

Recommendation Systems in Scholarly Publishing

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Abstract

The area of Recommendation Systems has matured after intensive theoretical studies by researchers and practical applications by giant e-commerce enterprises. On the other hand, Scientometrics has become an independent field, focusing in the study of laws and statistics related to scholarly publications. Nowadays, the publishing industry has accumulated big bibliographic data. Thus, the need to provide recommendations when searching in the abundance of bibliographic data has arisen. To this end, several studies have appeared towards providing recommendations for: (a) citations, (b) papers, (c) collaborators, (d) venues, (e) patents, (f) reviewers, (g) topics, and so on. Key approaches for the above cases are presented. Finally, scholarly recommendations systems and issues related to ethics are tackled.

Keywords: Recommenders, Scientometrics

1. Introduction

The term “Recommendation Systems” has been coined in a theoretical study by [Raghavan et al. \(1998\)](#). Since then, a huge research area has been established, not only as a theoretical but also as high tech field due to its use in e-commerce and other applications with big data ([Aggarwal, 2016](#)). It is also important to recall that the “ACM Conference on Recommender Systems (RecSys)” was first organized at Minneapolis in 2007 as an event of two days, whereas its last edition at Singapore in 2023 is a mega-conference with a duration of five days¹. In addition, since 2023 a specialized journal, “ACM Transactions on Recommender Systems”, is being published².

On the other hand, “Scientometrics” is a term coined several decades ago ([Ball, 2021](#)); e.g. the Springer “Scientometrics” journal was founded in 1978³. Scientometrics is the field of study which concerns itself with measuring and analysing scholarly literature. Two scientists are considered as founders of the area. The first is Eugene Garfield (1925-2017), well-known for the definition of Impact Factor, Science Citation Index and the Institute for Scientific Information (now, Clarivate Analytics), whereas the second is Derek J. de Solla Price (1922-1983), well-known for the definition of the Price law, the Price model (aka. preferential attachment), and scale-free networks. On the latter two pillar-notions the fields “Network Science”⁴ and “Science of Science” greatly rely ([Wang and Barabási, 2021](#)).

The literature at the interface between Recommendation Systems and Scholarly Publishing has appeared during the last 10 years, due to the accumulation of big bibliographic

1. <https://dblp.org/db/conf/recsys>

2. <https://dl.acm.org/journal/tors>

3. <https://dblp.org/db/journals/scientometrics>

4. <http://networksciencebook.com>

data by publishing companies. Thus, the need to provide recommendations instead of blind searches in the abundance of bibliographic data has arisen. The most friendly journal for such papers is “Scientometrics”, since during the last 10 years (from 2013 until 16/7/2023) it has published about 40 papers, which include the term “Recommend” and its derivatives in their title, and respond to scholarly queries. During the same period, each of “Informetrics” and “International Journal on Digital Libraries” has published only about 5 papers in related issues. With respect to particular conferences where relevant papers have appeared, we mention the ones related to Digital Libraries (JCDL, ICADL, TPDF), and the ones related to Information Retrieval (SIGIR, ECIR). Sporadic papers appear in ACIIDS, CBI, ICCCI, WISE, and other fora.

In the next, the literature under investigation is categorized with respect to the recommendation item. The first three cases are the most well-honoured:

- *Citation* recommenders play an important role to alleviate the dilemma faced by researchers when they spend a lot of time to select the proper articles for a literature survey (Ali et al., 2021).
- *Paper* recommenders have a similar scope to citation recommenders, but in a broader sense. For example, students or novice researchers need to find suitable articles related to their field of focus (Kreutz and Schenkel, 2022).
- *Collaborator* or *co-author* recommenders learn from researchers’ profiles and provide possible persons, predicting quality and quantity of the anticipated publications (Xi et al., 2022).
- *Venue* (journals, conferences) recommenders may facilitate young researchers as the number of venues has exploded (Michail et al., 2023). In passing, all major publishers offer “journal finder” web tools (Kang et al., 2015).
- *Patent* recommenders are also becoming a necessity due to their ever increasing numbers (Choi et al., 2022).
- *Reviewer* recommenders help in selecting best-fit reviewers to evaluate research papers and proposals, usually with time deadlines (Liu et al., 2022).
- *Topic* recommenders help in efficiently finding promising research topics among a huge number of papers that are worthwhile to explore (Wang et al., 2019).

Several prototype systems have been built to assess assorted aspects of the proposed techniques (Zhang et al., 2023). Finally, FATE issues (fairness, accountability, transparency, and ethics) are also investigated in this framework, along the lines of the greater area or Recommendation Systems (Färber et al., 2023).

References

Charu C. Aggarwal. *Recommender Systems - The Textbook*. Springer, 2016.

- Zafar Ali, Irfan Ullah, Amin Khan, Asim Ullah Jan, and Khan Muhammad. An overview and evaluation of citation recommendation models. *Scientometrics*, 126(5):4083–4119, 2021.
- Rafael Ball. *Handbook Bibliometrics*. Walter de Gruyter, 2021.
- Jaewoong Choi, Jiho Lee, Janghyeok Yoon, Sion Jang, Jaeyoung Kim, and Sungchul Choi. A two-stage deep learning-based system for patent citation recommendation. *Scientometrics*, 127(11):6615–6636, 2022.
- Michael Färber, Melissa Coutinho, and Shuzhou Yuan. Biases in scholarly recommender systems: Impact, prevalence, and mitigation. *Scientometrics*, 128(5):2703–2736, 2023.
- Ning Kang, Marius A. Doornenbal, and Robert J.A. Schijvenaars. Elsevier journal finder: Recommending journals for your paper. In *Proceedings of the 9th ACM Conference on Recommender Systems (RecSys)*, page 261–264, 2015.
- Christin Katharina Kreutz and Ralf Schenkel. Scientific paper recommendation systems: A literature review of recent publications. *International Journal on Digital Libraries*, 23(4):335–369, 2022.
- Xiaoyu Liu, Xuefeng Wang, and Donghua Zhu. Reviewer recommendation method for scientific research proposals: A case for NSFC. *Scientometrics*, 127(6):3343–3366, 2022.
- Seth Michail, Joseph William Ledet, Taha Yigit Alkan, Muhammed Numan Ince, and Melih Günay. A journal recommender for article submission using transformers. *Scientometrics*, 128(2):1321–1336, 2023.
- Ravi Kumarand Prabhakar Raghavan, Sridhar Rajagopalan, and Andrew Tomkins. Recommendation systems: A probabilistic analysis. In *Proceedings 39th Annual Symposium on Foundations of Computer Science (FOCS)*, pages 664–673, 1998.
- Dashun Wang and Albert-László Barabási. *The Science of Science*. Cambridge University Press, 2021.
- Hei-Chia Wang, Tzu-Ting Hsu, and Yunita Sari. Personal research idea recommendation using research trends and a hierarchical topic model. *Scientometrics*, 121(3):1385–1406, 2019.
- Xiaowen Xi, Jiaqi Wei, Ying Guo, and Weiyu Duan. Academic collaborations: A recommender framework spanning research interests and network topology. *Scientometrics*, 127(11):6787–6808, 2022.
- Zitong Zhang, Braja Gopal Patra, Ashraf Yaseen, Jie Zhu, Rachit Sabharwal, Kirk Roberts, Tru Cao, and Hulin Wu. Scholarly recommendation systems: A literature survey. *Knowledge & Information Systems*, 2023.