Vol.15, Issue No 2, 2025

Automated Recruitment Process by using Machine Learning

[1] Challa Upendra, [2] Bobbili Hema Naga Sai Teja, [3] Eda Sanjay Babu, [4] Akurathi Durga Naga Sri Chaitanya, [5] Mrs. B. Supraja

[1,2,3,4] Students, Dept. of CSE, DNR College of Engineering & Technology, Balusumudi, Bhimavaram, India.

[5] Assistant Professor, Dept. of CSE, DNR College of Engineering & Technology, Balusumudi, Bhimavaram, India.

Abstract-

Manually verifying resumes is an extremely laborious task in today's competitive job market. Because going through each candidate's CV by hand is a laborious and time-consuming process, this work is an experimental approach to rating resumes for employment. The amount of labor needed to complete a given job will rise in proportion to the quantity of resumes received. A fresh approach has been suggested to fix these issues. A suggested application for processing resumes using machine learning aims to enhance the overall effectiveness of the recruiting process. Among the techniques used in this project are those that rank applicants according to their whole performance in relation to the skill requirements of the company's desired employment position and those that optimize candidates' performance in the chosen skill listed on their résumé. It will look at the user's course completion certificate for the desired abilities to make sure the information they provided is correct. Using a machine learning system, we can verify the accuracy of resumes, enhance user abilities, and rate prospects. The python language is used to accomplish the whole notion, and the results will undoubtedly improve the efficiency of the recruiting process.
Tags: AI, E-Hiring, Smart Recruitment, Machine Learning, and Ranking

INTRODUCTION

Thanks to the internet and other digital tools, recruiting teams may access a plethora of data on potential candidates. The challenge is in actually collecting, compiling, and analyzing the necessary data to make informed recruiting choices. The time and resources needed to carefully review each applicant's portfolio, find passive applicants, and write unique job descriptions are just not available to talent acquisition teams. There is a way that machine learning can tackle this. Using this technology, recruiting managers may automate many mundane and repetitive tasks, allowing them more time for strategic, value-adding work.
It would be a huge undertaking to go through N resumes to confirm whether the information provided is accurate, thus these days HR departments of multinationals would rather not spend a lot of time doing so. An application-based approach might be more suitable for this purpose. By streamlining the procedure, this app makes it easy for candidates to submit their resumes. Then, using HR-supplied keywords and the candidate's completed courses, the machine learning algorithm finds their perfect match. For applicants with relevant job experience, it also takes a look at their competency % in a certain skill. Following this, the application will provide a ranking to each applicant for the open position in the company according on their percentage of proficiency and the programs they have finished. So that they may simply notify the applicants who have been picked for the next stage, this will be shown for the HR department. Using this method, recruiters will be able to employ prospects faster.

LITERATURE REVIEW

Based on the previously published research articles, this section analyzes a few comparable studies. Publications from Arxiv, the IEEE digital library, Elsevier, and Springer that are primarily concerned with recruiting and hiring procedures are the primary focus of this literature study. The following subsections detail the study's conclusions.
Utilizing data to analyze HR resumes A 2016 paper by Tim Zimmermann, Leo Kotschenreuther, and Karsten Schmidt [1] developed a framework based on NLP and ML. This algorithm evaluates candidates based on the skills shown in their resumes. Analysis of the course experience was omitted. Stefan Wagner, Justus Bogner, Jonas Fritzsch, and Marvin Wyrich presented the Resume-Driven Development approach in 2021. The degree and abilities of the applicant were the main points of this method. The resumes of the applicants were not ranked.
Joosof Mashayekhi, Nan Li, Bo Kang, Jefrey Lijffijt, and Tijl De Bie [12] conducted an assessment of e-

recommendation systems based on challenges in 2022. They put too much emphasis on finding problems in this system. The certification and rating of the courses were not analyzed. In 2020, Lodewijk Gelauff, Ashish Goel, Kamesh Munagala, and Sravya Yandamuri presented the Advertising for Demographically Fair Outcomes [13]. The system's primary emphasis was on posting job openings. The certification and rating of the courses were not analyzed. Samuel F. Way, Daniel B. Larremore, and Aaron Clauset [14] addressed the gender gap in computer science faculty hiring networks by examining gender, productivity, and prestige. Adish Singla, Eric Horvitz, Pushmeet Kohli, and Andreas Krause [15] first proposed the idea of learning to build teams in 2015. Hiring a group of individuals from the crowd was the main emphasis of this approach. Once again, they neglected to evaluate the course's accreditation and placement. While discussing data mining in 2015, Gaurav Singh Thakur, Anubhav Gupta, and Sangita Gupta addressed the software industry's need to predict human performance[16]. The primary goal of this approach was to provide a structure that would enable any project manager to make an informed choice when hiring new staff. Peeking into the Pandora's Box from a Socio-Technical Perspective was also covered by Jun Yuan, Julia Stoyanovich, and Aritra Dasgupta [17]. The system's developers neglected to examine course certification in favor of concentrating on ranking algorithms. In 2020, C. Ebert and S. Counsel launched Resume Driven Development [2]. Their primary emphasis in this system was the ranking algorithm. Adomavicius, Bockstedt, Gupta, and Kauffman (2017) examined the topic of technology trends in the IT landscape from a design science perspective [18]. The ranking algorithm was the primary focus of both studies, however the course certification was not examined. Considering all of these factors, our paper suggests a better method of recruiting.

PROPOSED CANDIDATE HIRING SYSTEM

The increasing number of resumes might put a strain on human resources departments, who typically review applications by hand. An example of the decision-making process utilized by the HR department and exact parameterization by the department's experienced recruiters are typically required by systems that automatically rank potential prospects in order to speed up the recruiting process [3]. This laborious and prone to mistake procedure has to be repeated whenever the selection criteria are changed. One such approach is to automate the process of applicant rating using machine learning techniques. For this technique to work, it requires a substantial amount of training data, which includes the outcomes of candidate selections in the past. In order to learn how to include predefined characteristics for ranking, "learning-to-rank" methods use supervised learning algorithms. Ranking mastery has been a hot topic in the field of information retrieval for the last several years. The training set consists of feature vectors (Xi(k)) representing a candidate's previous applications and the relevance score (Vi) as determined by an expert recruiter. Whether a candidate lists a certain skill in their LinkedIn profile or not, or whether it's a numerical value (for instance, years of experience), it may be used as a Boolean variable to assess their character. The ranking model is constructed using the training data, and the learning algorithm's output predicts the recruiter's choice when presented with it. as an input, the contender's feature vector. To generate the final ranked list of applicants, the learned model is used to sort a collection of application candidates in the test phase. What follows is a detailed outline of the hiring procedure. As illustrated in Figure 1, the system will begin verifying the candidate's submitted document for resume status. If it is determined that the document is not a resume, the system will exit the process. The system will proceed to the next step if it is a resume. The next stage involves the system searching for a keyword, such as "machine learning," "cloud computing," or "full stack developer." If the keyword matches the role that the organization is seeking, the system will proceed to the next step, which involves checking the candidates' educational details, marks, and completed coursework [5]. applicants will be given marks and a credit score based on their educational background and any relevant course work they have done. The system would then rank the applicants according to these scores and save the results for future reference. You may see the outcome in an Excel spreadsheet.

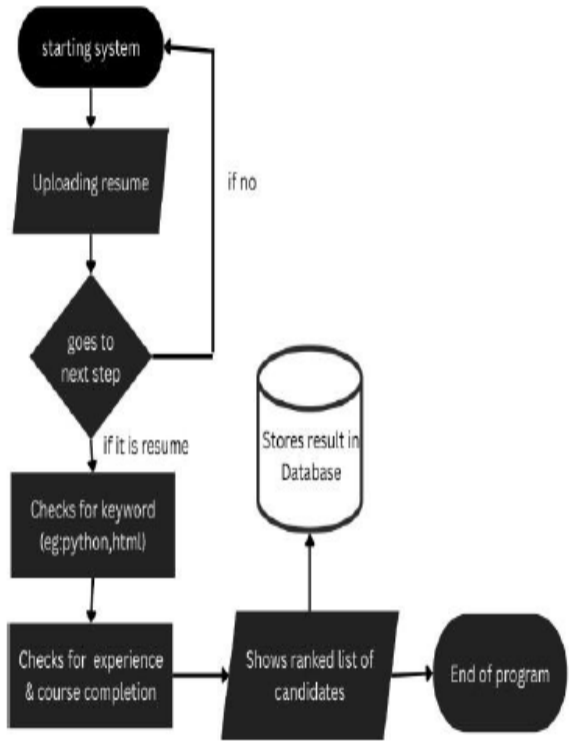

Fig-1-Proposed Hiring and Recruitment System

SYSTEM DESIGN

Below you will find the structural diagram that illustrates the physical implementation of a software system's components. It shows the general structure of the software system and the connections, limitations, and limits between each element. In this schematic, the applicant submits their résumé to the machine learning system's front end, which then gathers the information, processes it using the provided datasets, and displays the candidates who are most suited for the position. The results will be saved for later use, and the TF/IDF algorithm will rank the candidates according to their educational marks and course completion works. The system will display the results in an Excel sheet, as shown in Fig. 2.

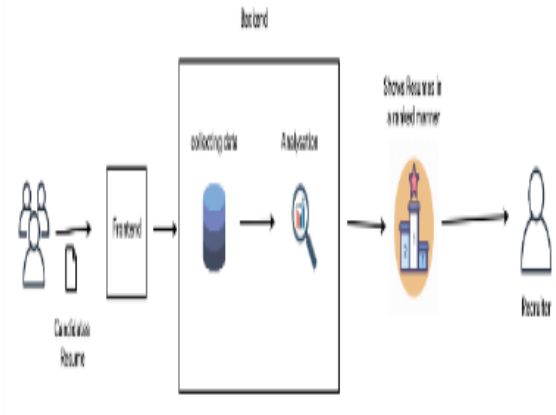

Fig-2-Architecture Diagram

RESULT AND DISCUSSION

In order to determine a candidate's credit score, the built system was trained using a collection of course syllabi that it may compare with the applicants' actual completed courses. The system's credit score will next be used to rank the prospects. The outcome will be saved and shown in the Excel spreadsheet, as seen in Figure 3. Figure 4 shows the graphical representation of the candidates' rankings. It is necessary to utilize the "pandas" module in Python to save the outcome to the Excel document. Pandas allows you to analyze data and draw conclusions based on statistical theory. Cleaning datasets makes them more usable and easier to interpret. We can properly store data read from any file in Pandas, however by default it can read from Excel and CSV files.

CONCLUSION

It is feasible to recruit workers according to their abilities and coursework with the help of ML. The score methodology is taught to machine learning algorithms using training data provided by human recruiters, allowing them to rate prospects effectively. An integrated e-recruitment system was developed and deployed using Python in accordance with the planned design. Our system has been tested and shown to accurately score job candidates based on their level of extraversion. Streamlining the whole process allows HR to concentrate on other priorities.

REFERENCES

1. Tim Zimmermann, Leo Kotschenreuther, Karsten Schmidt “Data – driven HR Resume Analysis based on Natural language processing and machine learning” in 2021 Available: https://arxiv.org/pdf/1606.05611.pdf
2. Ebert and S. Counsel “Resume - Driven Development: A Definitionand Empirical Characterization” in 2021 Available: https://arxiv.org/pdf/2209.05112.pdfcompany-switched-to- hyped-technology/
3. Evanthia Faliagka, Kostas Ramantas, Athanasios Tsakalidis, Giannis Tzimas “Application of Machine Learning Algorithms to an online Recruitment System” The Seventh International Conference on Internet and Web Applications and services in 2012
4. Shubham Shendage, Tushar Shinde, Ketki Govilkar “"Smart recruitment system using machine learning” JETIR June 2019, Volume 6, Issue 6
5. Karolina RĄB-KETTLER, Bada LEHNERVP “Recruitment in the times of machine learning” Sciendo 2019, Volume 27, Issue 2, pp. 105-109.
6. James Wright, Dr David Atkinson “The impact of artificial intelligence within the recruitment” Carmichael fisher May 2016
7. Ayesha Javed, Juthika Kabir Brishti “the viability of ai-based recruitment process” diva-portal in 2020
8. N. Sharma, R. Bhutia, V. Sardar, A. P. George and F. Ahmed, "Novel Hiring Process using Machine Learning and Natural Language Processing," 2021 IEEE International Conference on Electronics, Computing and Communication Technologies, Bangalore, India, 2021, pp. 1-6, doi: 10.1109/CONECCT52877.2021.9622692
9. A. Mahmoud, T. AL Shawabkeh, W. A. Salameh and I. Al Amro, "Performance Predicting in Hiring Process and Performance Appraisals Using Machine Learning," 2019 10th International Conference on Information and Communication Systems (ICICS), Irbid, Jordan, 2019, pp. 110-115, doi: 10.1109/IACS.2019.8809154.
10. D. Jagan Mohan Reddy, S. Regella and S.R. Seelam “Recruitement Prediction Using Machine Learning” 2020 5th International conference on computing, communication and security(ICCCSS), Patna, india, 2020,pp. 1-4, doi: 10.1109/ICCCS49678.2020.9276955.
11. K. Appadoo, M. B. Soonnoo and Z. Mungloo-Dilmohamud, "Job Recommendation System, MachineRegression, Classification, Natural Language Processing," 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE), Gold Coast, Australia, 2020, pp. 1-6, doi: 10.1109/CSDE50874.2020.9411584.
12. Mashayekhi, Yoosof & Li, Nan & Kang, Bo & Lijffijt, Jefrey & Bie, Tijl. (2022). A challenge-based survey of e-recruitment recommendation systems. 10.48550/arXiv.2209.05112.
13. Gelauff, Lodewijk & Goel, Ashish & Munagala, Kamesh & Yandamuri, Sravya. (2020). Advertising for Demographically Fair Outcomes.
14. Way, Samuel & Larremore, Daniel & Clauset, Aaron. (2016). Gender, Productivity, and Prestige inComputer ScienceFaculty Hiring Networks. 1169-1179. 10.1145/2872427.2883073.
15. Singla, Adish & Horvitz, Eric & Kohli, Pushmeet & Krause, Andreas. (2015). Learning to Hire Teams. Proceedings of the AAAI Conference on Human Computation and Crowdsourcing. 3. 10.1609/hcomp.v3i1.13243.
16. Thakur, Gaurav & Gupta, Anubhav & Gupta, Sangita. (2015). Data Mining for Prediction of Human Performance Capability in the Software-Industry. International Journal of Data Mining & Knowledge Management Process. 5. 10.5121/ijdkp.2015.5205.
17. Yuan, Jun & Stoyanovich, Julia & Dasgupta, Aritra. (2022). Rankers, Rankees, & Rankings: Peeking into the Pandora's Box from a Socio-TechnicalPerspective. 10.48550/arXiv.2211.02932.