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Academic Domain Importance: Judgment of Literature Resource Citations Using Index Analysis

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This paper briefly introduces the citation indexes used to measure the academic influence of researchers. These are the H index, G index, G_m index, and Y index. Then, taking 20 graduate tutors of Jinan University as subjects, the papers published by these 20 tutors by June 1, 2024were collected from China National Knowledge Infrastructure for acase analysis of academic influence. The results showed that there was a significant correlation between H index and G index and between G_m index and Y index, which can indicate the academic influence of researchers, and the academic influence ranking of tutors that changed under different citation indexes. According to these changes, the academic influence of tutors can be analyzed more comprehensively.

Keywords: academic influence, literature citation, citation index, ranking

1. INTRODUCTION

In the field of academic research, citations of literature resources is an important yardstick for measuring the influence and academic value of scientific research results (Wang et al., 2022). With the continuous deepening and expansion of scientific research, how to accurately and objectively evaluate the academic contributions of academic papers, journals, and even researchers has become an urgent problem to be solved (Wang et al., 2022). Against this background, various citation indexes and analysis methods have emerged, providing quantitative evaluation tools for the academic community. For researchers in the academic community, various citation indexes can provide an indication of the influence of the researcher's academic papers or journals in the academic community (Wren & Georgescu, 2022). A higher citation index means that the researcher's research results have higher academic value and greater recognition in related fields, which can provide important references for scientific research evaluation, professional title reviews, academic awards, and other aspects. Han et al. (2022) proposed a new method for evaluating the academic influence of authors. The empirical analysis results showed that this algorithm could effectively distinguish the ranking of author influence,and the evaluation results were more objective and reliable. Hutchins et al. (2016) quantified the influence of research articles by using their co-citation networks to field-normalize the number of citations. Zheng et al. (2021) proposed a new index for evaluating the academic influence of authors. This current paper briefly explains the citation index used to measure the academic influence of researchers, and then conducts a case analysis of 20 graduate supervisors in Jinan University.

2. INDEX ANALYSIS OF LITERATURE RESOURCE CITATIONS

The citation index, also known as the impact factor or H index, is an important measure of the academic impact of

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an academic paper or journal. These indicators are usually constructed based on the number of citations of literature by other scholars, reflecting the degree of recognition of research results in the academic community (Zhao & Sun, 2018). Some citation indexes are intended for journal papers; for instance, the impact factor indicates the average citation frequency of published papers over a certain period of time. Some indexes, such as the H index, are aimed at individual researchers. The index indicates that n papers published by researchers have been cited at least n times, which is an important standard against which to evaluate the sustainable and stable output of scholars. This current paper determines the citation index of individual researchers (Li et al., 2022), so as to analyze the degree of academic influence of researchers and make more accurate academic evaluation and professional title review.

The H index is a commonly-used citation index (Wang et al., 2019). Its specific definition is: if a researcher publishes a total of p papers, the least number of citations in h papers is h, and the number of citations of the remaining $p - h$ papers are all less than h, h is the H index. The calculation of the H index is as follows.

① The papers published by the researcher are ranked in descending order of citations and assignedwith serial numbers "1, 2, 3, . . . n".

② The papers are traversed in order, and the serial number of each paper is compared with the number of citations during the traversal (Xie et al., 2022).

③ If the serial number is smaller than the number of citations, then traversing continues; otherwise, traversing is terminated and the serial number is reduced by one to obtain the H index.

The advantage of the H index is that it can comprehensively consider the quantity and quality of papers published by researchers, but the disadvantage is that it is difficult to ascertain the academic level of researchers at the beginning of their career or of those who have published fewer papers (Li & Weng, 2021). In addition to the H index, there is also a G index. After papers published by a researcher are ranked in descending order, the cumulative number of citations of the previous g papers is less than g^2 times, g is called G index. Its calculation process is as follows.

① The papers published by the researcher are also ranked in descending order according to the number of citations and assigned the serial numbers "1, 2, 3, . . . n".

② The papers are traversed according to the ranking order. The cumulative number of citations of the paper with the corresponding serial number is calculated during the traversing process and is compared with the square of the corresponding serial number (Mcburney & Kubas, 2022).

③ If the cumulative number of citations of the paper is not less than the square of the corresponding serial number, then traversing continues; otherwise, traversing is terminated and the corresponding serial number is reduced by one to obtain the G index.

It can be seen from the algorithm that the G index supplements the H index. On the one hand, it makes up for the shortcoming of the H index, which does not consider the papers with a high number of citations; on the other hand, similar to the H index, it focuses more on the evaluation of the long-term accumulated results of academic papers of researchers.

In order to analyze the academic influence of researchers more comprehensively and objectively, in addition to the above two indexes, this paper also includes the G_m index and the Y index. The former evaluates the academic influence of researchers according to the dispersion of citation times of their published literature (Westley et al., 2024). The latter combines the average number of citations, which indicates the citation average of a researcher's papers, with the dispersion of citations, which reflects the balanced citations of papers. The corresponding formulas are:

$$\begin{cases} G_m = \bar{C}^{\omega}(1 - Gi)^{1-\omega} \\ Gi = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n\sum_{i=1}^{n} x_i} \end{cases}, \tag{1}$$

where $\bar{C}$ is the average number of citations of papers published by a researcher over a certain period of time, Gi is the Gini coefficient of the number of citations of papers published by the researcher, which indicates the degree of dispersion of the number of citations, x_i and x_j are the number of citations of the i-th and j-th papers published by the researcher within the period, n is the total number of papers published by the researcher during that period, and ω is the weight.

Compared with the above indexes, the Y index measures the academic influence of researchers from aspects of academic productivity and academic participation. The former indicates the efficiency of researchers' paper production, and the latter indicates the researcher's contribution to the paper. Generally speaking, the higher the researcher's academic productivity, the more papers are produced, and the easier they are to be selected and cited by other scholars. The higher the academic participation, the more contributions the researcher makes (Moffatt et al., 2022; Zhang, 2023), and the more influence the paper will have after being cited by other scholars. The Y index shows a researcher's academic influence in the form of polar coordinates, expressed as:

$$\begin{cases} \rho = FP + SP \\ \theta = \tan^{-1}\left(\frac{SP}{FP}\right) \end{cases}, \tag{2}$$

where ρ is the polar radius of academic productivity, θ is the polar angle of academic participation, FP is the number of papers published by the researcher as the first author, and SP is the number of papers published by the researcher as the second author.

3. ANALYSIS OF EXPERIMENTS

3.1 Data Sources

Twenty graduate tutors from Jinan University were selected as subjects, and their papers published by June 1, 2024

Table 1 Part of the tutor's paper publication data.

Serial number	Number of published papers/n	Total number of citations	Average number of citations	Number of papers published by the researcher as the first author/n	Number of papers published by the researcher as the second author/n	H index
C01	301	2,258	7.5	47	115	87
C02	287	1,808	6.3	87	157	77
C03	243	1,385	5.7	125	58	76
C04	125	600	4.8	25	41	76
C05	113	1,006	8.9	57	32	72
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Table 2 Results of correlation analysis.

	Number of published papers	Total number of citations	Average number of citations	H index	G index	$G_m$index	ρ in Y index	θ in Y index
Number of published papers	1							
Total number of citations	0.458	1						
Average number of citations	0.215 *	0.211 *	1					
H index	0.621	0.528 * *	0.465 *	1				
G index	0.523	0.457 *	0.478 *	0.568 * *	1			
G_m index	0.359	0.327	0.422 *	0.427 *	0.542 *	1		
ρin$Y$index	0.369 * *	0.423	0.587	0.498 *	0.456 *	0.587 *	1	
θ in$Y$ index	0.426 *	0.486	0.549	0.447 *	0.489 *	0.546 *	0.321 *	1

Note: * indicates that the P value is less than 5%, ** indicates that the P value is less than 1%.

were collected from China National Knowledge Infrastructure (CNKI). The conclusion of the computational analysis pertained only to the influence in China. In order to avoid analytical bias and to protect the tutors'privacy, numbers were used instead of the tutors' real names. Some of the data are shown in Table 1. The H index is a built-in index in CNKI.

3.2 Analysis Methods

When analyzing the academic influence of graduate tutors, firstly, the G, G_m, and Y indexes were calculated according to the aforementioned method. The H index was provided by CNKI. Then, the Pearson correlation coefficient method (Yang & Zhu, 2022; Zhao et al., 2019)was used to analyze the number of published papers, total number of citations, average number of citations, H index, G index, G_m index, and Y index. Finally, the tutors were ranked according to the above indexes, and their academic influence was determined(Du & Ding, 2026; Peng et al., 2020).

3.3 Analysis of Results

After the relevant literature citation indicators were calculated as described above, the Pearson correlation coefficient method was used to conduct a correlation analysis of these indicators to verify that they can accurately indicate the academic influence of researchers. As can be seen from Table 2, although the correlation between the H index and the number of published papers was not significant, its correlation with the total number of citations, the average number of citations, and the G, G_m, and Y indexes was significant. The correlation between the G index and the number of published papers was not significant, but the G index was significantly correlated with the total number of citations, average number of citations, H, G_m, and Y indexes. Although the correlation of theG_m index with the number of published papers and the total number of citations was not significant, its correlation with the average number of citations and the H, G, and Y indexes was significant. The correlation of ρ and θ in the Y index with the total number of citations and the average number of citations was not significant, but their correlations with the total number of citations and the H, G, and G_m indexes were significant. Among the above indexes, the H index is an index commonly used to measure the academic influence of scholars' published papers; therefore, it was taken as the benchmark academic influence measurement index in this paper. It can be seen that the correlation between the H index and the G, G_m, and Y indexes was significant, indicating the academic influence of researchers.

After verifying the indicators related to academic influence, the academic influence of the tutors was ranked based on these indicators. As can be seen from the data in Table 3,

Table 3 Ranking of tutors under different indicators of academic influence.

Serial number	H	Ranking	G	Ranking	G_m	Ranking	ρ	Ranking	θ	Ranking
C01	87	1	124	1	1.38	3	84	14	0.74	12
C02	77	2	102	4	1.33	4	188	3	0.66	13
C03	76	3	106	3	1.11	7	217	1	0.91	9
C04	76	4	115	2	1.18	6	84	15	0.2	18
C05	72	5	94	8	0.15	19	130	8	1.22	3
C06	71	6	102	5	0.6	13	41	20	1.43	1
C07	70	7	90	10	1.21	5	114	11	0.43	16
C08	68	8	95	7	0.68	12	122	10	0.87	11
C09	67	9	90	11	0.9	8	190	2	1.05	8
C10	65	10	97	6	0.29	16	148	6	1.17	5
C11	55	11	92	9	0.15	20	75	17	1.33	2
C12	55	12	83	13	1.42	2	78	16	0.31	17
C13	50	13	85	12	0.76	11	129	9	0.89	10
C14	39	14	67	15	0.47	15	150	5	0.64	14
C15	34	15	59	16	0.49	14	54	19	1.17	7
C16	29	16	69	14	0.19	18	105	12	0.13	20
C17	23	17	51	17	0.77	10	68	18	1.18	4
C18	23	18	45	19	0.26	17	138	7	0.13	19
C19	21	19	43	20	1.47	1	87	13	1.17	6
C20	17	20	46	18	0.85	9	163	4	0.61	15

the ranking of tutors' academic influence changed according to the different citation indexes. The reason is that different citation indexes measure academic influence from different angles. Therefore, when analyzing the academic influence of tutors, it is necessary to comprehensively consider multiple citation indexes. Taking tutor number C02 as an example, the corresponding ranking under the H index was 2, the ranking under the G andG_m indexes was 4, the ranking under ρ in the Y index was 3, and the ranking under θ in the Y index was 13. These rankings indicated the academic influence of tutor C02. Among the papers published by the tutor, there were relatively few papers with high citation frequency, so the ranking under the G index was lower than that under the H index. The ranking under the G_m index showed that the papers published by the tutor were relatively high in terms of recognition and utilization. The ranking under ρ in the Y index showed that the tutor has produced many papers, but the ranking under θ in the$Y$ index showed that the tutor has contributed few papers. To sum up, it can be seen that although tutor C02 produced many high-quality papers together with other authors, C02 made few contributions; i.e., this tutor has an academic influence, but most of the influence is due to the collaborators.

4. CONCLUSIONS

This paper briefly introduces the citation indexes used to measure the academic influence of researchers: the H index, G index, G_m index, and Y index. Then, taking 20 graduate tutors of Jinan University as subjects, the papers published by these tutors as of June 1, 2024 were collected from the CNKI for a case analysis of academic influence. Firstly, the correlation between different citation indicators was verified, and then the tutors were ranked according to the H, G, G_m, and Y indexes. The correlation analysis results showed that the correlation between the H index and the G index and between the G_m index and the Yindex was significant, indicating the academic influence of the researcher. Under different citation indexes, the ranking of tutors' academic influence changed, and the academic influence could be comprehensively analyzed according to these changes in ranking.

REFERENCES

1. Du, G., Ju X., & Ding, Y. (2026). Identification and Guidance of Intimate Relationships Among Students Based on Reinforcement Learning. *Engineering Intelligent Systems, 34*(1), 129–138, 2026.
2. Han, L., Zang, S., & Zhao, Y. (2022). A method of evaluation index of author's academic influence based on author Citation Network. *2022 14th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC)*, 72–75.
3. Hutchins, B.I., Yuan, X., Anderson, J.M.,& Santangelo, G.M. (2016). Relative Citation Ratio (RCR): A New Metric That Uses Citation Rates to Measure Influence at the Article Level. *Plos Biology*, *14*(9), 1–25.
4. Li, J.Y., Yan, Z.H., Xiang, Z., Gao, C., & Wu, J. (2022). Comparison of evaluation indexes for Gastroenterology and Hepatology journals in different databases. *World Journal of Gastroenterology*, *28*(38), 5648–5657.
5. Li, M., & Weng, P.F. (2021). A Bibliometrics Analysis on Academic Influence of Chinese Journal of Integrated Traditional and Western Medicine. *Chinese Journal of Integrative Medicine*, *27*(2), 148–152.
6. McBurney, J., & Kubas, A. (2022). Limitations to success in academic data reference support. *Journal of Librarianship and Information Science*, *54*(1), 121–131.
7. Moffatt, D.C., Ferry, A.M., Stuart, J.M., Supernaw, J.D., Wright, A.E., Davis, E.D., & Chaanban, M.R. (2022). Trends in Academic Achievement Within Otolaryngology: Does Fellowship Training Impact Research Productivity? *American Journal of Rhinology & Allergy*, *36*(3), 291–296.

8. Peng, H., Yang, S., Liu, Q., Peng, Q., & Li, Q. (2020). Intelligent Indexing Algorithm for the Association Rules of a Multi-LayerDistributed Database. *Engineering Intelligent Systems*, *28*(4), 229–240.
9. Wang, J., Khurshid, K., Jalal, S., Nicolaou, S., White, S.B., Englander, M.J., Salazar, G.M., & Khosa, F. (2019). Influence of Academic Productivity on Gender Disparity in Academic Interventional Radiology. *American Journal of Roentgenology*, *212*(6), 1–7.
10. Wang, J.L., Ma, Y.J., Ma, L., Ma, N., Guo, D.M., & Ma, L.S. (2022). Baishideng's Reference Citation Analysis database announces the first Journal Article Influence Index of 104 core journals and a list of high-quality academic journals in orthopedics. *World Journal of Orthopedics*, *13*(10), 891–902.
11. Wang, J.L., Ma, Y.J., Ma, L., Ma, N., Guo, D.M., & Ma, L.S. (2022). Baishideng's Reference Citation Analysis database announces the first Journal Article Influence Index of 101 core journals and a list of high-quality academic journals in gastroenterology and hepatology. *World Journal of Gastroenterology*, *28*(37), 5383–5394.
12. Westley, M.N., Huang, C.C., Jagsi, R., & McClelland, S. (2024). The Impact of H-Indexin Predicting Academic Radiation Oncology Promotion. *Journal of the National Medical Association*, *116*(4), 457–457.
13. Wren, J.D., & Georgescu, C. (2022). Detecting anomalous referencing patterns in PubMed papers suggestive of author-centric reference list manipulation. *Scientometrics*, *127*(10), 5753–5771.
14. Xie, D.,Wang, B.,Li, Y., & Yang, Y. (2022). Study on the Influence of Cognitive Behavior Intervention on Psychological Stress of Patients with Training Injury. *Foreign Edition: Medicine and Health*, *2022*(2), 175–178.
15. Yang, H., & Zhu, Z. (2022). Analysis of the factors which influence the academic performance of students and regression prediction based on multiple linear regression. *International Journal of Engineering Intelligent Systems*, *30*(5), 399–406.
16. Zhang, Y. (2023). Data Mining: Analysis of The Influence of College Students' Daily Behaviours on Their Academic Performance. *International Journal of Engineering Intelligent Systems*, *31*(6), 423–428.
17. Zhao, F., Zhang, Y., Lu, J., & Shai, O. (2019). Measuring academic influence using heterogeneous author-citation networks. *Scientometrics: An International Journal for All Quantitative Aspects of the Science of Science Policy*, *118*(3), 1119–1140.
18. Zhao, Y., & Sun, S. (2018). Evaluation of sci-tech journals based on big data. *IPPTA: Quarterly Journal of Indian Pulp and Paper Technical Association*, *30*(8), 671–675.
19. Zheng, W., Hou, H., Wu, N.,& Zhao, F. (2021). The application of author's academic influence in expert retrieval. *2021 International Conference on Computer Engineering and Application (ICCEA)*, 481–485.