CVoR Issued. July 13, 2023. DOI: 10.1145/3544549.3585899

QuickRef: Should I Read Cited Papers for Understanding This Paper?

Sangjun Park
KAIST
South Korea
sangjun@kaist.ac.kr

Chanhee Lee
KAIST
South Korea
chanhee015@kaist.ac.kr

Uichin Lee*
KAIST
South Korea
uclee@kaist.ac.kr

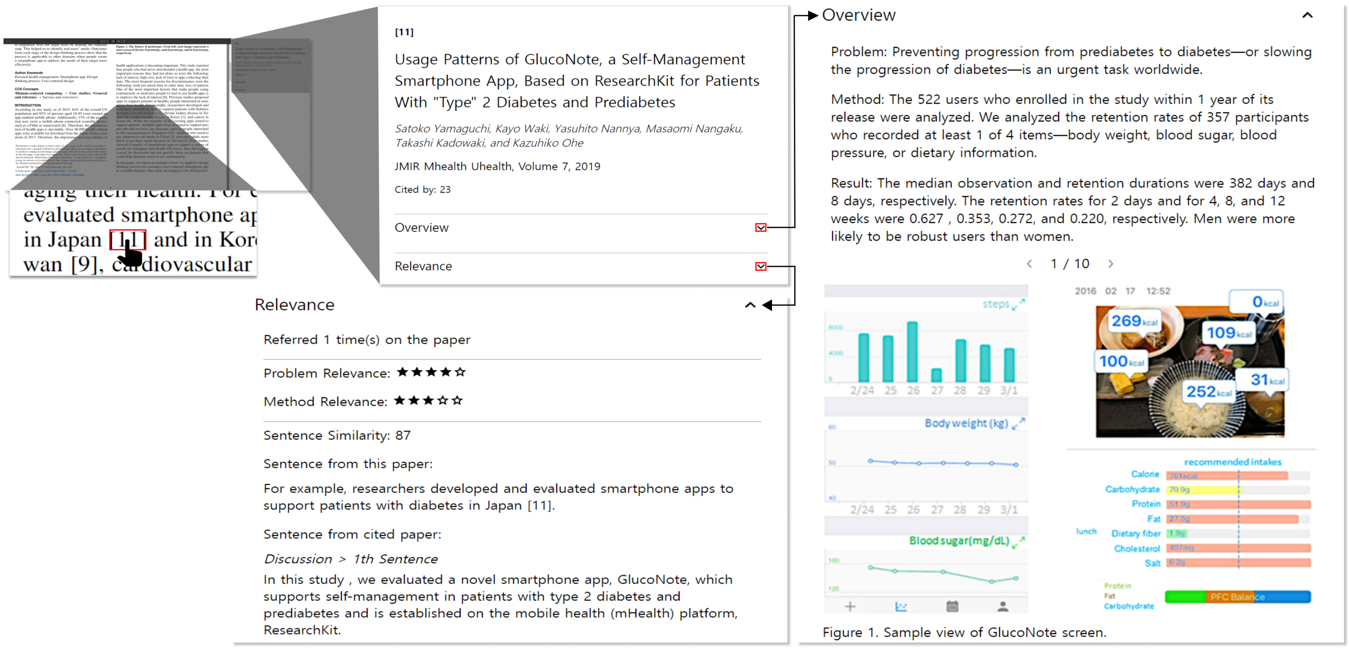

Figure 1: Overview of QuickRef. When a user clicks numbered citation, user can check meta information, overview, and relevance which will be given as cited papers along with main paper on the right side panel.

ABSTRACT

Researchers spend lots of time for reading scientific papers as they need to stay updated with recent trends. However, navigating citations, which are indispensable elements of research papers, can act as a barrier for junior researchers as they do not have enough background knowledge and experience. We conduct a formative user study to identify challenges in navigating cited papers. We then prototype QuickRef, an interactive reader that provides additional information about cited papers on the side panel. A preliminary user study documents the usability of QuickRef. Further, we present practical design implications for citation navigation support.

*Corresponding author

CHI EA '23, April 23–28, 2023, Hamburg, Germany

ACM ISBN 978-1-4503-9422-2/23/04.
https://doi.org/10.1145/3544549.3585899

CCS CONCEPTS

• **Human-centered computing → User interface programming**.

KEYWORDS

interactive reader, citation, reference

ACM Reference Format:
Sangjun Park, Chanhee Lee, and Uichin Lee. 2023. QuickRef: Should I Read Cited Papers for Understanding This Paper?. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA '23), April 23–28, 2023, Hamburg, Germany*. ACM, New York, NY, USA, 7 pages. https://doi.org/10.1145/3544549.3585899

1 INTRODUCTION

Researchers devote a lot of their time to reading research papers. Researchers must stay updated with the most recent research in their area of interest, and they have to continuously read papers to investigate appropriate methods and analyze the research's outcomes. This led researchers to read more than 100 papers a year [32]. Moreover, the number of papers released every year keeps increasing [21]. The amount of research paper that researchers have to read will continue to rise, suggesting the need of supporting tools for reducing the cost of reading papers.

Prior studies identified key factors that hinder readability of research papers, such as the frequent use of nonce words (used only within research papers) and a lack of background knowledge. There is also a structural characteristic where information is often scattered within a document (i.e., multiple information in one document) and multiple documents at once to understand a single paper (i.e., cross-document navigation) is often required therefore leading to non-linear navigation for reading [1, 4, 31]. To deal with these issues, novel interactive readers were designed. For example, ScholarPhi [12] connected definition of nonce words using tooltips, Andrew et al. [13] matched mathematical symbols to their explanation with color, and Powley et al. [25] proposed to connect numbered citations with endnotes.

These attempts to design interactive readers resolved the issue of scattered information within a document. However, citations, the indispensable element in research papers, serves as barriers because the description of cited work is often brief. It requires researchers to further read cited papers. This is especially burdensome for junior researchers who still lack research experience and background knowledge [34].

This motivation has driven us to design an interactive reader that can show additional information that helps to understand cited papers without opening and reading cited papers. As additional information must be extracted from cited papers, it might be beneficial to use natural language processing (NLP) technologies for automation. However, recently developed NLP technologies require a large-scale corpus and remarkable computational costs, so the required information and design implications can be studied first.

Therefore, in this paper, we try to find out which information is needed and how it should be presented to the reader. We consider the burden of navigating cited papers with graduate students that can represents junior researchers. We started with a preliminary user interview with 6 graduate students to identify the purposes and scenarios of reading cited papers. Based on our findings, we designed QuickRef to present meta information, an overview, and the relevance of cited papers. We then conducted a within-user study with 20 participants to look at how QuickRef can be used compared to the basic document viewer. We also had interviews with the participants to identify usability and improvement in details after the experiment.

Evaluation through usability questionnaires (i.e., SUS and NASA-TLX) showed that QuickRef could reduce the burden of citation navigation. Participants said that barriers to grasp the contents of the cited paper, such as searching and reading cited papers, had been reduced. They also demanded an additional explanation of the extracted information and a guide to interpret such information, as well as improvements related to the presentation of the extracted information.

Using this research as a background in the future study, we expect to automate information extraction by incorporating advanced natural language processing techniques and conduct large-scale field studies for exploring various use cases.

2 RELATED WORKS

The purpose of this paper is to create a support tool that makes reading papers easier by providing additional information about cited papers and to provide design implication for automation using NLP pipeline. To this end, we reviewed (1) the inconvenience of reading research papers, (2) interactive readers for reading scientific papers, and (3) how NLP was used in scientific tasks.

2.1 Reading Patterns and Barriers in Scientific Papers

Many studies have been conducted on reading patterns and barriers as reading scientific papers is an essential task for researchers. In digital reading space, following reading pattern can be easily observed: non-linear navigation which the readers are jumping back and forth to connect scattered information, cross-document navigation which the readers refer multiple documents at once, and skimming to find out which papers are related to their interest [1, 4, 31]. This results in a complicated situation since multiple documents' contents should be considered at once.

To explain this phenomenon, numerous interview studies were conducted and observed that participants lacked background knowledge [4, 5], encountered with terms that readers were unfamiliar with [29], or had interests that differed from the purpose of the paper [4]. Furthermore, junior researchers generally lacked background knowledge, and had difficulties in reading scientific papers [34].

2.2 Systems for Reading Scientific Papers

To overcome the aforementioned barriers, new user interfaces that provide additional information or augment the information in the paper have been introduced.

ScholarPhi [12] focused on nonce words, Kim et al [17] focused on data table, Andrew et al. [13] focused on Mathematical Symbol, and Powley et al. [25] focused on numbered citation and sought to reduce difficulty in reading through a system that highlights corresponding explanations within the paper. In particular, the tool presented in Powley et al. [25] is actually used to show the information of endnotes along with citation numbers by using tooltips in various publication websites [9, 26, 27, 30] and some reference management systems [23]. These studies focused on connecting scattered information within a document. However, since the information of cited papers included in end note (e.g., title, author, and venue) is limited and explanation of cited papers is sometimes not sufficient, it requires additional information from cited papers.

Some systems that use additional information to support reading have also been studied. OCPR [20] provides related Open Source Educational Resource with seeking paragraph, PaperQuest [24] visualizes and recommends the most similar papers to support reading decisions, and CiteSense [36] highlights how reference and citer are related to seeking paper. These systems are more about recommending other resources, so resources were given directly rather than extracting necessary information. Therefore, we hypothesized that the existing system could be improved by extracting and providing only the necessary parts of the cited paper.

2.3 Information Extraction from Scientific Papers

As NLP technologies develop rapidly with deep learning, various NLP tasks are being studied in the scientific domain to help researchers. The recommendation system of scientific papers is also a trend that uses keyword extraction or similarity between documents [10, 11]. Summarization, which is a technique that can reduce the reading time of the researchers, creates and uses a large-scaled corpus to perform document summarization [8], method extraction [14], results extraction [16], concepts extraction [7, 18], and keyword extraction [35]. In addition, citation classification [3, 6], a task to understand the use and importance of citation, is also actively studied along with creating annotations.

However, there is a lack of research on how the aforementioned NLP techniques can aid in reading the paper. In other words, it is necessary to investigate how tasks like summarization and citation classification can be applied and what factors should be taken into account. In this work, we build a simple prototype that leverages a Wizard-of-Oz approach to implement such information extraction features. Our goal is to better understand which information can be helpful to junior researchers.

3 FORMATIVE STUDY

Before creating the QuickRef prototype, we conducted a preliminary interview with 6 graduate students, 4 of whom were masters and 2 were PhDs, all majoring in computer/electronics. The interviews lasted approximately 20 minutes each and were conducted using a semi-structured format with below questions to identify the participants' discomfort while reading papers with cited papers. Follow-up questions were also asked to clarify the participants' answers.

- Q1. Under what circumstances do you look for cited papers?
- Q2. Are there any inconveniences related to cited papers?
- Q3. What information do you usually look for in cited papers?

The study conducted a thematic analysis of the user interview results, and the participants were labeled as U1 to U6 to differentiate them from the participants in the subsequent user study.

3.1 Circumstances in Reading Cited Papers

The study identified three themes related to the circumstances that lead readers to navigate cited papers: (1) a lack of explanation for information of interest, (2) identifying trends in research topics, and (3) checking descriptions used in their own writing.

The first theme was identified from 5 participants. To be specific, U2 mentioned the lack of detail in the method section, *"Detailed methods can be replaced by citations, while details are required to reproduce the results."*. U1 and U4 mentioned that sometimes specialized terms appear and this makes them look over cited papers or search the Internet for that terminology. The second theme was mentioned by 4 participants. U3 reported that, *"To get broad sense of the research topic, I try to utilize citations."*. U1 and U6 mentioned that, as they also need to write about related work, they try to start with cited papers because these papers have already summarized well about related topics. The third theme was captured by 2 participants. For example, U6 reported *"It is hard to find which part was quoted from the cited papers. I refer to the cited papers and jump back and forth to find the parts."*.

3.2 Inconveniences While Reading Cited Papers

The inconveniences related to navigating cited papers can be divided into three linear steps: (1) checking endnotes, (2) searching for cited papers, and (3) reading and understanding the contents. 4 participants reported that it is taxing to scroll down to the reference section to check the paper titles. 2 participants reported that it was time-consuming to search cited papers if links (i.e., Digital Object Identifier) are not given in the references because they will have to search for the paper in the web. 2 participants felt that it was time-wasting to understand the contents of cited papers. For example, U4 reported that *"I felt like time was wasted because I had to read the cited paper's whole content to grasp the main idea."*.

3.3 Useful Information for Understanding Cited Papers

Useful information was categorized as (1) overview, (2) relevance, and (3) meta information. To grasp the main ideas of the cited papers (i.e., an overview), U2, U4, U5, and U6 mentioned a summary, and U6 mentioned that graphics can be helpful. U2 mentioned that it would be helpful to show a summary of each section, and U4 and U6 wanted to have more abstraction as they could understand the overall content by skimming. Next, all except U4 mentioned showing which part of the paper is relevant and how is relevant regarding problem and method. For example, U6 said that, *"I want to know which part of the reference paper was actually used with page numbers because I can also know the exact location"*. Lastly, U4 and U5 mentioned the need for meta information like title, author, and venue.

4 QUICKREF PROTOTYPE DESIGN

QuickRef was produced as shown in Figure 1. It was created using HTML, CSS, and JS with PDF.js [2] for rendering PDF. For user interface, a sidebar was used instead of tooltips, as in other interactive readers like Elsevier and SAGE [9, 27], to display a greater amount of additional information and to avoid obscuring the content while hovering. According to the interview results, the information was divided into three parts: meta information, overview, and relevance. Meta information includes the citation number, title, author, venue, and number of citations. The number of citations obtained from Google Scholar is added beyond the information from the reference section, as the importance of papers can be one metric to select cited papers to read [33]. It will be displayed right after clicking numbered citation.

Overview provides a structured abstract and all graphics of cited papers to grasp the main idea of the cited papers, which can be expanded by clicking the expand button. We decided to use structured abstract since original abstract can be redundant regarding the interview result. To build a prototype, we used a Wizard of Oz approach: the first and second author collaboratively generated the structured abstracts of sample articles.

Relevant information includes the number of times the cited papers were mentioned, a star rating for problem and method relevance, and the most similar sentence from the cited paper, as inferred from the interview. Advanced natural language processing techniques are required to extract this information. The current prototype uses manual labeling for star ratings–the first and second authors rated the relevance collaboratively on a 5-point Likert scale. The similarity sentence was calculated using a sentence-similarity score by the pretrained DistillBERT [28], and is presented with its location and similarity score. Similar to the overview, it will be displayed when the expand button is clicked.

5 PRELIMINARY USER STUDY

5.1 Study Design

5.1.1 Participants. The study involved 20 graduate students, consisting of 15 masters and 5 PhDs, with backgrounds mainly in computer/electronics. The experiment was conducted in a one-on-one format and lasted approximately an hour, with two authors taking turns hosting the sessions. The study aimed to investigate how additional information of cited papers could assist readers.

5.1.2 Procedure. The experiment involved reading two short papers, one about an application for self-healthcare [19] and the other analyzing people's comments on online political news articles. The papers were read using both QuickRef and a baseline reader that only provided the function of a document viewer. The experiment was conducted in a designated user study office with the same equipment for all participants, consisting of a 27-inch monitor, keyboard, and mouse. The short papers were selected from CHI EA archives because they were easy for participants to read.

Before the experiment began, participants provided consent for the recording of the experimental environment. Participants were instructed to read the paper in a comfortable manner, including searching the internet. To mitigate ordering effects and fatigue effects [15], the order of papers and readers were randomized. Participants completed SUS and NASA-TLX questionnaires for usability evaluation. After the experiment, a 15-minute interview was conducted with each participant to ask following questions and gather detailed feedback on usability and user experience.

(1) What information did you find helpful when using QuickRef?
(2) Is there anything you want to improve or add on QuickRef?

5.1.3 Analysis. To understand how QuickRef can generate positive changes, the study recorded participants' activities during an experiment comparing a baseline and QuickRef using three metrics: count of citation click (click count in short), count of additional web search (search count in short), and reading time. We also have done post-interview and thematic analysis to get deeper insight.

5.2 Results

5.2.1 Evaluation of Extracted Information. Figure 2 of the study shows that all participants rated the entire system positively for QuickRef, consistently giving NASA-TLX a low score and SUS a high score. Furthermore, although reading time do not have difference significantly, P2, P4, and P13 evaluated that QuickRef could save a lot of time. One possible explanation is that QuickRef could potentially allow them to read more about cited papers by saving users' time. Participants P1, P8, and P10 found that QuickRef's overview information made it easier to check the contents of the cited paper, reducing the need for additional searches. As a result, it also leads to more clicks of citation to check the cited papers. For instance, P8 reported that *"...the overview information significantly reduced the efforts to search for cited papers"*.

During the interview, the study sought to identify the useful components of QuickRef by interview. All information provided by QuickRef, except for the number of occurrence and number of citations, were found to be useful by the participants. 5 participants found the overview information to be helpful for quickly checking the cited paper. For example, P11 said that, *"I usually look at the abstract and introduction of the cited paper so the structured summary was very helpful."*. 3 participants found the relevance ratings to be convenient for assessing the relevance of the cited papers quickly. In particular, P7 said *"The method relevance helped me to quickly decide if the specific cited paper was really related to the main paper or not."*. 5 participants found the most similar sentence function to be useful to reduce time for reading cited papers for related parts. For instance, P7 said *"It is annoying to check all of the references just for a small part, so the relevance information really helped me to save some time."*.

Positive synergies were created between the components. There were also participants (e.g., P5 and P12) who used the overview and relevance information in tandem. They used the relevance information to rapidly identify critical references and check the overview to understand those references. Specifically, P12 said that *"It was convenient to see how relevant the cited paper was when I checked method relevance and read the overview information for clarification."*, and P5 also mentioned that *"I was able to use the problem and method relevance along with the overview information to quickly check if the specific reference papers are important references."*

5.2.2 Improvements. Participants mainly mentioned three areas for improvements: (1) additional information, (2) additional explanations of presented data, and (3) user interfaces.

Some participants desired additional information about cited papers. P8, P11, and P19 wanted the detailed information to be provided as formulas, models, and data set composition are critical in the field of AI. P11 explained that *"In papers about NLP or model improvement, details such as formulas, models, and dataset composition are also important, and I think it will be difficult to grasp these parts in overview."* In this regard, P19 also suggested that, *"I wish I could check the sentences through keyword search."*. In contrast, P7 said that *"...I want overview to shorten it further and mark it as keyword. Overview is provided, but it was difficult to recognize keywords at once... I hope you can provide keywords together."* In addition, P8 added that *"External resources that gives a summary of academic papers can also be useful."*

Next, the guideline to interpret results and the explanation of methods were asked by 9 participants. P11 and P15 thought that it was ambiguous on what basis the overview was extracted and wanted to know which exact parts of the cited papers were used for summary. P11 said that *"It would be nice to also show the actual sentences in cited papers."*. Five participants also wanted some clarification about the ambiguity of the relevance ratings. They felt like the relevance rating was not credible since they did not know how these ratings were actually obtained. For example, P18 said that *"I*

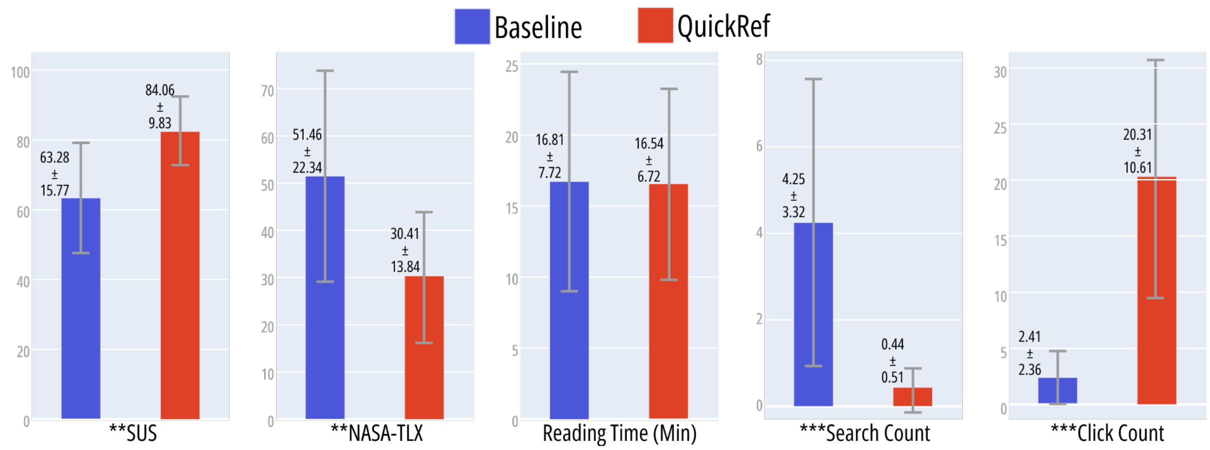

Figure 2: The study compared five metrics after using QuickRef or Baseline. The figure presented mean of each metric with error bars. Statistical significance was represented by an asterisk in the x label (*: p < .05, ** : p < .01, *** : p <.001) .

want to know how relevance was calculated. Also, I wonder how credible this is.". In addition, P7 and P12 mentioned that in addition to reliability, a guide to interpret the star rating score is also necessary. Furthermore, P7 suggested that *"Relevance of Method and Result was hard to understand . . . It would be better to provide an additional explanation of the criteria through information icon."*.

Third, participants suggested improving the interface for some information. P14 suggested that *"meta information such as the title can be shown with hovering and allow users to control the size of the sidebar."*. Three participants mentioned that the interface will be better if they can control the figure sizes. For example, P12 noted *"It was hard to check the details of the figures due to their small sizes."*. In this regard, P1 said *"I wish I could expand the figure through actions such as clicking."*.

6 DISCUSSION

In this work, we prototyped QuickRef, an interactive reader providing additional information about the cited paper. Conducting a usability study with graduate students, we were able to gather several design implications to present information and adapt NLP technologies. In addition, the limitations of our study and future work are suggested.

6.1 Design Implications

6.1.1 Offering Data Explanation and Interpretation Guidelines. The main issue identified in the interview was the lack of explanation for how data is extracted and how data can be interpreted. While some participants found it helpful to use summary in overview and rating in relevance parts, others were doubtful about these information. A lack of explanation can reduce the trust of the entire system, and thus, offering detailed explanations is required. As suggested in the interview, one possible way is to present the original text used to write the summary or evaluate relevance rating. Norkute et al. [22] also reported that presenting the original text along with summary increases confidence and trust. However, due to limited space for additional information, it might be redundant and has a negative effect for practical use. It would require further consideration to use minimal information to provide sufficient explanation by utilizing more abstracted information such as keywords.

6.1.2 Providing Granularity Control with Adaptive UI. While reading scientific papers, the essential granularity level of the information varied depending on the participants. Identified in the interview, users wanted to select and use information at their preferred level, whether it could be keyword content, relevance rating of cited papers, structured abstracts, figures, or even higher level details for technical papers. Furthermore, users can use multiple levels of information in a complementary manner. As complementary use is possible, the arrangement of information regarding abstraction level can also be considered to clearly show the connection between different levels of information.

Along with granularity level of information, user interface of QuickRef can be also changed. The prototype of QuickRef presented additional information in a sidebar alongside the viewer, but participants noted that simple information such as the title can be viewed with tooltips, which would not disrupt the user and be useful. This suggests that user interface can be diverse according to the abstraction level of information and the available interface size for visualization to minimize interrupt of reading flow.

6.2 Limitations and Future Work

In the future study, as the user study revealed, we will further improve the user interface and extract more diverse level of information along with automation using NLP technology. It may require an iterative design process to reflect users' needs. Furthermore, we would like to conduct field study since a controlled study cannot reflect many use cases and long-term usage. While doing the additional experiment, we also need to increase the population since most of the participants involved in our study were computer science graduate students, and their characteristics could be different with the general population of graduate students. We also plan to consider users' prior usage habits and tools as these factors can affect users interactions.

7 CONCLUSION

We presented QuickRef, an interactive reading support tool specialized for citation navigation for academic reading. Our preliminary user study showed that QuickRef can help increase productivity by making citation navigation easy. We found that the required level of information to understand the cited paper is highly dependent on the users, so it needs to be improved further by adding more diverse level of information and changing user interface through iterative design process.

ACKNOWLEDGMENTS

This research was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Korean government (MSIT) (2022R1A2C2011536). Furthermore, as we started to develop this idea from the term project of Human Computer Interaction course, we would like to thank professor Geehyuk Lee who gave out the lectures.

REFERENCES

[1] Annette Adler, Anuj Gujar, Beverly L. Harrison, Kenton O'Hara, and Abigail Sellen. 1998. A Diary Study of Work-Related Reading: Design Implications for Digital Reading Devices. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Los Angeles, California, USA) *(CHI '98)*. ACM Press/Addison-Wesley Publishing Co., USA, 241–248. https://doi.org/10.1145/274644.274679

[2] Apache. 2023. PDF.js. https://mozilla.github.io/pdf.js/, Last accessed on 2023-01-17.

[3] Akito Arita, Hiroaki Sugiyama, Kohji Dohsaka, Rikuto Tanaka, and Hirotoshi Taira. 2022. Citation Sentence Generation Leveraging the Content of Cited Papers. In *Proceedings of the Third Workshop on Scholarly Document Processing*. Association for Computational Linguistics, Gyeongju, Republic of Korea, 170–174. https://aclanthology.org/2022.sdp-1.19

[4] Susanne Askwall. 1985. Computer supported reading vs reading text on paper: a comparison of two reading situations. *International Journal of Man-Machine Studies* 22, 4 (1985), 425–439. https://doi.org/10.1016/S0020-7373(85)80048-1

[5] CHARLES BAZERMAN. 1985. Physicists Reading Physics: Schema-Laden Purposes and Purpose-Laden Schema. *Written Communication* 2, 1 (1985), 3–23. https://doi.org/10.1177/0741088385002001001 arXiv:https://doi.org/10.1177/0741088385002001001

[6] Iz Beltagy, Kyle Lo, and Arman Cohan. 2019. SciBERT: A Pretrained Language Model for Scientific Text. *CoRR* abs/1903.10676 (Nov. 2019), 3615–3620. https://doi.org/10.18653/v1/D19-1371

[7] Arthur Brack, Jennifer D'Souza, Anett Hoppe, Sören Auer, and Ralph Ewerth. 2020. Domain-independent Extraction of Scientific Concepts from Research Articles. *CoRR* abs/2001.03067 (2020), 251–266. arXiv:2001.03067 http://arxiv.org/abs/2001.03067

[8] Xiaoyan Cai, Sen Liu, Libin Yang, Yan Lu, Jintao Zhao, Dinggang Shen, and Tianming Liu. 2022. COVIDSum: A linguistically enriched SciBERT-based summarization model for COVID-19 scientific papers. *Journal of Biomedical Informatics* 127 (2022), 103999. https://doi.org/10.1016/j.jbi.2022.103999

[9] Elsevier. 2023. Elsevier. Example document; https://www.sciencedirect.com/science/article/pii/S0740818807000692, Last accessed on 2023-01-17.

[10] Esra Gündoğan and Mehmet Kaya. 2022. A Novel Hybrid Paper Recommendation System Using Deep Learning. *Scientometrics* 127, 7 (jul 2022), 3837–3855. https://doi.org/10.1007/s11192-022-04420-8

[11] Hebatallah A. Mohamed Hassan. 2017. Personalized Research Paper Recommendation Using Deep Learning. In *Proceedings of the 25th Conference on User Modeling, Adaptation and Personalization* (Bratislava, Slovakia) *(UMAP '17)*. Association for Computing Machinery, New York, NY, USA, 327–330. https://doi.org/10.1145/3079628.3079708

[12] Andrew Head, Kyle Lo, Dongyeop Kang, Raymond Fok, Sam Skjonsberg, Daniel S. Weld, and Marti A. Hearst. 2021. Augmenting Scientific Papers with Just-in-Time, Position-Sensitive Definitions of Terms and Symbols. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21)*. Association for Computing Machinery, New York, NY, USA, Article 413, 18 pages. https://doi.org/10.1145/3411764.3445648

[13] Andrew Head, Amber Xie, and Marti A. Hearst. 2022. Math Augmentation: How Authors Enhance the Readability of Formulas Using Novel Visual Design Practices. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) *(CHI '22)*. Association for Computing Machinery, New York, NY, USA, Article 491, 18 pages. https://doi.org/10.1145/3491102.3501932

[14] Hospice Houngbo and Robert E. Mercer. 2012. Method Mention Extraction from Scientific Research Papers. In *Proceedings of COLING 2012*. The COLING 2012 Organizing Committee, Mumbai, India, 1211–1222. https://aclanthology.org/C12-1074

[15] Rajiv S Jhangiani, I-Chant A Chiang, Carrie Cuttler, Dana C Leighton, et al. 2019. *Research methods in psychology*. Kwantlen Polytechnic University, 2666 72 Ave, Surrey, BC V3W 2M8 Canada.

[16] Marcin Kardas, Piotr Czapla, Pontus Stenetorp, Sebastian Ruder, Sebastian Riedel, Ross Taylor, and Robert Stojnic. 2020. AxCell: Automatic Extraction of Results from Machine Learning Papers. *CoRR* abs/2004.14356 (2020), 8580–8594. arXiv:2004.14356 https://arxiv.org/abs/2004.14356

[17] Dae Hyun Kim, Enamul Hoque, Juho Kim, and Maneesh Agrawala. 2018. Facilitating Document Reading by Linking Text and Tables. In *Proceedings of the 31st Annual ACM Symposium on User Interface Software and Technology* (Berlin, Germany) *(UIST '18)*. Association for Computing Machinery, New York, NY, USA, 423–434. https://doi.org/10.1145/3242587.3242617

[18] Daniel King, Doug Downey, and Daniel S. Weld. 2020. High-Precision Extraction of Emerging Concepts from Scientific Literature. In *Proceedings of the 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval* (Virtual Event, China) *(SIGIR '20)*. Association for Computing Machinery, New York, NY, USA, 1549–1552. https://doi.org/10.1145/3397271.3401235

[19] Minji Kwon, Jihyun Lee, Wanhae Lee, and Hyunggu Jung. 2020. BYE-TAL: Designing a Smartphone App for Sustainable Self-Healthcare through Design Thinking Process. In *Proceedings of the 2020 Symposium on Emerging Research from Asia and on Asian Contexts and Cultures* (Honolulu, HI, USA) *(AsianCHI '20)*. Association for Computing Machinery, New York, NY, USA, 9–12. https://doi.org/10.1145/3391203.3391204

[20] Xiaozhong Liu, Zhuoren Jiang, and Liangcai Gao. 2015. Scientific Information Understanding via Open Educational Resources (OER). In *Proceedings of the 38th International ACM SIGIR Conference on Research and Development in Information Retrieval* (Santiago, Chile) *(SIGIR '15)*. Association for Computing Machinery, New York, NY, USA, 645–654. https://doi.org/10.1145/2766462.2767750

[21] David Nicholas, Peter Williams, Ian Rowlands, and Hamid R. Jamali. 2010. Researchers' e-journal use and information seeking behaviour. *Journal of Information Science* 36, 4 (2010), 494–516. https://doi.org/10.1177/0165551510371883 arXiv:https://doi.org/10.1177/0165551510371883

[22] Milda Norkute, Nadja Herger, Leszek Michalak, Andrew Mulder, and Sally Gao. 2021. Towards Explainable AI: Assessing the Usefulness and Impact of Added Explainability Features in Legal Document Summarization. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI EA '21)*. Association for Computing Machinery, New York, NY, USA, Article 53, 7 pages. https://doi.org/10.1145/3411763.3443441

[23] Papers. 2023. Papers. https://www.papersapp.com/, Last accessed on 2023-01-17.

[24] Antoine Ponsard, Francisco Escalona, and Tamara Munzner. 2016. PaperQuest: A Visualization Tool to Support Literature Review. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (San Jose, California, USA) *(CHI EA '16)*. Association for Computing Machinery, New York, NY, USA, 2264–2271. https://doi.org/10.1145/2851581.2892334

[25] Brett Powley, Robert Dale, and Ilya Anisimoff. 2009. Enriching a document collection by integrating information extraction and PDF annotation. In *Document Recognition and Retrieval XVI*, Kathrin Berkner and Laurence Likforman-Sulem (Eds.), Vol. 7247. International Society for Optics and Photonics, SPIE, San Jose, California, United States, 724707. https://doi.org/10.1117/12.805548

[26] PubMed. 2023. PubMed. Example document; https://pubmed.ncbi.nlm.nih.gov/35126506/, Last accessed on 2023-01-17.

[27] SAGE. 2023. SAGE. Example document; https://journals.sagepub.com/doi/10.1177/24723444221132309, Last accessed on 2023-01-18.

[28] Victor Sanh, Lysandre Debut, Julien Chaumond, and Thomas Wolf. 2019. DistilBERT, a distilled version of BERT: smaller, faster, cheaper and lighter. https://doi.org/10.48550/ARXIV.1910.01108

[29] Mary D. Shepherd and Carla C. van de Sande. 2014. Reading mathematics for understanding—From novice to expert. *The Journal of Mathematical Behavior* 35 (2014), 74–86. https://doi.org/10.1016/j.jmathb.2014.06.003

[30] Springer. 2023. Springer. Example document; https://link.springer.com/article/10.1007/s41095-022-0277-5, Last accessed on 2023-01-17.

[31] Craig S. Tashman and W. Keith Edwards. 2011. Active Reading and Its Discontents: The Situations, Problems and Ideas of Readers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Vancouver, BC, Canada) *(CHI '11)*. Association for Computing Machinery, New York, NY, USA, 2927–2936. https://doi.org/10.1145/1978942.1979376

[32] Carol Tenopir, Donald King, Sheri Edwards, and Lei Wu. 2009. Electronic Journals and Changes in Scholarly Article Seeking and Reading Patterns. *Carol Tenopir* 61 (01 2009). https://doi.org/10.1045/november2008-tenopir

[33] Mingyang Wang, Jiaqi Zhang, Shijia Jiao, and Tianyu Zhang. 2019. Evaluating the impact of citations of articles based on knowledge flow patterns hidden in the citations. *PLOS ONE* 14, 11 (11 2019), 1–19. https://doi.org/10.1371/journal.

pone.0225276

[34] Xiaoguang Wang, Lingying Xia, and Qingyu Duan. 2022. The barriers and informational needs of students and junior researchers when reading scientific papers. *Learned Publishing* 35 (07 2022), 308–320. https://doi.org/10.1002/leap.1475

[35] Chengzhi Zhang, Lei Zhao, Mengyuan Zhao, and Yingyi Zhang. 2022. Enhancing Keyphrase Extraction from Academic Articles with Their Reference Information. *Scientometrics* 127, 2 (feb 2022), 703–731. https://doi.org/10.1007/s11192-021-04230-4

[36] Xiaolong Zhang, Yan Qu, C. Lee Giles, and Piyou Song. 2008. CiteSense: Supporting Sensemaking of Research Literature. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Florence, Italy) *(CHI '08)*. Association for Computing Machinery, New York, NY, USA, 677–680. https://doi.org/10.1145/1357054.1357161