence punishable with imprisonment for a term which shall not be less than six months but which may extend to three years with a fine which shall not be less than Rs 50,000 (approx. US$ 800) but may extend to Rs 2,00,000 (approx. US$ 3,000). For the second and subsequent offences, there are provisions for enhanced fine and punishment under the Copyright Act. The (Indian) Copyright Act, 1957 gives power to the police authorities to register the Complaint (First Information Report, ie, FIR) and act on its own to arrest the accused, search the premises of the accused and seize the infringing material without any intervention of the court.

**Protection to Foreign Works in India**

Copyright of "works" of foreign nationals, whose countries are member of Convention Countries to which India is a signatory, are protected against any infringement of their "works" in India through the International Copyright Order, 1999. The Indian courts have also been pro-active for the protection of copyright of foreign authors/owners, which includes software, motion pictures including screen play of motion pictures and database.

The Government of India is also taking initiative to combat piracy in the software industry, motion pictures and the music industry along with players in the industry through their associations and organizations like NASSCOM (National Association of Software and Service Companies), NIAPC (National Initiative Against Piracy and Counterfeiting) etc.

**Licensing and Assignment of Copyright**

Copyright in any work, present or future, can only be assigned or licensed in writing by the copyright owner or his duly authorised agent.

**Duration/Term of Copyright**

In the case of original literary, dramatic, musical and artistic works, the duration of copyright is the lifetime of the author or artist, and 60 years counted from the year following the death of the author.

In the case of cinematograph films, sound recordings, posthumous publications, anonymous and pseudonymous publications, works of government and works of international organisations are protected for a period of 60 years which is counted from the year following the date of publication.