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ScienceDirect

IERI Procedia 10 (2014) 57 – 62

Procedia IERI

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`2014 International Conference on Future Information Engineering

Ranking of Journals in Science and Technology Domain: a Novel and Computationally Lightweight Approach

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Abstract

In this paper, a regression analysis based method is proposed to calculate the Journal Influence Score. This Influence Score is used to measure the scientific influence of scholarly journals. Journal Influence Score is calculated by using various factors in a weighted manner. The Score is then compared with the SCImago Journal Score. The results show that the error is small between the existing and proposed methods, proving that the model is a feasible and effective way of calculating scientific impact of journals.

Selection and peer review under responsibility of Information Engineering Research Institute

Keywords: Multiple linear regression, scientific journal, Journal influence score, SCImago journal score, Quartile matching

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doi:10.1016/j.ieri.2014.09.091

Introduction

Ranking of journals has been one of the core and frequent topics of recent research due to academic reward system. Many ranking methods have been undertaken by organizations using different parameters and we propose an alternate algorithmic method for ranking of journals using "multiple linear regression model". We then compare our approach with the SCImago approach of journal ranking and find the match of the samples that lie in the same quarter.

Journal citation report (JCR) draws its data from Web of Science and is mainly based on citations and impact factor. But now in addition to that there is Scopus SJR, Google Scholar etc. Both use different methods for evaluation of journals [1]. A Journal is a central object in library science as well as bibliometrics and its visibility through impact is a major concern [2].

It is quite possible that a non-international journal may publish very advanced and innovative research [3]. Buela-Casal [4] concludes that a combination of suitably weighted criteria is the only way to quantify the degree of internationality. Our definition of "internationality" is based on the influence of a journal. We define and measure an "influence score" based on several scholastic parameters and the journals are ranked based on their calculated influence scores.

Different organizations use different parameters such as impact factor, citations, self-citations, percentage international collaboration, cites per doc etc. to estimate rank of journals. However there is not much correlation among different journal ranking methods. For calculation of impact factor/journal influence score, JCR uses citations of two preceding years where as Scimago uses the citations of past three years. Most of the journal ranking approaches are based on single measure of either citations or perceptions. If better results are obtained, one should combine these approaches for the ranking process. There is no guarantee that a top journal is a leading journal and hence application of multi-item measures is required for ranking of journals [5].Gaby Haddow and Paul Genoni [6], performed citation analysis of Australian Social Science journals and found that Scopus database provides higher citations for many of the journals.

The lack of a standard classification scheme used for the journals indexed in WoS and Scopus makes it difficult to compare the performance of all journal titles covered by both databases as the indices used to rank journals are different.

Nomenclature

SJR	SCImago Journal Rank	;	JCR	Journal Citation Report

1. Related Work

The Scimago Journal Rank (SJR) involves transfer of "prestige" (impact) from one journal to another. This is executed through the references journals share. The final prestige of a journal is computed iteratively, where the prestige in stage 'i' of a journal depends on the prestige of journal set in stage 'i-1'.

$$SJR_i = \frac{(1-d-e)}{N} + e.\frac{Art_i}{\sum_{j=1}^{N} Art_j} + d.\sum_{j=1}^{N} \frac{C_{ji}.SJR_j}{C_j}.\frac{1-\left(\sum_{k\in\{Dangling-nodes\}} SJR_k\right)}{\sum_{h=1}^{N}\sum_{k=1}^{N}\frac{C_{kh}SJR_k}{C_k}} + d.\left[\sum_{k\in\{Dangling-nodes\}} SJR_k\right].\frac{Art_i}{\sum_{j=1}^{N} Art_j} \quad (1)$$

$$\mathrm{SJRQ_i} = \frac{\mathrm{SJR_i}}{\mathrm{Art_i}} \quad (2)$$