PRINCIPLED RANKING FOR ACADEMIC JOURNALS

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INTRODUCTION

Academic journals are vital for sharing scholarly research and advancing knowledge. This report examines the current ranking system and proposes modifications based on robust criteria to evaluate journal value. It explores data science techniques like PCA to extract meaningful features and reduce dimensionality for more accurate rankings. Factors such as citation impact, expert insights, and disciplinary relevance are considered to refine the system. Aiming to provide valuable insights on how to better reflect the significance and impact of academic journals. By serving as dynamic platforms for sharing discoveries, journals contribute to the scholarly landscape and facilitate the dissemination of insights to the academic community and beyond.

RESEARCH OBJECTIVE

The study aims to address the **intrinsic flaws of the current ranking system** and provide a **more comprehensive** and **accurate evaluation of academic journals**. Criteria that evaluate both the value and influential power of academic journals will be outlined. Refining the ranking system is aimed to enhance its accuracy and relevance compared to traditional ones.

METHODOLOGY

In the development of new academic journal ranking metrics, a collaborative approach that combined both subjective expertise and objective technique was considered.

- **First Approach - Subjective Expertise:** 1 expert and 2 professional researchers were invited to provide insights on critical factors for journal ranking. Their collective judgment guided the weight allocation to various ranking metrics (including SJR-index, CiteScore, H-index, Cites/Doc. 2y, Total Cites 3y, Refs./Doc.).
  The weighted sum of each journal was calculated and ranked accordingly.

- **Second Approach - Objective Data Science Technique:** Principal Component Analysis **(PCA)** was employed to convert the original data into lower-dimensional space, enhancing comprehensibility and minimising information loss. The PCA score of each journal was computed and ranked accordingly.

- The result rankings will be compared and assessed for their consistency and correlation using a statistical tool - **Kendall's Tau Rank Correlation**.

- Data analysis and computation completed on Python

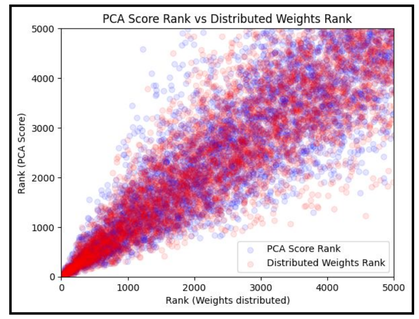
RESULTS

Table 1	
Metric	**Weighting**
SJR-index	0.6
H-index	0.15
CiteScore	0.1
Cites/Doc. in 2 years	0.05
Total Cites in 3 years	0.05
Refs./Doc.	0.05

1. Mean weighting value allocated by 3 professionals (Table 1)

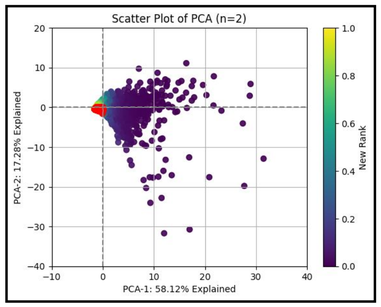
Table 2			
Ranking Metrics	**Original Rank**	**Distributed Weights Rank**	**Rank (PCA)**
Original Rank	/	0.85	0.80
Distributed Weights Rank	0.85	/	0.88
Rank (PCA)	0.80	0.88	/

3. Kendall's Tau Rank Correlation between Ranks (Table 2)



5. Scatter plot for comparing the **PCA Score Rank** and **Experts Distributed Weights Rank** of academic journals

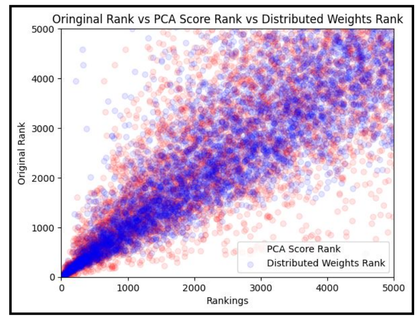
Kendall's Tau Rank correlation coefficient = 0.88



2. Visualisation of PCA-1 and PCA-2

Table 3			
	Journal Titles		
Ranking Metrics	**"Cell"**	**"Science"**	**"Nature"**
Original Rank	4th	38th	12th
Distributed Weights Rank	5th	15th	6th
Rank (PCA)	3rd	4949th	9th

4. Academic Journals Across Different Ranking Metrics (Table 3)



6. Scatter plot for comparing the **PCA Score Rank, Experts Distributed Weights Rank** and **Original Rank** of academic journals

DISCUSSION

The Original Rank, Experts Distributed Weights Rank, and PCA Score Rank showed a strong positive correlation (Kendall's Tau: 0.85, 0.8, and 0.88). These rankings aligned closely, indicating agreement among different methods. Factors considered may vary, but the overall ranking pattern remained consistent. This means that these ranking methods captured similar aspects of the dataset's characteristics while emphasising different aspects at the same time, in which the robustness and convergence were reinforced.
In this academic journal rankings comparative analysis, "Nature" consistently excelled across metrics, reflecting its substantial impact and interdisciplinary nature. "Cell" also maintained a high rank, while "Science" showed diminished influence post-PCA, possibly due to outliers.

CONCLUSION

In summary, this study comprehensively analysed the traditional academic journal ranking system, proposed modifications, and demonstrated statistical techniques to enhance accuracy. These changes address flaws, leading to more precise evaluation of journals and advancing scholarly research and knowledge dissemination.

References and Acknowledgement

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