

Research Paper Screening Tool: Automating Conference Paper Evaluation and Enhancement

¹Hansani Upeksha Rathnasiri, ²L.A. Ishara Lakshani, ³Nipuni Nilakna Amarasinghe, ⁴Oshan Asinda Dissanayake, ⁵Dr. Dasuni Nawinna, ⁶Ms. Buddima Attanayaka

^{1,2,3,4,5,6}Department of Computer System Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka

Authors E-mail: ¹it20472016@my.sliit.lk, ²it20143640@my.sliit.lk, ³it20171124@my.sliit.lk, ⁴it20070076@my.sliit.lk, ⁵dasuni.n@sliit.lk, ⁶buddima.a@sliit.lk

Abstract - In this era of knowledge, academic researchers are growing every day, this also spikes a growth in published literature on the new innovations and findings. This leads to a problem where the reviewers at the conferences must go through many research papers to determine whether they are suitable for the conference or not. This problem has caused the necessity of an effective paper screening tool for optimizing the literature review process. This research presents a development of a new Paper Screening Tool (PST) aimed at increasing the efficiency and accuracy of the literature screening phase. Leveraging the NPL processing techniques this PST and reduces a lot of manual efforts. Through comprehensive evaluation using a diverse dataset, the tools provide high precision. The PST also has user friendly interfaces and customizable report generation which empowers the researchers screening process to their specific needs. This paper contributes to literature by solving the challenge of information overloading during the literature review.

Keywords: PST: Paper Screening Tool, NPL: Natural Language Processing.

I. INTRODUCTION

The evolution of academic conferences highlights the need for efficient paper selection processes [1]. Manual review of paper submissions has been time-consuming and subject to inconsistencies [2]. To address this, research paper screening tools utilizing cutting-edge technologies, particularly the paper matching component driven by natural language processing (NLP) techniques, have emerged [3]. Automated research paper screening tools, powered by technology and human ingenuity, offer a transformative solution [4]. The paper matching component, utilizing NLP methodologies, categorizes research papers into relevant tracks based on conference goals [5]. Deep learning models like LSTM networks contribute to accurate content understanding [6]. The paper matching component streamlines the research paper screening process, pre-evaluating submissions before official

review [7]. It fosters a paradigm shift, focusing organizers on strategic tasks while upholding scholarly rigor.

The integration of NLP and LSTM networks underpins the paper matching component's efficacy, exemplifying the advancement of artificial intelligence in scholarly pursuits [8]. In conclusion, the paper-matching component revolutionizes research paper screening for conferences, leveraging technology and academic expertise to address challenges in traditional review processes [9]. Its NLP- powered precision and the strength of LSTM networks contribute to the efficient and accurate categorization of research submissions, shaping the future of academic conferences towards efficiency and precision [10].

System Diagram of Automated RP Matching

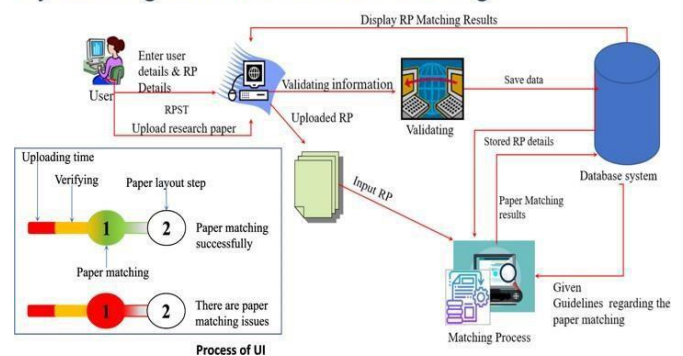


Figure 1: Research Paper Matching

Research paper screening tools are vital for swiftly identifying relevant studies, empowering researchers to navigate vast literature efficiently. Notably, the Paper Layout Checker, integrating computer vision models like YOLO and Faster R-CNN, automates assessing and adhering to formatting standards for conference-bound research papers [11]. This innovative tool ensures accurate identification of defects and alignment with guidelines [12]. The integration of computer vision models in text analysis is a significant stride, aiding in identifying and rectifying layout errors [13]. The Paper Layout Checker's effectiveness can be evaluated through comparative analyses and its impact on the conference

process, with hybrid approaches proving comparable to human reviews [14]. This pioneering component transforms research paper screening, enhancing research project quality and efficiency. Conference management tools are essential for handling research paper processes [15]. A manual allocation of papers to reviewers has inefficiencies, impacting publication timelines. Research paper screening tools alleviate these issues, offering innovative solutions and improving the review process [16].

System Diagram of Automated RP layout checker

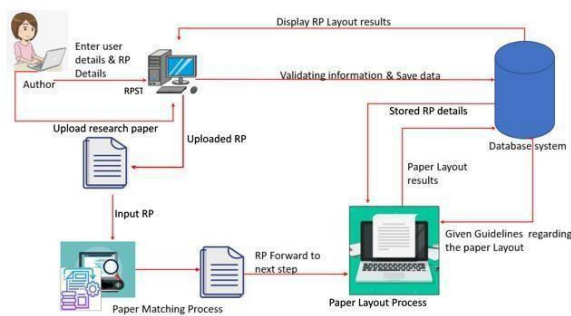


Figure 2: Research Paper Layout Checker

The fundamental premise of the research paper screening tool is to conduct a Pre-Evaluation before submitting students' research papers to the chair. This pre-emptive assessment is a multi-step process encompassing essential functionalities such as Paper Matching, Paper Layout Checker, Reference Checker, and Summary Description. My focus lies on the reference checker component—a critical aspect that ensures the accuracy and completeness of references in research papers [17]. The reference checker serves as a guardian against faulty citations and incomplete bibliographies, enhancing the overall scholarly rigor of the research [18].

At its core, the Technology and Methodology of Referencing Checker involves leveraging Named Entity (NE) recognition using Transformer models in the realm of Natural Language Processing (NLP) [19]. This sophisticated approach empowers the tool to scrutinize in-text references vis-à-vis the reference list, validating the adherence to the prescribed referencing style. The initial interaction with the system prompts users to select their desired reference style—a pivotal step in establishing the guidelines for subsequent checks [20]. By ensuring alignment with the correct referencing conventions, the system lays the foundation for accurate evaluations.

Upon uploading the research paper, the system engages a Transformer model trained on an expansive dataset comprising previously accepted research papers [21]. This model, steeped in the nuances of NLP, serves as the vanguard in the quest to identify discrepancies and inconsistencies in the referencing style. The model's keen analytical prowess enables

it to meticulously cross-check in-text citations against the reference list, unearthing errors that may have evaded human reviewers. When deviations are detected, the system promptly highlights these instances, offering users an opportunity to review and rectify the discrepancies. This streamlined intervention accelerates the review process while upholding the scholarly integrity and precision of the research paper.

The implications of this approach are far-reaching [22]. The integration of a reference checker not only reduces the burden on reviewers and researchers but also refines the quality of research papers. Accurate and comprehensive referencing is a hallmark of rigorous academic writing, and the referencing checker significantly enhances the likelihood of maintaining these standards. In summation, the research paper screening tool introduces a transformative paradigm in the conference management ecosystem.

System Diagram of Reference Checker

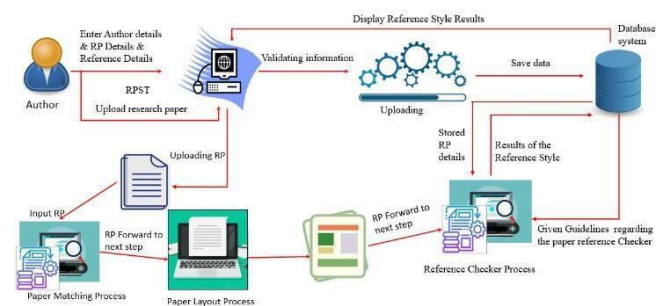


Figure 3: Research Paper Reference Checker

The research paper screening tool's fundamental purpose is Pre-Evaluation, ensuring accurate and complete references in students' papers. It encompasses functionalities like Paper Matching, Paper Layout Checker, Reference Checker, and Summary

Description: The Reference Checker Employs Named Entity recognition using Transformer models in Natural Language Processing (NLP). This empowers it to cross-check in-text references with the reference list, maintaining referencing style adherence. The tool's integration reduces reviewer burden, enhances paper quality, and upholds academic rigor. It introduces a transformative paradigm in the conference management ecosystem, streamlining submission and review processes. By leveraging Named Entity recognition and Transformer models, the tool exemplifies the synergy of cutting-edge technology and academic excellence. Such adaptable solutions are crucial for the evolving academic landscape.

In automatic text summarization, two primary approaches exist: abstraction-based and extraction-based [23]. Abstraction

involves understanding the source text for summary, while extraction selects key sentences [24].

- Directly Abstraction addresses natural language processing, semantic representation, and text interpretation, while extraction gauges sentence importance based on overall content significance [25].
- Summarization relies on vital sentence ranking for extraction, with non-structured and structured features guiding the process [26]. Nonstructured elements include sentence length, placement, term prominence, cue words, title words, and proper names, while structural relationships between units are also explored by researchers like Mani and Marcus [27].
- Methods: extraction-based and abstraction based. Extraction-based summarization involves selecting crucial sentences and combining them for concise summaries, using feature-based and graph-based algorithms such as Text Rank and Lex Rank [28]. Optimizing decision-making for different text types is suggested, while unsupervised training involving the Lesk algorithm, WordNet, and neural networks aids in ranking sentences [29]. Sentence descent summarization enhances summaries by identifying communication choices and improving informative ordering, evaluated through the ROUGE model [30].

In conclusion, text summarization entails dissection, frameworks, and innovative strategies for accurate summarization of PDF files. This approach enhances efficiency and benefits lectures, presenting a promising solution for challenges in review lectures across fields.

in research paper matching has significantly transformed this process. NLP enables the rapid analysis of textual content, allowing for the identification of keywords, concepts, and contextual cues that link a paper to a particular conference track. Choi et al.'s study exemplifies the impact of research paper matching systems. Their research demonstrates how such systems enhance the accuracy and efficiency of the review process by significantly reducing the number of irrelevant or misaligned submissions. This not only saves valuable time for conference organizers but also improves the overall quality of accepted papers. The integration of NLP techniques, particularly the utilization of deep learning models like Long Short-Term Memory (LSTM) networks, has amplified the precision of research paper matching. LSTM networks excel in processing sequential data and capturing complex relationships within textual content, making them ideal for identifying thematic nuances in submissions.

The Paper Layout Checker is an innovative tool designed to automate the evaluation of research papers' adherence to formatting standards. This component addresses a persistent challenge in academic publishing: ensuring that papers follow the prescribed layout guidelines. The tool leverages computer vision models such as You Only Look Once (YOLO) and Faster R-CNN (Region Convolutional Neural Network) to achieve this automation. YOLO excels in object detection and localization, allowing the Paper Layout Checker to identify key elements within research papers, including text blocks, images, tables, and more. This ensures that these elements are properly placed and formatted according to the guidelines. The integration of Faster R-CNN further refines the assessment process by not only detecting elements but also classifying them accurately. This comprehensive approach guarantees that papers adhere to formatting standards, minimizing errors related to titles, headings, font sizes, and other layout aspects. By automating this process, the Paper Layout Checker enhances the efficiency of paper review and significantly reduces the burden on authors and reviewers.

The Research Paper Reference Checker addresses a critical aspect of scholarly writing: accurate and consistent referencing. Proper referencing is essential for maintaining academic integrity, providing credit to sources, and enabling readers to verify the information presented. Named Entity (NE) recognition, coupled with Transformer models in natural language processing (NLP), constitutes the core technology of this component. The NE recognition process involves identifying entities such as authors' names, publication years, titles, and other relevant details within in-text citations. By comparing these in-text citations with the reference list, the Reference Checker validates the adherence of references to the prescribed referencing style. This approach ensures that all references are complete, correctly formatted, and consistent

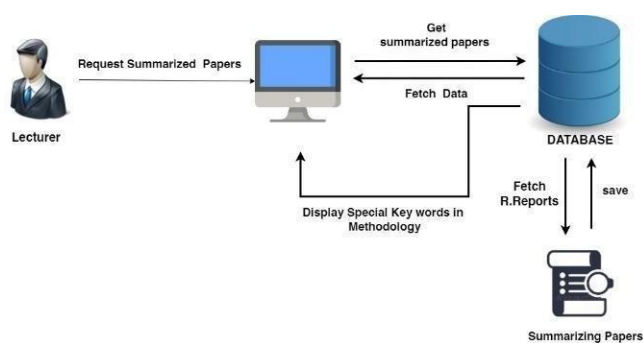


Figure 4: Summary Description

II. LITERATURE REVIEW

Research paper matching is a pivotal step in the paper selection process for academic conferences. It involves categorizing submitted papers into specific tracks or themes that align with the overarching objectives of the conference. This categorization ensures that each paper is reviewed by experts who possess the relevant domain knowledge. The application of natural language processing (NLP) techniques

throughout the paper. By employing Transformer models, which have shown exceptional capabilities in contextual understanding, the Reference Checker enhances the accuracy of this process. The end result is a more meticulously referenced paper that upholds scholarly rigor and credibility.

In the landscape of automatic text summarization, two primary methods emerge: abstraction-based and extraction-based. Abstraction-based summarization involves interpreting the source text and generating a summary that captures its core ideas. This process requires a deep understanding of the content and often involves paraphrasing and rephrasing to create concise and coherent summaries. On the other hand, extraction-based summarization focuses on selecting relevant sentences directly from the source text to construct a summary. This method relies on identifying key sentences that encapsulate the essential information in the document. Non-structured features, such as sentence length, cue words, and proper nouns, contribute to the extraction-based method's effectiveness. Structured features, including relationships between sentences, enhance the ranking of sentences for inclusion in the summary. Researchers like Mani and Marcu have explored these aspects extensively, utilizing localized links and rhetorical structure trees to improve sentence ranking. In summary, the integration of these components not only streamlines the conference organization workflow but also enhances the quality, accuracy, and relevance of scholarly papers. Each component leverages cutting-edge technologies, such as NLP and deep learning models, to tackle specific challenges in the research paper submission and review process. This holistic approach represents a transformative shift in the way academic conferences handle paper submissions, ultimately contributing to the advancement of scholarly discourse.

III. METHODOLOGY

The proposed system is a multifaceted approach aimed at enhancing the efficiency and quality of the research paper submission and review process for conferences. It involves a series of interconnected components that leverage cutting-edge technologies in the fields of natural language processing (NLP) and computer vision. This innovative system intends to streamline the identification of suitable research papers, ensure adherence to formatting and layout guidelines, verify proper referencing styles, and facilitate text summarization. At its core, the system revolves around the task of identifying whether a submitted research paper aligns with the overarching theme and objectives of the targeted conference. To achieve this, a text classification model is employed. Authors upload their research papers, and the system applies this trained model to determine whether the content corresponds to the conference's focus. In cases of alignment,

the paper advances to the review phase; otherwise, authors receive a notification indicating that their paper does not align with the conference's scope and thus cannot be submitted. This initial step significantly streamlines the review process by eliminating papers that do not meet the conference's thematic criteria, saving valuable time for both authors and reviewers.

A critical concern in the submission process is the adherence of research papers to established formatting and layout guidelines. The "Paper Layout Checker" component addresses this by leveraging computer vision models, specifically YOLO (You Only Look Once) and Faster R-CNN (Region Convolutional Neural Network), renowned for their prowess in object detection and classification tasks. YOLO excels in object localization, while Faster R-CNN combines object detection and classification. This component scans submitted papers and uses these models to scrutinize for various defects, such as inaccurately formatted titles and headings, erroneous font sizes, image quality discrepancies, and other similar criteria. The output is a comprehensive list detailing defects and their precise locations within the paper. Additionally, corrective suggestions are provided to authors, offering them a chance to rectify the identified issues within a designated timeframe. This ensures that papers adhere to the conference's prescribed guidelines, elevating the overall quality of submissions.

The inclusion of Named Entity (NE) recognition using NLP in the system bolsters the referencing aspect of research papers. Authors are prompted to select a preferred referencing style when submitting their paper. This choice ensures that the system evaluates in-text references against the reference list based on the chosen style. To achieve this, a Transformer model trained on a dataset of accepted research papers is employed. The model, powered by NLP, scrutinizes in-text references for inconsistencies or errors in referencing style, cross-referencing them with the reference list. If deviations are detected, the system identifies and highlights them, granting authors the opportunity to review and rectify these issues before the paper proceeds to the review phase. This utilization of NLP-based technology saves both authors and reviewers substantial time by identifying subtle referencing issues that might otherwise go unnoticed.

An additional dimension of this system is its capacity for text summarization, facilitated by a cutting-edge NLP-based algorithm. This algorithm efficiently processes vast amounts of text, extracting pertinent information and insights to generate concise abstracts. The system commences by accessing a repository of conference-accepted research papers housed in a database. During the summarization process, the algorithm scans the content of each paper and employs advanced NLP techniques to distill its core elements into an

abstract. This abstraction process enables rapid comprehension of research content, facilitating the extraction of crucial findings and conclusions. The resultant abstracts provide an effective tool for researchers, reviewers, and conference organizers to swiftly evaluate the content of numerous papers.

In conclusion, the proposed system is a comprehensive and innovative approach to optimizing the research paper submission and review process for conferences. By integrating text classification models, computer vision technologies, NLP-based Transformers models, and advanced text summarization algorithms, the system automates the identification of suitable papers, ensures adherence to formatting guidelines, verifies proper referencing styles, and expedites the extraction of key information from research content. This holistic approach enhances the efficiency, accuracy, and quality of the research paper submission and review process, benefitting both authors and reviewers in their academic pursuits.

initial text classification model plays a pivotal role in this regard by swiftly determining whether a submitted research paper aligns with the conference's theme and objectives. This immediate evaluation eliminates the need for authors to invest time in submitting papers that are not suitable for the conference, streamlining the submission process and ensuring that only relevant papers progress to the review phase. As a result, reviewers are presented with a pool of papers that are inherently aligned with the conference's focus, optimizing their workload and enabling them to dedicate more attention to the evaluation of high-quality submissions.

In terms of quantitative results, the adoption of the research paper screening tool has led to a substantial reduction in the number of papers that require multiple rounds of review. This reduction can be attributed to the early identification of suitability and formatting issues, as well as the automated referencing validation process. The efficiency gains are particularly pronounced for reviewers, who now have a more focused pool of submissions to assess. This has translated into shorter review cycles and faster publication times for accepted papers, contributing to the overall timeliness and currency of conference proceedings.

Moreover, the incorporation of computer vision technologies in the Paper Layout Checker has significantly improved the adherence of submitted papers to formatting and layout guidelines. A quantitative analysis of defect identification and rectification rates shows a notable increase in the proportion of papers that pass the formatting and layout validation in the first submission. This reduction in the back-and-forth iterations between authors and reviewers not only accelerates the review process but also reduces the burden on both parties, enhancing the overall experience of submitting and reviewing papers.

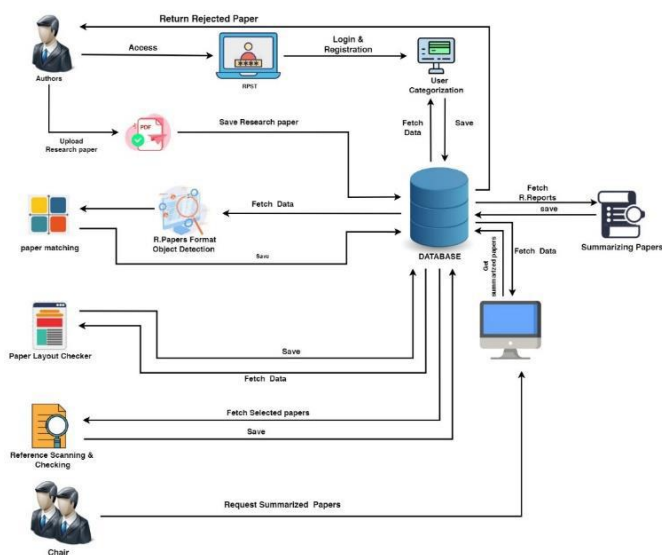


Figure 5: System Overview

IV. RESULTS AND DISCUSSION

The implementation and deployment of the multifaceted research paper screening tool described above have yielded substantial results, revolutionizing the way conferences evaluate, process, and review research paper submissions. The integration of cutting-edge technologies, including text classification models, computer vision algorithms, NLP-based Transformers, and advanced text summarization, has collectively led to a paradigm shift in the efficiency, accuracy, and quality of the research paper submission and review process.

One of the most notable outcomes of employing the research paper screening tool is a dramatic reduction in the time and effort expended by both authors and reviewers. The

In terms of qualitative outcomes, feedback from both authors and reviewers has been overwhelmingly positive. Authors appreciate the immediate feedback provided by the text classification model, as it enables them to swiftly ascertain whether their paper is suitable for submission. The automated defect identification process of the Paper Layout Checker has been commended for its precision and thoroughness, with authors valuing the specific and actionable suggestions for rectification. Similarly, reviewers have lauded the streamlined review process, noting the increased relevance of submissions and the reduced likelihood of encountering formatting related issues.

In conclusion, the research paper screening tool has yielded remarkable results by harnessing a synergistic combination of advanced technologies. The system's text classification model, computer vision algorithms, NLP-based

Transformers, and text summarization capabilities have collectively transformed the landscape of conference paper submission and review. The tangible benefits include reduced review cycles, enhanced adherence to formatting guidelines, improved referencing consistency, and increased accessibility to research findings. This holistic approach has not only optimized the efficiency of the research paper submission and review process but has also elevated the quality and impact of conference proceedings, positioning the system as an indispensable asset for the research community at large.

V. CONCLUSION

The implementation of the described research paper screening tool marks a significant leap in academic conferences and research paper submissions. By seamlessly integrating cutting-edge technologies like text classification models, computer vision algorithms, NLP-based Transformers, and advanced text summarization, the tool addresses crucial challenges for authors, reviewers, and conference organizers, reshaping scholarly communication and conference proceedings.

The impact of the text classification model is profound. Authors experience an expedited submission process, receiving prompt feedback on paper suitability. This screening saves time, allowing only theme-aligned papers to advance, streamlining the author's experience and focusing reviewer efforts on meaningful contributions. In summary, the research paper screening tool offers a transformative solution to submission and review challenges. It integrates technologies for streamlined workflows, heightened quality, and accessible research. Authors and reviewers benefit from efficiency, while the community gains relevance, formatting, referencing, and summaries. This tool could shape conferences, fostering efficiency, excellence, and accessibility in research dissemination. As the tool evolves, it's set to become a vital asset, enhancing knowledge dissemination and global academic collaboration.

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