

Empowering Academic Collaboration: A Systematic Review of Research Portals for Research, Collaboration and Performance Metrics

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Abstract— This study explores the multifaceted landscape of academic research portals, digital platforms designed to facilitate collaboration, knowledge sharing, and access to scholarly publications within the academic community. Drawing upon existing literature and empirical research, the abstract examines key dimensions of research portal design, including user experience, collaboration tools, content curation, impact assessment, adoption patterns, and privacy considerations. By integrating insights from various disciplinary viewpoints, the study provides understanding into the factors influencing the uptake and use of research portals by researchers, students, and faculty. It also highlights the challenges and opportunities linked to their deployment and enhancement. The paper explores limitations and methodologies in academic collaboration research portals, focusing on identity management, user profiling, and paper recommendation systems. It discusses challenges in integrating online profiling services, managing individual identities, and providing personalized research paper recommendations. Different models, such as PAE-NN using a Bi-LSTM-CRF neural network and Collaborative Topic Regression, are explored for recommending scientific papers. The study emphasizes user engagement, collaboration barriers, metrics, career advancement, and adoption rates in academic collaboration portals.

Index Terms— Academic research portal, digital platforms, paper recommendation system .

I. INTRODUCTION

The growing popularity of academic profiling websites is transforming how researchers connect and promote their work. Platforms like ResearchGate, Academia.edu, Google Scholar Citations, ResearcherID, ORCID, and Scopus ID, along with blogs and personal websites, are fueled by new technologies that offer researchers unparalleled visibility and opportunities to share ideas[1]. This system offers a simplified way to manage online profiles and how they interact with various services. A core identity mechanism acts as a central hub, making it possible to configure users, machines, services, and policies from a single place with

unified tools. This centralization streamlines processes like sharing resources and configurations across devices, and improves user experience with single sign-on capabilities[2]. The digital landscape demands that researchers take charge of their online visibility for effective scholarly communication. There are now various strategies for increasing online presence. Platforms specifically designed for researcher profiles, such as Wikiscientist, offer a way to consolidate information and showcase a researcher's contributions[3]. A case study investigated the use of academic profiling websites among science researchers. The findings revealed that a significant majority (78%) of researchers actively maintain online profiles. The study further indicated that ResearchGate holds the most popularity compared to other platforms like Google Scholar Citations, Academia.edu, and ORCID[4]. Wang et al. put forward a concept for a new type of college portal. Their model prioritizes academic social networking as its core element. This design includes a specialized platform for managing college teacher information, linked to an existing academic social network (SCHOLAT). Key features include customizable teacher homepages, collection of academic data, and tools to enhance communication between teachers. [5]. The proposed Personalized Research Paper Recommendation System (PRPRS) works by using a detailed user profile. It has a built-in algorithm designed to identify and analyze keywords from research papers. When new papers relevant to a user's interests are added, their profile is automatically updated, emphasizing their most frequent research areas and keywords. The PRPRS then uses cosine similarity (a common technique in information retrieval) to match these topics with new papers, providing tailored recommendations[6]. Researchers investigated the potential of web-based systems to address limitations in knowledge sharing within universities. They aimed to bridge this gap by creating a dedicated knowledge portal, enhancing collaboration and access to research. The portal's design was

informed by direct input from faculty, ensuring it would meet their specific needs[7]. The PAE-NN model introduces a new way to extract profile attributes. It employs a specialized neural network (Bi-LSTM-CRF) designed to analyze the unique characteristics and context of target data. This advanced network operates seamlessly with end-to-end training, resulting in superior accuracy (precision and recall) compared to previous models. The PAE-NN model's performance further improves when trained with large datasets, demonstrating its scalability[8]. A new strategy combines association rule mining with the Collaborative Topic Regression system to significantly improve scientific paper recommendations. This model analyzes user data, uncovering hidden patterns that boost prediction accuracy, particularly in the case of out-of-matrix recommendations where limited prior data exists. This approach demonstrated remarkable improvements, increasing out-of-matrix prediction accuracy by up to 20%[9]. The rapid growth of mathematical publications and the influx of new mathematicians highlight the challenge of designing effective author profiles in the digital age. These profiles must balance modern communication trends with maintaining the reliability of information. A new model tackles this challenge by using algorithms to pinpoint and correct ambiguities, ensuring accurate profiles even when there are variations in an author's name[10]. Thanks to advancements in semantic web technologies and structured data, this paper introduces a

unique correlation-based method for creating researcher profiles. By analyzing diverse online sources, it generates detailed and verified profiles specifically for computer science researchers. This approach significantly improves researcher profiling and tackles the challenge of name ambiguity by cross-referencing information from multiple profiles[11]. A new tool within the Academic Social Networking Research Community Portal offers exciting possibilities for expertise classification. Using sophisticated analytics, it can reliably predict an instructor's research specialization based on their previous work. This model leverages text analysis techniques and a Naive Bayes approach, demonstrating promising results with high accuracy rates during its early testing phase[12]. The Online Profile Maker offers a powerful solution for finding academicians. It intelligently combines data from multiple sources to provide comprehensive profiles tailored to the user's search terms. By removing duplicates and using targeted keywords, the tool ensures that the information presented is both refined and relevant[13]. This innovative approach matches researchers with relevant studies by intelligently searching a massive pool of academic content. It employs TF-IDF analysis to determine how frequently key terms appear, ensuring similarity matches. The system goes further, scoring potential matches based on the user's publications, their network of co-authors, and frequently referenced papers for even greater precision[14].

| S.No. | Research Papers | Methodology used | Limitations |
|-------|--|---|---|
| 1. | Identity Management in Scholars [2]. | Incorporation of online profiling services using an identity system. Central management of services, users, machines, and policies in one place. | Hesitation to manage multiple profiles because of minimal similarity. Management of individual identities for each online profiling service. |
| 2. | User Profile-Based Paper Recommendation System [14]. | TF-IDF for analyzing similarity based on frequency. Scoring based on user's publications, co-authors, and papers. | Single article-based recommendations may not be sufficient. The evaluation phase was tested with real users and existing data. |
| 3. | Scholarly profiles, user preferences, and impact scores [15]. | Web scraping applications developed at the University of Bergen Library. Analyzing the Document Object Model (DOM) of academic sites | Scholars reluctant to maintain multiple profiles Women underrepresented on academic network sites |
| 4. | Social Matching Systems for Research Collaboration: A Profile Page Design for University Faculty [16]. | Profile page design for university faculty. Survey to faculty for feedback on profile page design. | Inclusive section headings challenge: 'Populations Studied' not encompass all research. Minimal content in some sections due to confusion over headings. |
| 5. | Creating Structured Linked Data to Generate Scholarly Profiles: A Pilot Project using Wikidata and Scholia [17]. | Contributing data to Wikidata. Displaying data with Scholia. | Looking for ways to add extensive data sets to Wikidata. Organizing Wikidata edit-a-thons to enhance the library's understanding of the platform. |
| 6. | Laying the Groundwork for a | Semi-structured interviews were conducted with 18 scholar-practitioners | Time constraint is a major barrier to tool usage. |

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| | New Library Service: Scholar-Practitioner & Graduate Student Attitudes Toward Altmetrics and the Curation of Online Profiles [18]. | and 5 graduate students from two universities. | Lack of strategic approach to online scholarly identity. |
| 7. | Dynamic multi-concept user profile modelling in research paper recommender systems[19]. | The Dynamic Normalized Tree of Concepts (DNTC) model uses the ACM Computing Classification System (CCS) ontology. | Difficult for earlier methods based on ontology. The deep structure of the 2012 ACM CCS ontology poses challenges. |
| 8. | Improving Research Visibility Part 3: Online Profiles[3]. | Scholarly identifiers like ResearcherID and ORCID Google Scholar for showcasing papers and citations. | Author ambiguity issue in the scholarly research community Need to prepare the subject area, research interest, and brand name. |
| 9. | Who Is My Professor? A Content Analysis of Online Faculty Profiles to Inform Graduate Student Choice[20]. | Inferential coding strategy with 17 codes per faculty profile. Simple binary coding (1yes, 0no) used for analysis. | Faculty profiles lack personal identity information. Minoritized students may face inequitable access to graduate education. |
| 10. | University Teacher Service Platform Integrated with Academic Social Network[5]. | College portal model focused on an academic social network. A tailored platform for managing college teacher information. | Traditional school website portal not meeting modern teachers' needs. Difficulty in providing minimal customized granularity for different disciplines. |
| 11. | User profiles in organizational environments[21]. | Inheritable profile model with transactional and layout templates. Profile management system for personalization of organization users. | Depends on the organization's information system for updating user data. Not flexible, but can be customized for corporate services depending on roles. |
| 12. | A user-friendly college recommending system using user-profiling and matrix factorization technique[22]. | Hybrid strategy: Merging collaborative filtering with content-based filtering algorithms. Interactive User Profiling process to construct user profiles. | Large datasets require proper understanding before processing. Challenge in ranking data for user satisfaction. |
| 13. | Using association rule mining to enrich user profiles with research paper recommendation [9]. | Association rule mining using the Collaborative Topic Regression (CTR) model. | In-matrix prediction results needs to be improved. |

II. RESEARCH QUESTION RESULTS

Q1.What are the key barriers to effective collaboration and knowledge sharing among researchers within academic disciplines, and how can online portals address these barriers to foster interdisciplinary collaboration?

Q2.What impact do academic research portals have on researchers' citation metrics, scholarly networks, and career advancement compared to traditional publication channels ?

Q3.How do usage patterns and adoption rates of academic research portals vary across different disciplines, geographic regions, and institutional affiliations, and what implications does this have for platform customization and user

support strategies?

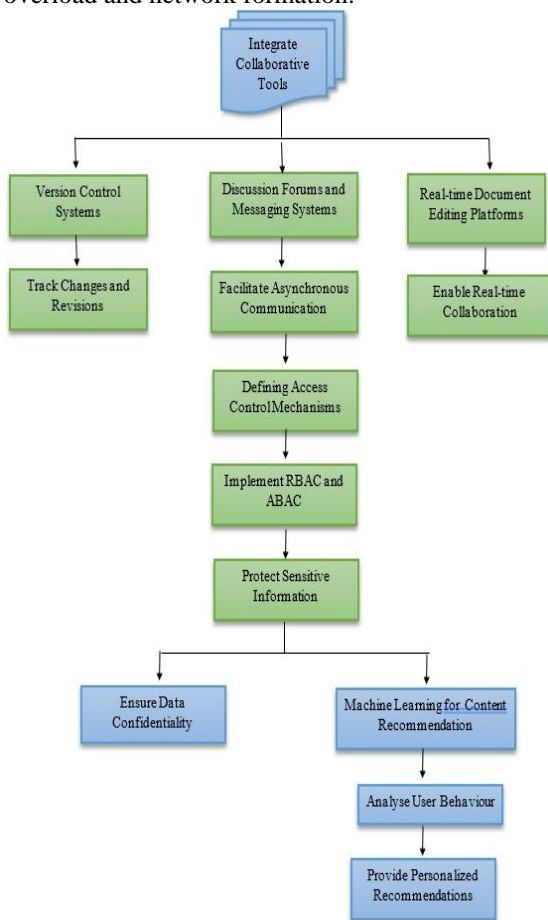
Answer1

Collaborative Tools Integration: Online portals can integrate various collaborative tools to facilitate communication and document sharing among researchers. Version control systems, such as Git or Subversion, enable multiple users to collaborate on the same documents while tracking changes and revisions. Platforms for real-time document editing, like Google Docs or Microsoft Office Online, enable users to work together on documents simultaneously, facilitating synchronous collaboration irrespective of where they are located. Discussion forums and

messaging systems provide channels for asynchronous communication and discussion among researchers.

Access Control Mechanisms: Access control systems guarantee that confidential data remains secure and is only accessible to permitted users. Role-based access control (RBAC) allocates varying roles or permissions to users depending on their position or responsibilities within the organization or project. For example, administrators may have full access to all features and content, while regular users may have limited access to certain functionalities. Attribute-based access control (ABAC) defines access policies based on attributes such as user identity, role, location, or time of access. By implementing access control mechanisms, online portals can protect sensitive information and ensure data confidentiality.

Machine Learning for Content Recommendation: Machine learning models can examine user actions and preferences to offer tailored suggestions for partners, papers, and research subjects. Collaborative filtering techniques review users' prior engagements and preferences to find like-minded individuals and suggest partners with complementary skills. Content-based filtering algorithms analyze the characteristics of documents and users' preferences to recommend relevant research papers or topics. By leveraging machine learning for content recommendation, online portals can connect researchers with relevant collaborators and resources, overcoming barriers related to information overload and network formation.



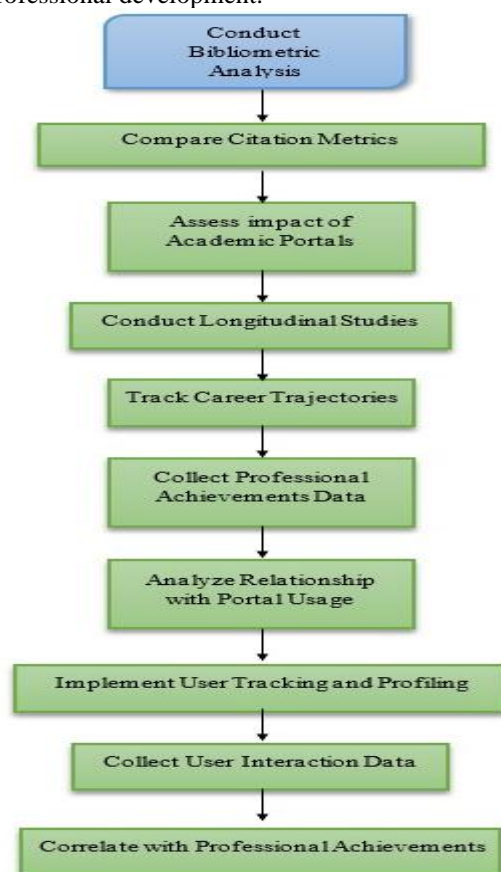
Answer2

Bibliometric Analysis Techniques: Bibliometric analysis involves collecting and analyzing publication data to assess researchers' impact and productivity. Researchers can

compare citation counts, h-index values, and other citation-based metrics between those who publish on academic portals and those who do not. By conducting bibliometric analysis, researchers can quantify the impact of academic research portals on researchers' metrics such as citation counts and h-index values.

Longitudinal Studies: Longitudinal studies track researchers' career trajectories over time to assess the long-term impact of academic research portals on their career advancement. Researchers can collect data on researchers' professional achievements, such as promotion rates, grant funding success, and academic honors, and analyze the relationship between portal usage and career advancement. By conducting longitudinal studies, researchers can identify trends and patterns in researchers' career trajectories and assess the impact of academic research portals on their career advancement.

User Tracking and Profiling Systems: User tracking and profiling systems collect data on users' interactions with the portal, including downloads, citations, and collaborations, to correlate portal usage patterns with researchers' professional achievements. Through studying user behavior and usage trends, researchers can determine how academic research portals influence metrics like citation numbers and h-index values. Advanced analytical methods like machine learning and predictive modeling can uncover patterns in user actions and evaluate the influence of these portals on researchers' professional development.



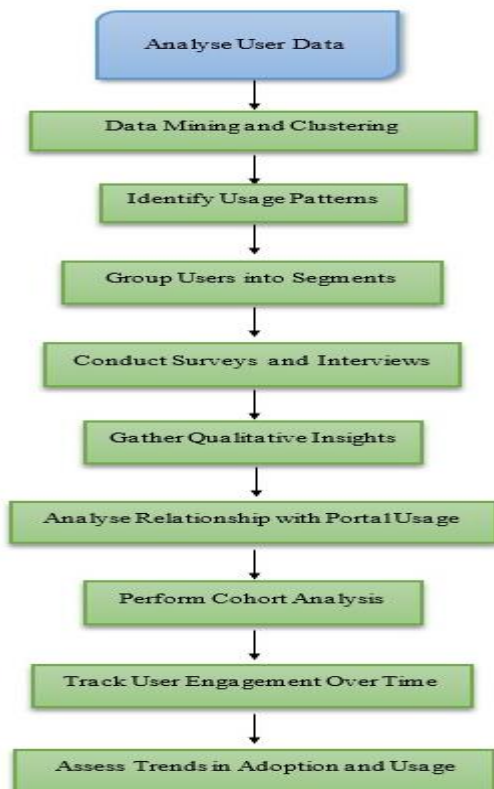
Answer3

Techniques for Data Mining and Clustering: Techniques for Data mining and clustering analyze user data to identify usage patterns and user segments based on demographic

characteristics, research interests, and geographic location. Researchers can examine user data like sign-up details, search terms, and download records to spot trends and patterns in user actions. By using clustering algorithms, they can categorize users with comparable behaviors, revealing unique user groups and shedding light on how usage varies among different demographic groups and fields of study.

Surveys and Interviews: Surveys and interviews gather qualitative insights into the factors influencing adoption and usage behaviors among different user groups. Researchers can design questionnaires and interview protocols to explore users' motivations, preferences, and challenges related to portal usage. Methods like thematic coding and content analysis in qualitative data analysis can help pinpoint common themes and trends in the feedback.

Cohort Methods of Analysis : Cohort analysis methods track user engagement metrics over time to identify trends in adoption rates and usage patterns within specific demographics and disciplines. Researchers can divide users into cohorts based on characteristics such as registration date or research field and analyze their behavior over consecutive time periods. Statistical techniques such as cohort retention analysis and churn prediction can be used to assess user retention and identify factors influencing long-term engagement. By implementing these detailed actions, researchers can gain deeper insights into the impact of academic research portals and address key research questions related to user engagement, collaboration barriers, metrics and career advancement, and usage patterns and adoption rates.



III. CONCLUSION AND DISCUSSION

Online research portals represent invaluable tools for fostering collaboration between faculty and students, offering a centralized platform for knowledge dissemination and

mentorship. While these portals provide numerous benefits, ensuring robust privacy measures and data security is essential to maintain trust and protect intellectual property. In the future, focusing on user-friendly design and complying with privacy rules will be essential for unlocking the maximum benefits of online research platforms to boost academic involvement and innovation.

REFERENCES

- [1] D.T., Kalbande., D.A., Hemke., S.P., Chavan. Academic footprint: need for the researchers identity. (2019).
- [2] Arturo, Elías., Guillermo, Domínguez. Identity Management in Scholars. (2016).
- [3] Nader, Ale, Ebrahim. Create an Online Researcher Profile on Wikiscientist. (2015). doi: 10.6084/M9.FIGSHARE.1375380.V1
- [4] Li, Zhang., Chen, Li. Investigating Science Researchers' Presence on Academic Profile Websites: A Case Study of a Canadian Research University. *Issues in Science and Technology Librarianship*, (2020). doi: 10.29173/ISTL51
- [5] Dan, Xiong., Lunjie, Qiu., Qing, Xu., Rui, Liang., Jianguo, Li., Yong, Tang. University Teacher Service Platform Integrated with Academic Social Network.. (2021). doi: 10.1007/978-3-030-87571-8_67
- [6] Kwanghee, Hong., Hocheol, Jeon., Changho, Jeon. UserProfile-based personalized research paper recommendation system. (2012).
- [7] Nory, B., Jones., Darylne, M., Provost., David, Pascale. Developing a university research web-based knowledge portal. *International Journal of Knowledge and Learning*, (2006). doi: 10.1504/IJKL.2006.009682
- [8] Weiwei, Lin., Haojun, Xu., Jianzhuo, Li., Ziming, Wu., Zhengyang, Hu., Victor, Chang., James, Z., Wang. Deep-profiling: a deep neural network model for scholarly Web user profiling. *Cluster Computing*, (2021). doi: 10.1007/S10586-021-03315-2
- [9] Lule, Ahmedi., Edonit, Rexhepi., Eliot, Bytyçi. Using association rule mining to enrich user profiles with research paper recommendation. *International Journal of Computing and Digital Systems*, (2022). doi: 10.12785/ijcds/110192
- [10] Helena, Mihaljevic-Brandt., Fabian, Müller., Nicolas, Roy. Author Profile Pages in zbMATH - Improving Accuracy through User Interaction.. (2014).
- [11] Hassan, Noureddine., Iman, Jarkass., Hussein, Hazimeh., Omar, Abou, Khaled., Elena, Mugellini. CARP: Correlation Based Approach for Researcher Profiling. (2015). doi: 10.18293/SEKE2015-145
- [12] Jonardo, R., Asor., Marco, Antonio, T., Subion. RESEARCH++: An Academic Social Networking Research Community Portal for Profiling and Expertise Classification. (2018). doi: 10.1109/ISRITL.2018.8864483
- [13] Nadeem, Akhtar., Nida, Iftexhar., Saumya, Varshneya. Online Profile Maker. (2015). doi: 10.1109/ICECT.2015.7226039
- [14] Buket, Kaya. User Profile Based Paper Recommendation System. *International Journal of Intelligent Systems and Applications in Engineering*, (2018). doi: 10.18201/IJISAE.2018642079
- [15] Susanne, Mikki., Marta, Zygmuntowska., Hemed, Ali, Al, Ruwehy., Øyvind, Liland, Gjesdal. Scholarly profiles, user preferences and impact scores. (2015). doi: 10.7557/5.3668
- [16] Matthew, Archer., Douglas, Zytka. Social Matching Systems for Research Collaboration: A Profile Page Design for University Faculty. (2019). doi: 10.1145/3311957.3359459
- [17] Mairelys, Lemus-Rojas., Jere, D., Odell. Creating Structured Linked Data to Generate Scholarly Profiles: A Pilot Project using Wikidata and Scholia. *Journal of Librarianship and Scholarly Communication*, (2018). doi: 10.7710/2162-3309.2272
- [18] Kathleen, Reed., Dana, McFarland., Rosie, Croft. Laying the Groundwork for a New Library Service: Scholar-Practitioner & Graduate Student Attitudes Toward Altmetrics and the Curation of Online Profiles. *Evidence Based Library and Information Practice*, (2016). doi: 10.18438/B8J047
- [19] Modhi, Al, Alshaikh. Dynamic multi-concept user profile modelling in research paper recommender systems. (2018).

- [20] Danielle, Zaragoza., ZW, Taylor., Jimmy, Huynh., Kevin, Lema. Who Is My Professor? A Content Analysis of Online Faculty Profiles to Inform Graduate Student Choice.. (2019). doi: 10.32674/JIMPHE.V4I1.955
- [21] Cláudio, Teixeira., Joaquim, Sousa, Pinto., Joaquim, Arnaldo, Martins. User profiles in organizational environments. Campus-wide Information Systems, (2008). doi: 10.1108/10650740810886312
- [22] Sheetal, Girase., Varsha, Powar., Debajyoti, Mukhopadhyay. A user-friendly college recommending system using user-profiling and matrix factorization technique. (2017). doi: 10.1109/CCAA.2017.8229779