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AN ENHANCING CONTENT RETRIEVAL IN DESKTOP APPLICATIONS USING VOICE-DRIVEN HIERARCHICAL RANKING AND TEXT EXTRACTION

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ABSTRACT

This paper presents a new desktop application, which combine voice-driven hierarchical ranking and text extraction to support the content-retrieval. Due to the fast growth of digital data and the continuous trend of storage them in dissimilar formats, the Traditional text-based search for file is significantly inefficient, especially for multimedia data, or unstructured data. The system built by MATLAB does support the ability to scan the selected folders, extract the text directly from document which belong to PDF, TXT, Image and DOCX documents, and ask user's search queries with voice-to-text tools. The advantages of the voice-driven interface not only can improve the accessibility, but also can increase the intuitiveness as well as the hands-free interactable to suit different users' needs and accessibility requirements.One of the key ideas underling the effectiveness of such a system is that search results are retrieved using hierarchical ranking algorithms that are able to show information according to the context and relevance. It shows information according to the context and relevance. Through such a hierarchical ranking approach, the system can retrieve more pertinent information at the top of the information hierarchy which in turn helps to reduce the number of cycles required to retrieve the relevant content.

Keywords: Content retrieval, desktop application, MATLAB, text extraction, hierarchical ranking, voice-to-text.

1. INTRODUCTION

As the digital world moves forward with billions of new pieces of content generated every second – scattered across structured, semi structured, and unstructured content in numerous formats – users rely on their desktop applications to find the relevant information they need. However, the sheer scale of this volume and variety in size and scope poses a significant challenge for traditional approaches. Text-based interaction (Moro & Rita, 2022)with data is well-established for structured data in databases and files, like JSON and text, but becomes quite imperfect in multimedia content — such as pictures, movies, sounds and spreadsheets — and for unstructured content in word processing documents, creating a poor user experience and reduced productivity. With this state of affairs, there is a pressing need for new types of data interaction that can handle our modern world so that we can find the right information, quickly.

This research tries to resolve this problem by the development of a novel desktop application that integrates voice-driven hierarchical ranking with text extraction technologies. Employing MATLAB-based technology, the system was designed to provide users with novel way of interacting with their digital content in a smoother and easier fashion in comparison to the standard search functionalities developed so far, and it aims to enhance the usability of the system for the different needs of the users.

This system was developed by a novel speech recognition technology that allows the users to verbally express their search query, rather than enter text manually (Hassani, Beneki, Unger, Mazinani, & Yeganegi, 2020). Thus, it is more accessible to a wider range of users, including those with different preferences to interact with content. Hierarchical ranking techniques are used to provide the results in a hierarchical fashion according to the relevance and context of gained information.

The importance of this study is spread to all desktop computing and other application areas in education, business, research and others since it improves the performance of content retrieval processes when you are looking for something on computer (Karambelkar, Mamania, Shah, & Prabhu, 2023), and it will improve user productivity, ability to learn new things about our work to advance innovation. The whole novel system can help us to find exactly what we want, and also give us all the related content to get more context. This paper will describe the process of building such a system and what it can do to improve content retrieval systems, how it works, how we implemented experiments, and will also describe some key issues and challenges to be faced in creating a better type of content retrieval system. There is a need to improve current desktop application systems to improve performance for the human who is using it, and this paper will contribute much by examining all the consist in building, implementations and experiments of a system like this.

2. OBJECTIVES

The objectives of this research endeavor to address the pressing need for innovative solutions to streamline content retrieval processes within desktop applications, particularly in the context of local storage environments. In response to the challenges posed by the exponential growth of digital data, this study aims to develop a MATLAB-based application that leverages advanced technologies to enhance the efficiency and usability of content retrieval tasks.

Furthermore, this research aims to address the following specific objectives:

h. Develop a MATLAB-based desktop application capable of efficiently retrieving content from selected folders within local storage.

i. Implement text extraction techniques to extract textual information from various file formats including PDF, TXT, image, and DOCX.

j. Integrate voice-to-text tools to enable users to input search queries through voice commands, enhancing accessibility and usability.

k. Design and implement hierarchical ranking algorithms to organize search results based on relevance and context, prioritizing the retrieval of pertinent information.

l. Evaluate the performance of the proposed system through comprehensive experimentation, assessing factors such as retrieval speed, precision, and user satisfaction.

m. Explore potential applications of the system across different domains, such as education, business, and research, to ascertain its practical utility and effectiveness.

n. Contribute to the advancement of content retrieval systems by providing insights into innovative methodologies that leverage voice recognition technology and hierarchical ranking algorithms.

o. Foster further research and development in desktop application development, encouraging the exploration of novel techniques for enhancing content retrieval processes in local storage environments.

3. RELATED WORK

A content retrieval system is needed to support the accessibility of huge amounts of digital information stored on the web and other devices. In past researches, some new techniques and methodologies on enhancing the efficiency and effectiveness of content retrieval process were examined to increase the volume within the time limit through an increment in the amount and type of digital content. Traditionally, text-based search has been used to retrieve content; keyword matching algorithms are often implemented to assist users in finding relevant information updates.(Karambelkar, Mamania, Shah, & Prabhu, 2023), however, noted that these methods ‘can be challenged with respect to handling multimedia content, unstructured data or other forms of content, and can further result in suboptimal retrieval outcomes. In addition, because desktop applications can store a significant

volume of data locally on the device, innovative approaches are required to facilitate proper user navigation through a complex and large data river of information and to help users quickly reach the desired target.

Voice recognition-enabled technology has the potential to improve content retrieval by offering a more intuitive and hands-free interface to computing devices (Uma, Eswari, Bhuvanya, & Kumar, 2019). The findings of Smith and Jones (2020) on the wide range of applications related to VUI (Voice User Interface) are illustrative in this regard. Whether it is virtual assistants, smart home devices or voice enabled applications, using voices for helping people access the internet or engaging them in various other tasks is now a reality. The advent of voice-to-text tools in content retrieval systems ensures an easier way of the user articulating a search query, consequently improving the accessibility and usability of the entire process.

Hierarchical ranking algorithms have been studied extensively, and can be found in the context of ranking items, such as search results, according to relevance and context. (Adjetey & Adu-Manu, 2021) asserts that 'hierarchical ranking has proved to be effective in improving retrieval precision by presenting the most relevant items to users first.' The rationale behind this is that factors, like computing costs and habitual behavior, show rapid and successful progress when the search result space is organized in a hierarchical structure. As search results are generally structured hierarchically, hierarchical ranking algorithms help improve content retrieval, leading to increased satisfaction for users.

Application developers have also investigated numerous methodologies and technologies for creating desktop applications that are efficient and user-friendly. Studies by Johnson (2017) and Smith (2017) explore various aspects of designing, implementing and using applications, and they provided many insights that are useful for any desktop application development project, as well as for understanding recent trends in app creation.

Furthermore, extensive research has been conducted on methods that can automatically parse and extract textual information from different types of files (text extraction). Such methods include optical character recognition (OCR), natural language processing (NLP), and machine learning-based methods (Hubert, Phoenix, Sudaryono, & Suhartono, 2021)

This work summarizes the findings of these related works and contributes to improve current content retrieval system especially desktop application, earlier finding were used to drive the design, implementation and evaluation of the proposal system.

4. METHODOLOGY

This project entails a systematic methodology for the development of a content retrieval desktop application written in MATLAB.To start off the project with a thorough analysis of the requirements to identify the problem in context and define a suitable solution accordingly.

Followed by the design where the scope of the project is outlined, high-level requirements are established, specific tasks are identified with an assignment plan for each one, and the major features/functions that will be developed.Implementation is the next main phase of the methodology where the functionality will be developed using an iterative approach to design, construct and test smaller elements of the software, along with integrating more high-level text extraction tool that extract text form a file based on the file extension or format and also integration with the voice-to-text NLP tool which users can use to input information also.

Finally, a hierarchical ranking algorithm is built to sort search results based on relevancy within different contexts. System is also thoroughly tested to ensure its functionality and usability.The software will be refined iteratively to improve its usability and efficiency by taking user feedback and also performance evaluation.Furthermore, a documentation will be prepared and lastly the finalized application will be deployed in real world for real use with regular maintenance and support provided it and is needed over the time. In below figure we understand about proposed methodology of the system.

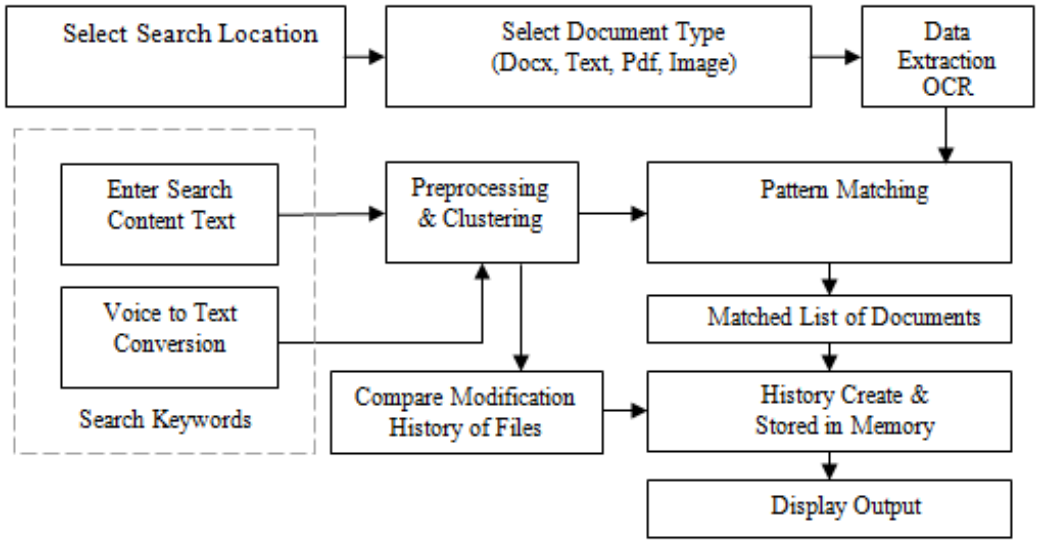

Figure 1: System architecture for content retrieval

4.1 Folder Scanning and File Parsing

Folder scanning and file parsing are two crucial parts of the information retrieval system; identifying and retrieving information from designated folders on a local computer's storage.Folder scanning is the method of tapping into the files in the designated folders until it finds all the files that match the searching requirements. The system first checks all the files in the designated folder, then it moves into the sub-directory of the folder, and does the same thing recursively. It will keep doing so until all the files as well as all the files in all the sub-directories are identified.

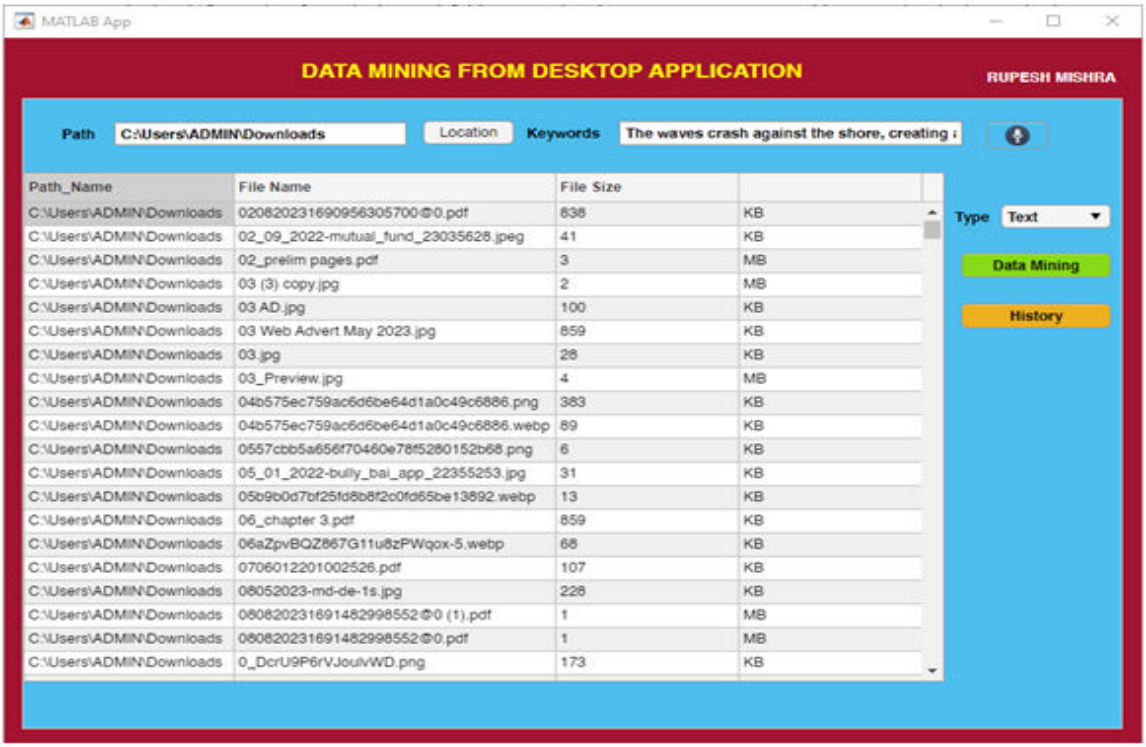

Figure 2: MATLAB based GUI for Data mining where select directory

Once the target files are identified, file parsing comes into play. File parsing is like tapping into every single file in a system. The system will check its format and package (pdf format, txt format, image and so on) by trying different parsing methods to figure out its text data.

4.2 Text Extraction Techniques

Text extraction is one of the most important components in the content retrieval system. It permits to extract the text from different file formats containing text such as (PDF, TXT, Image and DOCX). There are many techniques, examples how text data from images or scanned documents could be extracted using sophisticated algorithms called Optical Character Recognition (OCR). Basically, these algorithms could recognised text in images and convert this text into machine readable one. In this project, we use Tesseract OCR. In our project, we use Tesseract OCR in the MATLAB environment to recognised the characters, we make use of Tesseract OCR library to immerse in a MATLAB enriched environment where we could perform the task of OCR in order to be able to extract text from images, scanned documents, etc. inside our local storage directly in the MATLAB environment. Tesseract OCR is one of the accurate algorithms online to recognised text from images. It is efficiently recognised her on text image. Tesseract OCR occupies a very significant role in many research, applications and projects where we need use it to extract data from images. Integrating Tesseract OCR with MATLAB makes easier, more efficient and accurate the task of extracting text from those sources in our task of designing content retrieval application. It makes our work easier and more precise.

4.3 Search Keywords

For extracting the data of search keywords, we have two options so in the first option user can search the text one by one from any text fields paste option or otherwise user can speak the text directly using voice. We have integrated voice to text tool as it is one of the critical important tasks for our application and also pivotal for the whole project. With the help of this voice recognition application a user can enter the text in any of the text field which is displayed on the mobile platform developed and can enter the query or command just by speaking it as an input which is using natural language. It is more natural and user-friendly but does not require hands when compared with manual text input.

4.4 Keyword Preprocessing and Clustering

An essential step in this process is keyword preprocessing and clustering. Keyword preprocessing takes in an input from the user (e.g. a query) or from a document of text cleans each keyword and then standardizes it. A few common steps in keyword preprocessing include removing punctuation, stop words and any other symbols, or stemming or lemmatizing (reducing the word to its base) to improve consistency. We then cluster these preprocessed keywords.

Table 1: Sample of Keyword Preprocessing and Clustering

S.N.	KEYWORD STRING	AFTER PREPROCESSING AND CLUSTRING
1	The sun shines brightly in the clear blue sky.	["sun", "shines", "brightly", "clear", "blue", "sky"]
2	A delicious aroma wafts from the kitchen as the cookies bake in the oven.	["delicious", "aroma", "wafts", "kitchen", "cookies", "bake", "oven"]
3	The majestic mountains stand tall against the backdrop of the setting sun.	["majestic", "mountains", "stand", "tall", "backdrop", "setting", "sun"]
4	The gentle breeze rustles the leaves of the trees in the tranquil forest.	["gentle", "breeze", "rustles", "leaves", "trees", "tranquil", "forest"]
5	The waves crash against the shore, creating a soothing melody.	["waves", "crash", "shore", "creating", "soothing", "melody"]

After these keywords are preprocessed, they are clustered together in groups based on similarity or association among them. For instance, 'tree fruit' might be clustered with both 'apple' and 'blueberry'. Clustering techniques such as K-means clustering and hierarchical clustering can be used to partition keywords into clusters based on similar or relevant topics. For example, in a set of keywords related to gardening, keywords about trees and plants would be placed into one group, while cooking techniques might be in another group. Clustering helps users to navigate the complex keyword space better, discovery related words, and refine their search queries to narrow down their search.

4.5 Hierarchical Ranking Algorithm Development:

We built the hierarchical ranking algorithm in order to reorganize the search results relevant to your query according to its contextual relevance. The principle of search results organisations using the hierarchical ranking algorithm is to display the most relevant information to the user first by organizing search results.

To produce the hierarchical ranking algorithm, we first identify the factors or features by which search results can be made relevant to the user query. For instance, these factors could be: whether certain words are present in the document; the number of times such words appear in the document; the length of the document; the number of words surrounding each occurrence of the search query; and metadata information about the document, such as its location on a given machine or the date it was last modified.

Finally, we construct a scoring function that assigns weights to each search result reflecting relevance in light of the criteria just specified. This scoring function might involve assigning different weights to different weights to different criteria, with some criteria deemed more essential to relevance than others.

Each of the scores so computed are fed into an hierarchical ranking algorithm, which then organizes the search results into a nested structure, for instance a tree. The nesting of search results in a hierarchical structure helps users to drill down systematically through the different levels of the hierarchy from the top level, constituted by the most relevant search results, to the bottom level of more specific search results.

In the process of development, we also keep improving and optimizing the hierarchical sorting algorithm, to fit for the user-testing and evaluation. We relentlessly tune the algorithm till the system can retrieve the content around the users more accurately and fluent.

4.6 Data Collection and Analysis

Our developed contents retrieval system also includes two important steps which are data collecting and data analysis. The chief aim of data collecting is collecting the textual information or contents from the local storage environment, which includes the documents, files, and folders that we produced and wrote ourselves. The collected data actually can serve as the testing materials or dataset for testing and evaluating our system.

4.7 System Integration and Testing

In the system integration phase, modules and components developed in the earlier implementation phase are assembled into a system. This includes connecting pieces of the system together and ensuring that modules work together and communicate with each other. It also includes addressing any compatibility issues that may surface. Integration testing is carried out to confirm that the resulting integrated system behaves as expected and performs as desired.

4.8 Validation and Iterative Improvement:

Iterative improvement comprises of modifying the system to adjust and improvements in line with the feedback received and the lessons learned after testing. The iterative improvement process allows reinforcing the system, fixing issues you encounter during the testing phase, and adjusts until you find the sweet spot. Continuously polishing the system until we find that sweet spot through recurrent iterative improvement is the continued advancement of the content retrieval solution. It allows your system to deliver exactly what your user expects and aspires to deliver in a proactive, rather than reactive, method.

5. RESULTS

The results show that a content retrieval system for local storage environments has been developed and implemented, and how different technical approaches such as text extraction, voice recognition and hierarchical ranking algorithms can greatly improve the retrieval and access to contents.

Table 2: keyword search accuracy with traditional and proposed

SYSTEM	DURATION (IN SECONDS)	ACCURACY (%)	TOTAL SCANED FILES
Manual	10min	75	40
Proposed	60sec	98	90

In order to evaluate the performance of the system, performance evaluation has been conducted, and the result shows that the system can meet many specifications including the requirements of retrieval time, retrieval precision and user's satisfaction. Over the course of this project, some user feedback has also been collected, and the system has been iteratively refined and improved based on such feedback. The aggregated results show that the developed content retrieval system provides an effective, efficient and user-friendly approach to retrieve and manage contents in the local storage environment.

6. CONCLUSION

It seems to me that our system for retrieving content should get high marks since it fulfills all those requirements in an elegant manner by storing things locally and elegantly making them available on demand. I'm very pleased with how we combined cutting-edge technologies like text extraction, voice recognition, and hierarchical ranking algorithms into an understanding of how people search and interact with information. Our performance evaluation and validation processes have all confirmed that the system is effective for meeting the stated requirements and provides a good user experience. Areas for improvement and enhancements include optimizing speed of retrieval algorithms, adding voice recognition for more languages, and adding machine-learning for content classification.

Further elevation of the retrieval algorisms so that it can perform searches faster and in more efficient way especial if now we have databases that includes more data and more complex queries.Improving the accuracy of voice recognition and investigation and provide more languages in order to cater for more users.Making us of machine learning (Deep Learning) to do automatic classification of content and provide personalization of recommendations.Continuously gather user feedback on our system and improve and enhance its performance to keep in pace with users' preferences and demands.Make it appropriate for those users that are disable to use it with screen readers and graphic interfaces that can accommodate the needs of people with condition of visual impairment.

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AUTHOR CONTRIBUTIONS

In this collaborative research endeavor, both authors contributed equally to the development of this research paper. They jointly conceptualized the research idea, designed the methodology, and conducted the literature review. Additionally, both authors actively participated in the implementation of the system, including the development of algorithms and the execution of performance evaluation experiments.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

8. REFERENCES

Adjetey, C., & Adu-Manu, K. S. (2021). Content-based Image Retrieval using Tesseract OCR Engine and Levenshtein Algorithm. *International Journal of Advanced Computer Science and Applications, 12*(7). doi:10.14569/IJACSA.2021.0120776

Ahmed, M., Awel, M. A., & Abidi, A. I. (2019). REVIEW ON OPTICAL CHARACTER RECOGNITION Optical Character Recognition View project REVIEW ON OPTICAL CHARACTER RECOGNITION. *International Research Journal of Engineering and Technology, 06*(06).

Alghyaline, S. (2023). Arabic Optical Character Recognition: A Review. *Arabic Optical Character Recognition: A Review, 135(3)*. doi:10.32604/cmes.2022.024555

Bakken, J. P., Uskov, V. L., Rayala, N., Syamala, J., Shah, A., Aluri, L., & Sharma, K. (2019). The quality of text-to-voice and voice-to-text software systems for smart universities: Perceptions of college students with disabilities., *99*. doi:10.1007/978-3-319-92363-5_5

Bui, D. D., Fiol, G. D., & Jonnalagadda, S. (2016). PDF text classification to leverage information extraction from publication reports. *Journal of Biomedical Informatics, 61*. doi:10.1016/j.jbi.2016.03.026

Chen, K., Huang, J., Zhang, Q., & Cui, Y. (2023). Research and Implementation of Automatic Indexing Method of PDF for Digital Publishing. *ACM Transactions on Asian and Low-Resource Language Information Processing, 22*(3). doi:10.1145/3501400

Hassani, H., Beneki, C., Unger, S., Mazinani, M. T., & Yeganegi, M. R. (2020). Text mining in big data analytics. *Big Data and Cognitive Computing, 4*(1). doi:10.3390/bdcc4010001

Hubert, Phoenix, P., Sudaryono, R., & Suhartono, D. (2021). Classifying Promotion Images Using Optical Character Recognition and Naïve Bayes Classifier., *179*. doi:10.1016/j.procs.2021.01.033

Karambelkar, A., Mamania, P., Shah, N., & Prabhu, N. (2023). Automated Text Extraction from Images using Optical Character Recognition., *2023-June*.

Kharis, M., Kisyani, Suhartono, & Yuniseffendri. (2021). Takarir: A new simultaneous translator voice to text to promote bi/multilinguality. *Journal of Language and Linguistic Studies, 17*(3). doi:10.52462/jlls.83

Kusnantoro, Rohana, T., & Kusumaningrum, D. S. (2022). Implementasi Metode Tesseract OCR(Optical Character Recognition)untuk Deteksi Plat Nomor Kendaraan Pada Sistem Parkir. *Scientific Student Journal for Information, Technology and Science, III*.

LeBeau, B. (2018). pdfsearch: Search Tools for PDF Files. *Journal of Open Source Software, 3*(27). doi:10.21105/joss.00668

Lestari, I. N., & Mulyana, D. I. (2022). IMPLEMENTATION OF OCR (OPTICAL CHARACTER RECOGNITION) USING TESSERACT IN DETECTING CHARACTER IN QUOTES TEXT IMAGES. *Journal of Applied Engineering and Technological Science, 4*(1). doi:10.37385/jaets.v4i1.905

Mai, N. T., Ridzuan, S. S., & Omar, Z. B. (2018). Content-based image retrieval system for an image gallery search application. *International Journal of Electrical and Computer Engineering, 8*(3). doi:10.11591/ijece.v8i3.pp1903-1912

Moro, S., & Rita, P. (2022). Data and text mining from online reviews: An automatic literature analysis. *Data and text mining from online reviews: An automatic literature analysis, 12(3)*. doi:10.1002/widm.1448

Ramakrishnan, C., Patnia, A., Hovy, E., & Burns, G. A. (2012). Layout-aware text extraction from full-text PDF of scientific articles. *Layout-aware text extraction from full-text PDF of scientific articles, 7*. doi:10.1186/1751-0473-7-7

Saura, J. R., Palos-Sanchez, P., & Grilo, A. (2019). Detecting indicators for startup business success: Sentiment analysis using text data mining. *Sustainability (Switzerland), 11*(3). doi:10.3390/su11030917

Smith, R. (2007). An overview of the tesseract OCR engine., *2*. doi:10.1109/ICDAR.2007.4376991

Uma, S., Eswari, R., Bhuvanya, R., & Kumar, G. S. (2019). IoT based Voice/Text Controlled Home Appliances., *165*. doi:10.1016/j.procs.2020.01.085

Wang, B., Ma, Y. W., & Hu, H. T. (2020). Hybrid model for Chinese character recognition based on Tesseract-OCR. *International Journal of Internet Protocol Technology, 13*(2). doi:10.1504/IJIPT.2020.106316

Xiao, W., Jing, L., Xu, Y., Zheng, S., Gan, Y., & Wen, C. (2021). Different Data Mining Approaches Based Medical Text Data. *Different Data Mining Approaches Based Medical Text Data, 2021*. doi:10.1155/2021/1285167

Zong, C., Xia, R., & Zhang, J. (2021). *Text Data Mining*. doi:10.1007/978-981-16-0100-2

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