A Review of Developing a Web-Based Application for Job Recommendation Using Selected Job Portals

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Abstract— The emergence of job portals on the Internet has made job-seeking easier and more accessible in the current job market. However, with the increasing number of job postings across various platforms, job seekers face difficulties when deciding the best job portal that they can use to search for the best job opportunities. The fast growth of job portals has led to an enormous amount of job postings being posted on various job sites and job seekers find it difficult to choose suitable job opportunities that align with their skills, preferences, and other requirements. This paper presents a solution to this problem through the development of a Web-Based Job Recommendation System that aggregates job postings from multiple job portals. A job Recommendation System has the ability to provide personalized recommendations based on an individual's skills, preferences, and other requirements. The proposed approach aims to simplify the job searching process, allowing job seekers to access a wide range of job postings in one platform. With this application, Job Seekers will get the opportunity to get tailored recommendations that satisfy them without much effort.

Keywords— Job recommendation, Web Scraping, Job Portals, Personalized, Job seeker

I. INTRODUCTION

These days job search is a common task done through various job portals available on the internet. With the internet being the biggest source of information it has become an easy task to search for jobs with the help of different job portals available. The fast growth of job portals has led to an enormous amount of job postings(Slamet et al., 2018) being posted on various job sites. Every day a huge amount of job postings are posted in each and every job portal making it difficult for job seekers to decide on what job portal they should use. A large amount of data (Almalis et al., 2014) has opened up new challenges for job seekers as it is hard to decide which job portal will provide them with the most suitable job opportunities that match their skills, requirements, and other preferences. Sometimes job seekers miss the chance to apply for jobs that are suitable for them because there is an ocean of existing sites that posts millions of job postings. Visiting each and every job portal that provides job vacancies and searching for jobs entering the same things over and over again is overwhelming. It is clear that navigating through multiple job portals to find relevant job opportunities that satisfy a job seeker is a time-consuming task that will make job seekers eventually give up the search. Not only job seekers employers also struggle to find the most suitable candidate for their job openings because every day they will also get a large number of applications and resumes. Over the last few years, we can see that new systems were developed to overcome these challenges. One field of research that can provide a solution to this challenge is Recommendation Systems. A recommendation system (Siting et al., 2012) has the ability to provide personalized job recommendations based on a job seeker's skills, experience, and preferences. The purpose of this study is to develop a web-based application that will aggregate job postings from multiple job portals and recommend suitable job postings based on individual job seekers' skills, preferences, and other requirements. This web-based application will provide job seekers the opportunity to find an extensive amount of job opportunities easily allowing them to have access to a wide range of job opportunities in one place. The proposed application will save job seekers time and effort by giving them personalized recommendation that matches their job search criteria. It is clear that the development of a job recommendation system that displays job vacancies posted in multiple job portals in one place is a valuable tool not only for job seekers but also for employers. By using Web Scraping techniques (Reddy and Viswanath, 2022) and APIs (Kumar et al., 2022) to collect job-related data from other job portals and then utilizing recommendation algorithms to match the job seeker details with job posting details, the proposed system will simplify the process of job searching and provide job seekers a chance to connect with the right job opportunities without much effort.

A. Data Collection

Data collection is one of the most important and crucial steps when developing a job recommendation system. There are several techniques that can be used to collect the data that is needed to develop the proposed application. These techniques are described briefly below.

1) Web Scraping

Web Scraping can be identified as the process of extracting data from websites. There are automated tools that can be used for Web Scraping. It is important to identify the target website and study the structure of the website before starting the Web Scraping process. Web Scraping allows the collection of large amounts of data from websites. Web Scraping job portals is the process of extracting job-related data from job portals that post job vacancies.

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There are many programming languages that can be used for Web Scraping.

Python – Python can be considered one of the most popular languages used for web scraping. BeautifulSoup and Scrapy can be considered as some of the most popular libraries that provide tools for web scraping.

JavaScript(Node.js) – JavaScript is also used for web scraping. Using JavaScript for the scraping process is helpful these days because most modern websites load data dynamically.

Ruby

PHP

Java

2) APIs

Application Programming Interface helps the software to communicate with each other. APIs can be used to collect job-related data from different job portals. In order to get access to specific job portal API it is important to review the job portal and contact the job portal provider. Before using the API it is important to have a good understanding of the API's structure. Using an API to collect job-related data from job portals will streamline the data collection process. APIs provide structured data that is formatted. This makes the extracting process much easier than Web Scraping. Using APIs to collect data are much more efficient and it allows to extraction of only the data needed, unlike Web Scraping.

B. Recommendation Systems

A Recommendation System can be described as an algorithm or a program that uses the user's interests, past behaviors, preferences, and other factors to make personalized recommendations. In order to build efficient recommendation engines various filtering methods can be used. These methods can be identified as content-based, collaborative, knowledge-based, and hybrid.

1) Content-based Recommendation Systems

This approach utilizes items to recommend items similar to the items the user has already liked. The recommendation is based on features like keywords and genres. For example, if the user has liked a romantic movie, the system will recommend more of these types of movies to the user.

2) Collaborative Filtering Recommendation Systems

This approach utilizes the behaviors of multiple users to identify patterns and similarities between their preferences. The recommendation is based on the preferences of other users that have similar likes. This recommender system recommends items that the users with similar preferences have liked to other users. A new user will be matched with users that have similar kind of interests and tastes. If a matched user likes something it is believed that as other users also have similar tastes they also like the same thing.

3) Knowledge-Based Recommendation Systems

This approach utilizes domain knowledge, expert knowledge, and rules to make recommendations

4) Hybrid Recommendation Systems

This approach combines both content-based and collaborative filtering methods to make recommendations. This recommendation system will provide more accurate recommendations compared to content-based and collaborative recommendation systems. This approach will use collaborative filtering to identify users with similar preferences and skills and then use content-based filtering to recommend similar items that similar users have liked before to each other.

II. LITERATURE REVIEW

This section of the study reviews, a few relevant previous works of literature on job recommendation systems and different data collection methods. A total of 20 full research papers were read during the study and 15 most relevant papers are included in this section.

L. Gangadhara Reddy and P. Viswanath. 2022 (Reddy and Viswanath, 2022) proposed a study on Web Scraping of Selected Job Portals' targeting to explore the uses of Web Scraping Techniques to gather job-related data from different job portals. This study aims to identify the most effective Web Scraping Techniques that can be used to scrape data from job portals. This research aims to explore the skills in demand for specific jobs in selected job portals and identify industry job vacancies. In this study, authors have used several web scraping techniques and libraries including BeautifulSoup, Scrapy, and Selenium. Python is used as the programming language in this study. The authors of this paper have also discussed the challenges and limitations of using Web Scraping to collect job-related data. These challenges can be identified as low data quality and legal issues.

Shubham B. Gulik, Akash R. Gharat, Jayesh L. Choudhary, Sujata Kolhe. 2021 (Gulik et al., 2021) proposed a study on Scraping of Job Portal that explores the use of Web Scraping techniques to extract job-related data from different job portals. They have identified that job seekers face many challenges X and difficulties when finding jobs through advertisements, career fairs, etc. The authors of this research proposed to develop an application to address these shortcomings and provide job seekers with a method to efficiently find a job. This study mainly aims to develop a web scraping tool that can collect job-related data from multiple job portals. With the help of the proposed application, job seekers can find multiple jobs from various job portals in one place. This study uses several Web Scraping tools including BeautifulSoup, Scrapy, and Selenium to develop the Web Scraping tool. Python and JavaScrpit programming languages and MongoDB are also used for the development of the application. Job Seekers will get emails notifying them about the best-suited jobs for them.

Ranjani. R, Akshaya. K, M. Sirija, Reena. R. 2022 (Ranjani. R et al., 2022) proposed to develop a Career Guidance Application using Web Scraping. This study aims to develop a web application that will provide career guidance for users by scraping job-related data from different job portals and presenting these data to job seekers. The application will help job seekers to make career decisions by providing them with the necessary information and details. The proposed application will provide users the information related to different job vacancies posted in various job portals, the salary ranges of these jobs, and the skills that are needed to apply for these jobs. According to the authors of this paper,

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Web Scraping is used to extract data from various websites. This is done by Web Scrapers and Web Crawlers. The scraped data is analyzed using regression analysis and stored in a database. Finally, the necessary information is presented to the user through the web interface. The application includes features like a job search feature, a salary comparison tool, and a skill assessment tool.

SmitPatne, Tejas Raut, Vinit Bhagat. 2021 ("A Survey on Web Scraping and its Applications," 2021) conducted a Survey on Web Scraping and its Applications. This paper aims to provide a brief overview of Web Scraping and its Applications. The paper also presents different techniques and tools related to Web Scraping. The authors have discussed the challenges associated with Web Scraping. Weight Measurement approach, Differential approach, and Machine learning approach can be identified as the approaches that can be used for Web Scraping according to this paper. In this paper, the authors have discussed the various applications of Web Scraping in different fields such as business, finance, marketing, and research. This paper helps to get a deep understanding of various Web Scaping techniques and approaches.

Naresh Kumar, Manish Gupta, Deepak Sharma, and Isaac Ofori.2022 (Kumar et al., 2022) proposed to develop a Technical Job Recommendation System using APIs and Web Crawling. The authors of this paper are discussing developing a job recommendation system that uses APIs and Web Crawling techniques to collect and analyze job-related data from different job portals. The application aims to recommend technical job vacancies based on user skills, experience, and other requirements. In order to recommend the jobs they have used content-based filtering and collaborative filtering. Therefore the authors have proposed to use a hybrid approach to develop this recommendation system. In this research, the authors have identified that job seekers face different challenges when searching for jobs that match their skills and other requirements. To address this problem they are proposing to develop a recommendation system that has the ability to recommend job opportunities. Python programming language was used for the implementation and cosine XI similarity between job seekers' profiles and job posting were used to do the recommendation. This study was important to identify how APIs and Web Crawlers are used to extract job-related information from job portals and use the collected data to develop a recommendation system.

Tanya V Yadalam, Vaishnavi M Gowda, Vanditha Shiva Kumar, Disha Girish, Namratha M. 2020 (Yadalam et al., 2020) proposed a content-based filtering recommendation method to get personalized career recommendations. The authors of this paper address the limitations and challenges faced by job seekers when trying to search for jobs using traditional career guidance systems and propose to develop a system that can give a solution to overcome these challenges. In this paper, the authors have used Python programming language for the backend, and Python Flask is used to connect the front end and the back end. It helps to give personalized career recommendations to job seekers based on their individual preferences such as skills, experience, salary range, etc. It was also identified that cosine similarity was used to identify the similarity between a user's skills and other requirements and the job posting in the dataset. In addition, CSS and HTML were used to develop the website in this study and natural language processing techniques were used to preprocess the data. The authors of this paper emphasize that it is important to consider the individual preference of each job seeker when recommending careers. Most importantly the proposed application is developed using a content-based filtering method which is a machine-learning technique that can be used for recommendations. Overall this paper provides valuable information about career recommendation systems.

Santhosh Kumar, N. Prakash, and S. Anbuchelian.2020 (Kumar et al., 2020) proposed to develop a system to predict job openings in the IT sector using the Long Short–Term Memory Model. This study will provide job seekers a chance to find the ideal job that matches them and their preferences easily. This study mainly focuses on Engineering graduates. The authors are emphasizing the importance of career guidance after graduation in order to avoid problems that will arise when searching for jobs. In this paper, the system is developed only to predict the openings of the IT sector. So only IT and related undergraduate has use of this application. In this paper, they have identified a new method to predict job vacancies in the IT sector based on location and job category. For this prediction, the authors have used a Long Short–Term Memory Model (LSTM). As the data set they have used data of job openings in the IT sector. The data is pre-processed before using it for prediction. They have collected data manually for six months straight. The use of LSTM for job recommendation can be considered a novel approach.

Walid Shalaby, BahaaEddin AlAila, Mohammed Koraye, Layla Pournajaf, Khalifeh AlJadda, Shannon Quinn, and Wlodek Zadrozny 2017 (Shalaby et al., 2017a) proposed a Grapgh -based approach for a job recommendation system that will provide personalized job recommendations to job seekers. Job-related data can be selected from job portals and with the help of this data graph database is built This graph database represents job vacancies and the profiles of job seekers. It is identified that natural language processing techniques were used to extract the relevant information that is needed for the prediction from job portals. The authors of this paper have used graph algorithms to make job recommendations. Metrics such as precision, and recall to evaluate the performance of the developed system. Python and Apache Spark can be identified as the main technologies used. In this paper, it is important to identify the importance of scalability.

Zheng Siting, Hong Wenxing, Zhang Ning, and Yang Fan.2012 (Siting et al., 2012) did a survey on Job Recommender Systems. This paper begins with a brief overview of different types of job recommendation systems and their importance in the job market. The aim of this paper

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is to provide insight into the current research on job recommendation systems. During their survey, the authors faced many challenges when deciding the technique that can be used to extract job-related data, deciding the ideal machine learning techniques to develop the recommendation system, and finally how to implement the job recommendation system with the collected data. The following paper discusses several types of job recommendation systems and provides insight into these techniques. The recommendation technologies can be identified as content-based filtering, collaborative filtering, reciprocal recommender, etc. It was also identified that the technology used in the recommendation system will vary depending on the type of the system and it is important to know what technology is used in what recommendation system. Overall this study discusses different job recommendation systems including when each and every system is used, the strengths and limitations of these systems, and the factors that affect the efficiency of these systems.

Adib Hakimi Abdul Rashid, Masurah Mohamad, Suraya Masrom, Ali Selamat. 2022 (Rashid et al., 2022) presents a method that can recommend careers for computer science undergraduates. This will help freshly graduated students to choose the most ideal career path for them. The recommendation system is developed using a content-based filtering method. The study addresses the importance of a personalized career recommendation system based on individuals' skills, requirements, and other preferences. The first step is to collect data related to different job vacancies from job portals and student profiles. Student profiles include all the information that is needed to find a job. The authors have used cosine similarity to calculate the similarity between the student's profile and the job posting. After calculating the similarity score content-based algorithm is developed. Based on the algorithm suitable jobs are recommended to the job seeker. Python programming language and Flask framework were used to implement this system. The authors have used natural language processing to extract job-related data and student profile data. With the help of this system computer science students will get the chance to make career decisions that match their interests, skills, qualifications, and expectations.

Nikolaos D. Almalis, Prof. George A. Tsihrintzis, Nikolaos Karagiannis. 2014 (Almalis et al., 2014) has proposed to develop a recommendation system that uses content-based filtering to recommend suitable job positions to job seekers. The authors have tried to provide a solution to the challenges employees face when selecting the most suitable candidate for a specific job role and to the challenges job seekers face when selecting a job that matches their requirements, skills, and preferences. In this study, the authors have used Minkowski distance to calculate the similarity between the job description and the candidate's resume. With this algorithm similarity of skills, experience, and other things are calculated based on both documents as in the job description and the candidate's resume.

Juhi Dhameliya, Nikita Desai. 2019 (Department of Information Technology, Dharmsinh Desai University,

Nadiad, India et al., 2019) proposed to develop a job recommendation system using both content and collaborative filtering-based techniques. It can be considered a hybrid approach as it is proposed to use both content and collaborative filtering. The proposed study will only provide recommendations for jobs for computer science students. In this proposed system authors are not planning to use the CV to recommend jobs. They are planning to recommend the jobs based on the information entered by the applicant. In this paper, authors have identified that the current job recommendation system doesn't take job seekers' preferences and skills into account when recommending jobs. Python programming language, Flask framework was used to implement the web application.

Mingsheng Fu, Hong Qu , ,Zhang Yi ,LiLu Yongsheng Liu. 2019 (Fu et al., 2019) proposed to develop a novel deep learning-based collaborative filtering model for job recommendation. The aim of this study is to improve the accuracy and efficiency of the job search process. The paper provides an overview of the collaborative filtering method and how deep neural networks are used with it. The limitations of the traditional collaborative filtering methods are discussed while also discussing how they can be improved using deep neural networks. The paper delves into the proposed model and discusses the architecture, components, and algorithms used.

Pradeep Kumar Roya, Sarabjeet Singh Chowdhary, Rocky Bhatia 2020 (Roy et al., 2020) proposed a machine-learning approach that can automate the resume recommendation process. This resume recommendation system can be used to shortlist the candidates who are most suitable for a certain job position. The system will take job seekers' resumes as input and then generate a list of the resumes which are closest to a certain job position. Authors have proposed to develop the application using content-based filtering with the use of cosine similarity and the k nearest neighbour technique. It was identified that the proposed system yields an accuracy of 78% compared to the linear support vector machine classifier.

C Slamet, R Andrian, D S Maylawati, Suhendar,W Darmalaksana and M A Ramdhani 2017 (Slamet et al., 2018) proposed to develop a system that utilizes web scraping techniques and Naïve Bayes classification for a job search engine. The aim of this research is to develop a job search engine with the use of web scraping techniques. Web scraping techniques are used to collect job-related data from online sources. Naïve Bayes classification is used to categorize the extracted data based on their attributes and characteristics. the proposed application can be considered an effective approach that can be used to extract data from job portals, categorize them accordingly and provide recommendations to users.

III. RESEARCH METHODOLOGY

This study adopted a three-step literature review approach that consists of a literature survey, a review of the literature, and writing the literature review section in alignment with the research topic. The first step of this approach is searching for

research papers using the concepts of the research topic and reading the papers thoroughly. The next step is categorizing key themes, ideas, and issues of the research topic and analyzing the arguments, and findings, and building relationships between concepts and theories. The last step is to write the review. This approach aims to examine and analyse the findings of other authors that are similar to the research topic.

The proposed study is an attempt to develop a Web-Based Job recommendation System utilizing web scraping, APIs, and machine learning techniques. As the first step of the review, a bibliometric search was done using different research databases such as Google Scholar, Science Direct, and Google Search Engine. Google Scholar and Science Direct are the most used sources of scientific literature. Publications related to the title were downloaded from these research databases. Some of the keywords were identified and those were used to search the literature published in these databases. The main keywords identified can be listed as " Web Scraping", "Job recommendation", "API", "Data Extraction", "Prediction", and "Machine Learning Models. With the help of these keywords wide range of publications such as articles, conference papers, and journal papers that are related to the research topic were found. For example, when the keyword "recommendation system" was used to search the literature published in Google Scholar about 790,000, results were found. IEEE Xplore (Appadoo et al., 2020) (Shalaby et al., 2017b) was mainly used to find research papers throughout the reviewing process even though other sources were also used for the reviewing. Initially around 100 research papers were downloaded and following inclusion and exclusion criteria were applied to filter the most related research papers that will be helpful to continue the study further.

Inclusion Criteria

- Language (English)

- Document Type (Review Papers, Conference Papers, Journal Papers)

- Literature that discusses the Data Collection techniques (Web Scraping, APIs)

- Literature that discusses the Recommendation systems(Machine Learning Algorithms, Natural Language Processing, Rule Based Techniques, Cosine Similarity, Algorithms)

- Timespan (2010-2023)

Exclusion Criteria

- Literature that is not related to the objectives of the study

- Duplicated literature

- Literature that has been published before 2010

- Literature that is not written in English

From the documents, the papers that are highly related were selected. After filtering, a large number of research papers were excluded while important and useful papers for the research that related to the research topic and the keywords

remained. In the next step remaining papers were examined by title, abstract, and keywords. The study was conducted by using 20 most related publications. All the selected papers were organized in the reference management tool named "Zotero". The selected papers were reviewed and the main research areas, objectives, technologies used, and methodologies of the papers were identified. Finally, a table was made summarizing all the important and core information in order to make the analyzing process much easier. After analyzing and summarizing the information the research gaps, limitations of current work, and further recommended research work were identified. With the help of all the reviewed papers finally, the objectives and the novelty of the research topic were identified accurately

IV. DISCUSSION

The review was conducted by reviewing research papers to find the most accurate and efficient methods that will help to develop the proposed system. The review was conducted by reading 20 research papers. The selected papers were evaluated and analyzed carefully in order to understand the objectives, research gap, limitations, and further work. As a result of the reviews the most accurate data collection techniques, and machine learning models that can be used for the recommendation were identified. Finally a framework linking current research areas to new directions is suggested.

V. CONCLUSION

In this study, various kinds of literature were observed and reviewed in order to identify the most suitable and accurate methods and technologies that can be used for job recommendation and job-related data collection. The review was done with the help of recent studies that have been conducted in this area. The most widely used technique that can be used to extract job related data from job portals is Web Scraping. Web Scraping ("A Survey on Web Scraping and its Applications," 2021) is the process of extracting data from websites. There are many methods that can be used for web scraping. There are different web scraping techniques such as Regular Expression, HTML DOM, and Xpath(Gunawan et al., 2019) (Rahmatulloh and Gunawan, 2020). Also, there are many widely used automated tools for Web Scraping. Python and Python-related libraries are widely used for web Scraping. BeautufulSoup, and Request are some of the Python librraies that can be used for the web scraping process. Scrapy is a comprehensive web scraping framework that can be used for making HTTP requests. Using machine learning models for the recommendation was identified as the most accurate and efficient technique that can be used. Content-Based Filtering and Collaborative-based filtering (Department of Information Technology, Dharmsinh Desai University, Nadiad, India et al., 2019) (Almalis et al., 2014) (Rashid et al., 2022) (Appadoo et al., 2020) are the widely used machine learning techniques that have been used in most of the research for used for providing personalized job recommendations for job seekers. A hybrid technique (Al Fararni et al., 2020) that combines both of these techniques can also be used for the recommendation. The collaborative

filtering method will analyze the behavior, and characteristics of users and then find similarities between other users. And then it will match the users that have similar interests. Content-based filtering technique analyses the interactions and behaviors of multiple users to make the recommendation. Both of these techniques have their strengths and weaknesses. In order to achieve the highest accuracy most of the researchers have suggested combining both of these two methods and building a hybrid technique. It is evident that developing a web-based application for job recommendation using selected job portals holds significant importance when searching for jobs using online job portals.

VI. REFERENCES

A Survey on Web Scraping and its Applications, 2021.

Al Fararni, K., Aghoutane, B., Riffi, J., Sabri, A., Yahyaouy, A., 2020. Comparative Study on Approaches of Recommendation Systems, in: Bhateja, V., Satapathy, S.C., Satori, H. (Eds.), Embedded Systems and Artificial Intelligence, Advances in Intelligent Systems and Computing. Springer Singapore, Singapore, pp. 753–764. https://doi.org/10.1007/978-981-15-0947-6_72

Almalis, N.D., Tsihrintzis, G.A., Karagiannis, N., 2014. A content based approach for recommending personnel for job positions, in: IISA 2014, The 5th International Conference on Information, Intelligence, Systems and Applications. Presented at the IISA 2014, The 5th International Conference on Information, Intelligence, Systems and Applications, pp. 45–49. https://doi.org/10.1109/IISA.2014.6878720

Appadoo, K., Soonnoo, M.B., Mungloo-Dilmohamud, Z., 2020. Job Recommendation System, Machine Learning, Regression, Classification, Natural Language Processing, in: 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE). Presented at the 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE), pp. 1–6. https://doi.org/10.1109/CSDE50874.2020.9411584

Department of Information Technology, Dharmsinh Desai University, Nadiad, India, Dhameliya, J., Desai, N., Department of Information Technology, Dharmsinh Desai University, Nadiad, India., 2019. Job Recommendation System using Content and Collaborative Filtering based Techniques. Int. J. Soft Comput. Eng. 9, 8–13. https://doi.org/10.35940/ijsce.C3266.099319

Fu, M., Qu, H., Yi, Z., Lu, L., Liu, Y., 2019. A Novel Deep Learning-Based Collaborative Filtering Model for Recommendation System. IEEE Trans. Cybern. 49, 1084–1096. https://doi.org/10.1109/TCYB.2018.2795041

Gulik, S.B., Gharat, A.R., Choudhary, J.L., Kolhe, S., 2021. Scraping of Job Portal. Int. J. Adv. Res. Ideas Innov. Technol.

Gunawan, R., Rahmatulloh, A., Darmawan, I., Firdaus, F., 2019. Comparison of Web Scraping Techniques : Regular Expression, HTML DOM and Xpath. Proc. 2018 Int. Conf. Ind. Enterp. Syst. Eng. IcoIESE 2018. https://doi.org/10.2991/icoiese-18.2019.50

Kumar, N., Gupta, M., Sharma, D., Isaac, O., 2022. Technical Job Recommendation System Using APIs and Web Crawling. Comput. Intell. Neurosci. 2022, 1–11. https://doi.org/10.1155/2022/7797548

Kumar, R.S., Prakash, N., Anbuchelian, S., 2020. Prediction of Job Openings in IT Sector using Long Short -Term Memory Model, in: 2020 Fourth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC). Presented at the 2020 Fourth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), pp. 945–953. https://doi.org/10.1109/I-SMAC49090.2020.9243483

Rahmatulloh, A., Gunawan, R., 2020. Web Scraping with HTML DOM Method for Data Collection of Scientific Articles from Google Scholar. Indones. J. Inf. Syst. 2, 16. https://doi.org/10.24002/ijis.v2i2.3029

Ranjani. R, Akshaya. K, Ms. M. Sirija, Mrs. Reena. R, 2022. Career Guidance Application using Web Scraping. Int. J. Adv. Res. Sci. Commun. Technol. 225–231. https://doi.org/10.48175/IJARSCT-5013

Rashid, A., Mohamad, M., Masrom, S., Selamat, A., 2022. Student Career Recommendation System Using Content-Based Filtering Method. https://doi.org/10.1109/AiDAS56890.2022.9918766

Reddy, L.G., Viswanath, D.P., 2022. A STUDY ON WEB SCRAPING OF SELECTED JOB PORTALS 9.

Roy, P.K., Chowdhary, S.S., Bhatia, R., 2020. A Machine Learning approach for automation of Resume Recommendation system. Procedia Comput. Sci. 167, 2318–2327. https://doi.org/10.1016/j.procs.2020.03.284

Shalaby, W., AlAila, B., Korayem, M., Pournajaf, L., AlJadda, K., Quinn, S., Zadrozny, W., 2017a. Help me find a job: A graph-based approach for job recommendation at scale, in: 2017 IEEE International Conference on Big Data (Big Data). Presented at the 2017 IEEE International Conference on Big Data (Big Data), pp. 1544–1553. https://doi.org/10.1109/BigData.2017.8258088

Shalaby, W., AlAila, B., Korayem, M., Pournajaf, L., AlJadda, K., Quinn, S., Zadrozny, W., 2017b. Help me find a job: A graph-based approach for job recommendation at scale, in: 2017 IEEE International Conference on Big Data (Big Data). Presented at the 2017 IEEE International Conference on Big Data (Big Data), IEEE, Boston, MA, pp. 1544–1553. https://doi.org/10.1109/BigData.2017.8258088

Siting, Z., Wenxing, H., Ning, Z., Fan, Y., 2012. Job recommender systems: A survey, in: 2012 7th International Conference on Computer Science & Education (ICCSE). Presented at the 2012 7th International Conference on Computer Science & Education (ICCSE 2012), IEEE, Melbourne, Australia, pp. 920–924. https://doi.org/10.1109/ICCSE.2012.6295216

Slamet, C., Andrian, R., Maylawati, D.S., Suhendar, Darmalaksana, W., Ramdhani, M.A., 2018. Web Scraping and Naïve Bayes Classification for Job Search Engine. IOP Conf. Ser. Mater. Sci. Eng. 288, 012038. https://doi.org/10.1088/1757-899X/288/1/012038

Yadalam, T.V., Gowda, V.M., Kumar, V.S., Girish, D., M., N., 2020. Career Recommendation Systems using Content based Filtering, in: 2020 5th International Conference on Communication and Electronics Systems (ICCES). Presented at the 2020 5th International Conference on Communication and Electronics Systems (ICCES), pp. 660–665. https://doi.org/10.1109/ICCES48766.2020.9137992

VII. ACKNOWLEDGMENT

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