Filtering journal impact factor rank by specific parameters

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ABSTRACT

This paper reports the development of a bot to filter the journal impact factor rank by specific parameters such as papers published in a specific area during a specific period. The filter is done by an automatic search on Scopus and results are processed to ensure high accuracy and reliability.

Introduction

The journal impact factor (JIF) is an important metric parameter to evaluate scientific journals influence, published yearly in the Journal Citation Reports (JCR), hence it is commonly used by researchers to filter and rank journals in specific areas. However, filtering journals of the JCR rank for specific criteria may be, sometimes, complicated. In this paper I describe how did I develop a bot, under demand, to filter all the journals which have at least one published review in Social Science subject area, from 2006 to current date. The filtered journals were further analyzed one by one to study recent scientific production in the field of Social Sciences [Torres et al., in press].

Due to interdisciplinary, it is not uncommon for Journals to publish articles correlated with fields other than its main subject area, which brings to an important discussion about how to evaluate interdisciplinary in journals [Leydesdorff and Rafols, 2011]. A consequently relevant problem when searching for articles is that, by applying a filter of journal subject area, one may be undesirably neglecting important papers published as exceptions in journals of different areas. To work around this problem, some research tools, as Elsevier’s Scopus¹, allow us to classify articles by its own subject area and not by the journal subject area. Beyond that, Scopus search tool compiles this information, displaying the number of articles published in a journal inside each specific area. A search by Ca-A Cancer Journal for Clinicians as source title reviews more than 2 thousand articles all at the same area of Medicine, while a search for Science and Nature reviews articles in 10 different areas including Agricultural and Biological Sciences, Social Sciences, Earth and Planetary Sciences and Medicine. The Scopus, however, does not classify journals by the impact factor (IF), but by a new metric rival, the Elsevier’s CiteScore [Zijlstra and McCullough, 2016, Van Noorden, 2016, Teixeira da Silva and Memon, 2017] or others metrics such the Source Normalized Impact per Paper (SNIP), which has both strengths and limitations [Moed, 2010], and the SCImago Journal Rank (SJR) [Falagas et al., 2008].

In order to obtain the journals with the highest IF, which have published articles in a specific subject area, one may search in Scopus for each journal of the JCR impact factor rank. A hard work that can be much more rapidly executed by a bot.

1 Methods

The bot was developed in Python in order to check in Scopus every journal from the JIF rank. Since Scopus webpage uses JavaScript to render the required information, it was necessary to use an automated test software to control a web browser. To do that I opted to use the ChromeDriver controlled by selenium webdriver.

The unrestricted access to Scopus was guaranteed by the VPN network from Sao Paulo University (USP). To speed up the process, the Scopus search was done by directly filling the search parameters (periodic name and date restrictions) in the Scopus search URL. However some care had to be taken to ensure reliability.

1.1 Scopus search

During the Scopus search procedure the bot may look for the journal name as source title and verify if there is at least one document in the Social Science subject area. Since we are dealing with an automatized processes, we have to be sure that all the documents Scopus may find are from the desired journal. Thus, to avoid contamination of data from other journals with similar
names, the search must be limited to the exact source title, although this restriction increases the probability of a journal to not be found. A series of more complex procedures was done to re-search journals that have not been initially found, increasing the search success with no loss of reliability.

The search steps are illustrated on figure 1, which represents the main steps and decision flow during the bot searching for each of the journals. All processes are explained in details in the followings.

1. **Retrieving the journal name from the JIF rank**: the journal names was taken from a CSV file exported from the 2017 JCR and accessed via pandas library.

2. **Adjusting journal name**: Scopus do not accept non-alphanumeric characters on journal names. It uses ‘and’ instead of ‘&’ and empty spaces instead of hyphens and slashes.

**Figure 1.** Flowchart diagram representation of the principal operation processes of the bot search algorithm for one journal name.
3. **Creating the URL for exact source name search:** during the first search attempt search was restricted to the exact source title. I initially tried to include `s=EXACTSRCTITLE(Journal+Name)` at the search URL. At this point Scopus search webpage is not case sensitive. The time restriction to articles from 2006 to current time can be easily incorporated by concatenating `+AND+PUBYEAR++2005` at the end of previous URL code. The example below describe the whole URL that may be added to the Scopus results page in order to search for documents on the journal “Energy & Environmental Science” as exact source title, from 2006 to current time:

```
results.uri?src=s&sot=a&s=EXACTSRCTITLE(energy+and+environmental+science)+AND+PUBYEAR++2005
```

When verifying the results, one can observe that the exact source title was not enough to restrict results to one only source title, thus requiring a more complex search. The found solution was limiting the search to the exact source title, done by including the term `cluster=scoexactsrctitle,"Journal+Name",t`. Despite this seems to be a clean and simple solution, it brings a complex problem to the search due to the fact that the scopus limit restriction is case sensitive and JCR doesn’t follow any rule to discriminate the use of capital or small letters in the JIF rank. The use of Python `.title()` string method solve this problem in most of cases, as in the example of “Energy & Environmental Science”, with the URL:

```
results.uri?src=s&sot=a&s=EXACTSRCTITLE(energy+and+environmental+science)+AND+PUBYEAR++2005&cluster=scoexactsrctitle,"Energy+And+Environmental+Science",t
```

However, this solution fails for cases as the JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, for which the name JAMA should be maintained with all uppercase letters, just as in the following URL:

```
results.uri?src=s&sot=a&s=EXACTSRCTITLE(jama+journal+of+the+american+medical+association)+AND+PUBYEAR++2005&cluster=scoexactsrctitle,"JAMA+Journal+Of+The+American+Medical+Association",t
```

Because the possibility of not finding a journal due to case sensitivity, a second search attempt was made without limiting the results to exact source title. However, the analysis of these results demands special procedures to insure data reliability.

4. **Checking for subject area indexing:** in the case that the search is well succeed (independent if we can guarantee or not, that all found documents were published in in the same journal) it is necessary to verify if there are any documents indexed as from the Social Science subject area. This was done by verifying the text in all html span elements with class equals to “btnText”, which are child from the html unordered list element with id equals to “cluster_SUBJAREA”.

If no document is indexed as from Social Science, the journal can be excluded and a new search, for the next journal, starts. By the other hand, if there is Social Science documents, depending on if it is the first or the second search attempt the journal is direct included at the output list, or double checked by the special procedures.

5. **Special procedures:** special procedures are applied only for journals wich can cointain documents from Social Science. They are applied with the objective of verifying if a sort of documents from a specific search are from the desired journal or from another one, with a similar name.

5.1. **Checking for source title:** the first procedure is to verify if, when searching for documents from a specific journal, the resulting documents are all from the same journal, or from more than one. If they come all from the same source, then the journal does contain documents indexed as from Social Science. If not, we have to verify all source titles.

The source titles can be extracted from the html in a similar way of the subject area.

5.2. **Comparing journal names with source title list:** in case of multiple sources for the search result documents each source title was compared with the researched journal name. If the intersection between the words from the source title and the words from the researched journal name were more than 75% of the words from both names, than it was considered a match (even though the intersection between Nature Materials and Nature contains 100% of the words from Nature, it contains only 50% from Nature Materials, thus it is not considered a match). The comparison is done using only small letters to avoid case-sensitivity. If a match is found a third search is preformed using the source title exact as it was in Scopus source title list. This search away returns a result which can contains or not documents indexed as from Social Science.

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2 Browsers do not differentiate the plus sign from %20 or empty spaces
1.2 Output list
The output list consists on a csv file containing the rank position, the journal title as in JRC JIF rank, the JIF and the search result status from all not excluded journals.

Excluded journals are the journals which certainly don’t have documents indexed as from Social Science. The search result status is “Not Found” for journals which were not found after the second attempt; “Ok” for all journals that certainly do have documents from Social Science; “Unsure” for journals whose name didn’t match with names from the source title list (item 5.2. from procedures list, section 1.1); and “Probably Ok” or “Probably False”, added from the searched source title, for journals that have or haven’t passed the subject area test after the third search.

2 Results
The bot was developed to order to filter the most relevant journals which have published articles in the Social Science subject Area. It analyzed more than 1000 journals from the JIF rank obtained from the 2017 JCR looking for then on Scopus. The bot filtered 85 journals from which 45 certainly have documents from Social Science, 6 were marked to be manually verified and 34 were not found. The most common reason to not find a journal was the differences in the name of the journal in Scopus and the JCR rank.

Despite the high number of not found journals compared with the number of filtered journals it is very small compared with the number of analyzed journals. As result the bot reduced the number of journals which had to be manually checked from more than one thousand, which would be take day to be done by one human, to 40.

To verify the bot accuracy, all found journals were checked manually and all journals marked as “ok” really had papers in Social Science. The same amount of journals were randomly selected from the rejected journals and none of then had papers published on Social Science.

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