Citation indexes and impact factors
Lecture 23 September 2014
Maria Johnsson

SCIENTIFIC INFORMATION MANAGEMENT, SPRING 2014, LTH
Agenda

1. Citation analysis – a short introduction
2. Citation indexes
3. Impact factors
4. Examples of databases/sources with citation data:
   – Web of Science
   – Scopus
   – Google Scholar
Citation analysis

Who is citing my articles? How many times have I been cited? (Professor)

How do I know if this article is important? (Student)

Which journal should I publish in for my tenure? (Researcher)

What are the best journals in the field of Anthropology? (PhD student)
Citation analysis

Some historical background

• **1873**, "Shepard’s Citations" was the first citation system, created by Frank Shepard (law)

• **1960**, Eugene Garfield’s Institute for Scientific Information (ISI) introduced the first citation index for papers published in academic journals called "Science Citation Index (SCI)"

• **During the 1970s and 1980s** "Science Citation Index" developed from print to digital form

• **1997**, ISI launched "Web of Science", the web-based interface of "Science Citation Index"
Reasons for performing a citation search

• Find the *original work* on which an idea or research is based

• Find *reactions* to a research work

• Find authors working in a *similar* research field

*Source: Rumsey, How to find information: A guide for researchers, 2008*
Reasons for performing a citation search

• Follow up *further developments* in the research field

• *Map trends* in the research field

• Find the *impact of one author’s work* on others’ work

• Find the *influence of research on innovation*, particularly on when searching citations in a patent

*Source: Rumsey, How to find information: A guide for researchers, 2008*
Citation index

Definition of citation index:

”A citation index is a kind of bibliographic database, an index of citations between publications, allowing the user to easily establish which later documents cite which earlier documents”.

Journal impact factor

• The journal impact factor (JIF) of an academic journal is a measure reflecting the average number of citations to recent articles published in the journal. It is frequently used as a proxy for the relative importance of a journal within its field, with journals with higher impact factors deemed to be more important than those with lower ones.

• The impact factor was devised by Eugene Garfield, the founder of the Institute for Scientific Information.

• Impact factors are calculated yearly starting from 1975 for those journals that are indexed in the Journal Citation Reports.
Journal impact factor

- In a given JCR year (e.g. 2010), the impact factor of a journal is the average number of citations to those papers that were published during the two preceding years (2008 & 2009)

Number of citations in 2010

Publications from 2008-2009
Alternative journal metrics

- **SJR – SCImago Journal Rank**
  The SJR indicator is a free journal metric, based on an algorithm similar to PageRank. Used in the database "Scopus".

- **SNIP – Source Normalized Impact Per Paper**
  Created by Henk Moed, University of Leiden. Measures contextual citations impact by weighting citations based on the total number of citations in a subject field. Used in the database "Scopus".

- **Eigenfactor score**
  Created by Jevin West and Carl Bergstrom at the University of Washington. Eigenfactor scores are calculated by http://eigenfactor.org. The Eigenfactor 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.
Databases/sources with citation data

**Web of Science**
- Database which indexes 12,000 journals
- Selection according to ISI quality criteria, e.g. Journal impact factor
- Anglo-American dominance
- Varying coverage depending on research field:
  - Very good coverage of science and medicine
  - Medium/good coverage of engineering
  - Less coverage of social science and humanities

**Scopus**
- 20,000 peer reviewed journals, citation data from 1996

**Google Scholar**
- Broader in coverage but also includes publications which aren’t strictly scientific
- Less reliable citation data
Some search examples

1. Bo Mathiasson – AUTHOR
   Professor at Dep of Biotechnology

2. “Detection of duplicate defect reports using Natural Language Processing” – ARTICLE TITLE
   By Per Runeson, Professor at Dep of Computer Science

3. Journal of Biomechanics – JOURNAL TITLE
# Comparison search examples

<table>
<thead>
<tr>
<th>Search term</th>
<th>Web of Science</th>
<th>Scopus</th>
<th>Google Scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bo Mattiasson – AUTHOR</strong></td>
<td>850</td>
<td>718</td>
<td>984</td>
</tr>
<tr>
<td>- Number of articles</td>
<td>17476</td>
<td>14709</td>
<td>-</td>
</tr>
<tr>
<td>- Total number of citations</td>
<td>11323</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- Number of citing articles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>“Detection of duplicate defect reports using Natural Language Processing” – ARTICLE TITLE</strong></td>
<td>51</td>
<td>102</td>
<td>211</td>
</tr>
<tr>
<td>- Total number of citations</td>
<td>19</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>- Number of citing articles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Journal of Biomechanics – JOURNAL TITLE</strong></td>
<td>~28,000 hits</td>
<td>~11,000 hits</td>
<td>~21,000 hits</td>
</tr>
</tbody>
</table>

/Example from 2 September 2014
Reasons for performing a citation search in this course

To gain a sense of the **general context** when reading a particular research article (RA), including:

- the importance of the publishing journal for the field/a subfield
- the interest of the reported research for other researchers in the field/a subfield
- the type of research typically carried out by the author(s) of the RA
- the current and long-term status of the RA author(s)
Thanks!

Maria Johnsson, LTH libraries
maria.johnsson@bibliotek.lth.se
Tel: 046-222 34 28