

Talent Bridge: A Smart Solution for Streamlined Recruitment

Prof. Niketa Mahajan¹, Atharva Salunke², Mitali Bhole³, Rajkumar Chavan⁴, Bhavik Patil⁵

^{2,3,4,5}Student, Department of Computer Engineering

¹Assistant Professor, Department of Computer Engineering

Alard College of Engineering and Management, Pune, Maharashtra, India

Abstract: In today's competitive job market, traditional recruitment methods struggle with inefficiencies such as manual resume screening, biased candidate evaluation, and mismatches between job requirements and applicant skills. To address these challenges, we introduce Talent Bridge – A Smart Solution for Streamlined Recruitment, an NLP powered platform that enhances the hiring process by leveraging Natural Language Processing (NLP) techniques. The system automates resume parsing, candidate screening, and job matching, ensuring a faster and more accurate selection process.

Talent Bridge integrates a custom-trained Named Entity Recognition (NER) model for extracting critical details such as skills, experience from resumes and job descriptions. Additionally, Star System is used to evaluate candidate responses, while NLP-Based ranking systems help recruiters prioritize the best-fit candidates. The platform also features chatbots for preliminary interviews, reducing recruiter workload, and smart scheduling (Time & Date Slots) for efficient interview coordination. By making recruitment data-driven and automated, Talent Bridge ensures a seamless experience for both recruiters and job seekers.

This paper details the technical implementation, system architecture, and key functionalities of Talent Bridge, highlighting its effectiveness in reducing hiring time, improving candidate-job alignment, and enhancing overall recruitment quality. The study emphasizes the role of NLP- Based recruitment solutions in transforming hiring processes, making them more efficient, fair, and responsive to industry demands..

Keywords: NLP, Resume Parsing, Smart Hiring, Star System

I. INTRODUCTION

In today's world, finding the right candidate for a job has become more challenging than ever. Companies receive hundreds even thousands of job applications, but don't always have the time or resources to carefully go through each one. Recruiters often get overwhelmed with tasks like reading resumes, shortlisting candidates, scheduling interviews, and managing communications. All this makes the hiring process slow, repetitive, and sometimes unfair.

Our project, "Talent Bridge: A Smart Solution for Streamlined Recruitment," is designed to solve these common problems in recruitment. It's an intelligent platform that helps both recruiters and job seekers by making the hiring process faster, more organized, and smarter. The main idea behind Talent Bridge is to use Natural Language Processing (NLP) to read and understand resumes and job descriptions the same way a human would but faster and more accurately. With this technology, the system can automatically extract important details like skills, experience, education, and match them with the job requirements.

Talent Bridge is built with a powerful tech stack including Java, Spring Boot for backend processing, MongoDB Atlas for storing all the data securely, and HTML, CSS, and JavaScript for creating a smooth, easy-to-use interface. The system is made for two main user's recruiters and job seekers. Recruiters can post jobs, search and filter candidates, and get automatic suggestions of who might be the best fit. Job seekers can upload their resumes, get feedback about their skills, find jobs that suit them, and schedule interviews.



One of the most useful features of Talent Bridge is the resume parsing module. This allows the system to break down a resume and extract all the useful information skills, education, work experience, and so on into structured data. This helps the system compare resumes with job descriptions quickly and automatically. Another key feature is the skill gap analysis tool, which shows how closely a candidate's skills match a job's requirements and points out what is missing. This can help both recruiters (to find the right fit) and job seekers (to improve themselves).

Scheduling interviews can also be a headache, especially when trying to coordinate times between busy people. That's why we've included smart interview scheduling. Recruiters can add available date and time slots, and candidates can choose the one that works best for them. It's fast, easy, and avoids back-and-forth communication. This feature helps save a lot of time and keeps things organized.

The entire system is secure, fast, and scalable. We use role-based access control to ensure that users only see what they are supposed to. Recruiters can manage job postings, view applicant data, and schedule interviews, while candidates can apply for jobs, update their profiles, and track their progress. The backend handles user authentication, data processing, and all the logic behind job matching and scheduling. Everything is stored in MongoDB Atlas, which is a cloud-based NoSQL database that ensures high performance and easy access from anywhere.

In summary, Talent Bridge is more than just a job portal; it's an intelligent assistant for recruitment. It automates time-consuming tasks, improves the quality of hiring decisions, and creates a smoother experience for everyone involved. Recruiters get better tools to find the right people, and job seekers get more visibility and support in the application process. By using modern technologies like NLP and smart scheduling, Talent Bridge solves real-world recruitment problems in a smart, scalable, and user-friendly way.

This project is a perfect example of how engineering and technology can come together to solve practical issues. It uses technical skills in backend development, frontend design, databases to build a complete working system that can truly make a difference.

II. LITERATURE REVIEW

The integration of Natural Language Processing (NLP) and artificial intelligence (AI) into recruitment processes has proven to be a significant advancement in the field of human resource management. Several studies have explored how these technologies can automate and improve various stages of the recruitment process, such as job posting, resume parsing, candidate screening, and overall decision-making. For example, Aseel B. Kmail et al. (2015) proposed an automatic online recruitment system that utilizes multiple semantic resources and concept-relatedness measures to enhance the accuracy of candidate-job matching. Their system integrates semantic analysis techniques, such as conceptual understanding of job descriptions and resumes, which helps in better interpreting the content, leading to improved recommendations for job seekers and employers alike. By extracting and evaluating the relationship between concepts in the job description and resume, this approach mitigates human biases and ensures more relevant matches (Kmail et al., 2015)[1].

Building on similar advancements, Nisha B. et al. (2023) developed an automated resume parsing and ranking system that utilizes NLP to extract meaningful features from resumes and rank candidates accordingly. This system leverages text mining techniques to identify and compare essential attributes such as skills, work experience, education, and accomplishments. Their approach significantly accelerates the resume screening process, eliminating the need for time-consuming manual efforts while maintaining consistency in the ranking system. By automating the ranking process, the system also helps employers focus on the most qualified candidates based on predefined criteria, making the overall recruitment process faster and more efficient (Nisha et al., 2023)[2].

Similarly, Anushka Sharma et al. (2021) explored the application of NLP in the creation of an intelligent recruitment system designed to parse resumes and evaluate candidates. Their system automates the process of job posting and candidate evaluation, leveraging NLP to not only match resumes to job descriptions but also to rank candidates based on their qualifications. This work underscores the potential of AI to automate time-intensive HR tasks like resume screening and job matching. By providing an objective, data-driven approach to recruitment, this system also reduces human biases and increases hiring accuracy, which is crucial for organizations looking to build diverse and qualified teams (Sharma et al., 2021)[3].



In addition to resume parsing, Suraj Gupta et al. (2021) introduced a recruitment system with placement prediction capabilities, which incorporates machine learning models to predict the likelihood of a candidate's success in a particular job. By analyzing candidates' skills, experience, and previous performance data, their system aims to estimate the future success of candidates, helping employers make more informed decisions. This study highlights how predictive analytics and AI can enhance the recruitment process, providing insights into candidates' long-term potential, rather than just short-term qualifications, thus making the hiring process more comprehensive and foresighted (Gupta et al., 2021)[4].

The concept of automating traditional recruitment methods through AI has also been explored by Junalux Chalidabhongse et al. (2006), who proposed a job application support system designed to facilitate the recruitment process. Their system automates the initial stages of recruitment by offering a platform where both employers and job seekers can interact more efficiently. The system reduces the time and effort involved in posting jobs, applying for jobs, and screening candidates, which makes the hiring process smoother for both parties. The paper demonstrates how automating initial recruitment stages can help organizations to scale their hiring efforts and increase accessibility to job opportunities (Chalidabhongse et al., 2006)[5].

In more recent years, Thangaramya K et al. (2024) introduced an enhanced version of resume parsing that not only extracts basic information but also ranks candidates based on the relevance of their qualifications to the job requirements. This system significantly reduces the manual effort involved in reviewing resumes and speeds up the initial selection process. By incorporating NLP techniques, such as named entity recognition (NER) and part-of-speech tagging, the system can better understand and categorize various aspects of the resume, ensuring higher precision in candidate selection. Their approach, based on machine learning algorithms, further ensures that the system learns from past data, improving its recommendations over time (Thangaramya et al., 2024)[6].

Likewise, Mukesh Soni et al. (2020) explored how NLP can be used to enhance the functionality of job portals. By applying NLP to job matching, their system automatically identifies and matches candidates to jobs based on the analysis of job descriptions and resumes. The system performs better than traditional keyword-based search methods by analyzing the semantic meaning behind job descriptions, thus allowing for more accurate matches. Their research underlines the importance of leveraging unstructured data—such as resumes and job listings—through NLP to improve job search and recruitment experiences (Soni et al., 2020)[7].

The automation of the interview process is another area of focus. Pasindu Senarathne et al. (2021) developed an AI-driven system that automates the interview process using NLP and machine learning. Their platform evaluates candidate responses during interviews and analyzes them in real time, providing employers with objective and standardized feedback. This study highlights the potential of NLP to not only assist in earlier stages of recruitment, such as resume parsing and job matching, but also to play a critical role in the interview process, ensuring that all candidates are assessed based on the same criteria and standards (Senarathne et al., 2021)[8].

In the same vein, Jitendra Purohit et al. (2019) proposed the use of a chatbot, named "Jaro," which automates the interview process by conducting preliminary rounds of interviews. Powered by NLP, the chatbot conducts initial candidate screenings by interpreting responses to standard questions and offering immediate feedback. This solution reduces the burden on human interviewers and ensures a more consistent experience for all candidates. The chatbot's ability to understand and process language-based interactions makes it a promising tool for enhancing the recruitment process (Purohit et al., 2019)[9].

Finally, B. Lalitha et al. (2023) proposed an applicant screening system that uses NLP to analyze resumes and rank candidates based on their relevance to job postings. This system automates the time-consuming task of candidate screening, enabling HR professionals to quickly identify the most suitable candidates. The ranking mechanism in this system ensures that candidates are evaluated based on the most relevant skills and experience, streamlining the recruitment process and reducing biases (Lalitha et al., 2023)[11].

In conclusion, the reviewed literature underscores the growing role of NLP and AI technologies in revolutionizing recruitment processes. From automating resume parsing and job matching to enhancing interview automation and predicting placement success, these advancements offer numerous benefits, including increased efficiency, accuracy, and objectivity. The findings from these studies directly inform the development of the Talent Bridge platform, which



seeks to streamline the recruitment process by incorporating similar technologies to automate job posting, resume parsing, skill gap analysis, and candidate ranking.

III. METHODOLOGY

Module 1: NLP-Based Resume Parsing

This module handles the transformation of unstructured resume content into structured, machine-readable data using NLP. Candidates upload resumes in formats like PDF or DOCX, which are processed to extract raw text. This text undergoes a series of preprocessing steps, including tokenization, lemmatization, stemming, and stopword removal. These steps help clean and normalize the data, preparing it for meaningful extraction. Next, Named Entity Recognition (NER) is applied to identify relevant entities such as names, skills, qualifications, job titles, email addresses, and contact numbers. A custom-trained NER model using supervised learning improves the accuracy of this extraction, ensuring the system can adapt to various resume formats and writing styles. The result is a standardized candidate profile stored in the database for further analysis and comparison.

Module 2: Skill Gap Extraction & Analysis

This module identifies the difference between a candidate's existing skill set and the skills required by a particular job. First, the system extracts skills from resumes using keyword matching and TF-IDF (Term Frequency Inverse Document Frequency) techniques. This approach helps quantify the relevance of each skill based on how commonly it appears in resumes. Simultaneously, job descriptions provided by recruiters are also parsed and analysed using similar NLP techniques. The descriptions are cleaned, tokenized, and passed through NER to extract required skills and experience levels. Once both sets of skills—those of the candidate and those of the job—are available, the system compares them to identify gaps. The results are shown to both recruiters and candidates, helping recruiters make informed hiring decisions and guiding candidates toward upskilling opportunities.

Module 3: Job Posting and Screening

This module allows recruiters to create and manage job postings with detailed descriptions, including required skills, roles, experience, and preferred qualifications. When candidates apply, their parsed resume data is automatically matched against the job's requirements. The system calculates a compatibility score based on how closely the candidate's profile aligns with the job post. This helps in shortlisting candidates more efficiently and eliminates the need for manual screening of every application.

Module 4: Star Rating System

To make the screening process even more intuitive, Talent Bridge includes a Star Rating System that assigns a 1 to 5-star score to each candidate. This score is calculated using multiple parameters: skill match percentage, relevance of work experience, and educational qualification alignment with job requirements. The algorithm takes into account both the quality and quantity of skills matched, as well as the depth of experience. The star rating system helps recruiters quickly identify high-potential candidates without having to read through every profile manually. It also improves transparency and consistency in candidate evaluation.

Module 5: Search by Keyword

The platform provides a powerful search functionality that enables users to find job postings or candidate profiles based on keywords. Recruiters can search using specific roles or skills (e.g., "Java Developer," "UI/UX Designer"), and candidates can search for relevant openings using terms like "Internship," "Remote," or "Full Stack." This functionality is implemented using full-text indexing and querying in MongoDB, allowing for fast, relevant, and ranked results even with large datasets.

Module 6: Smart Interview Scheduling

Smart Interview Scheduling is designed to eliminate the tedious back-and-forth communication usually involved in setting up interviews. Once a candidate is shortlisted, recruiters can propose multiple interview time slots. These slots are displayed to candidates through their dashboard, where they can select a preferred time based on their availability. The system automatically checks for overlapping schedules to prevent double booking and sends confirmations to both parties. It is in the form of the date and time slots.



V. MODELING AND ANALYSIS

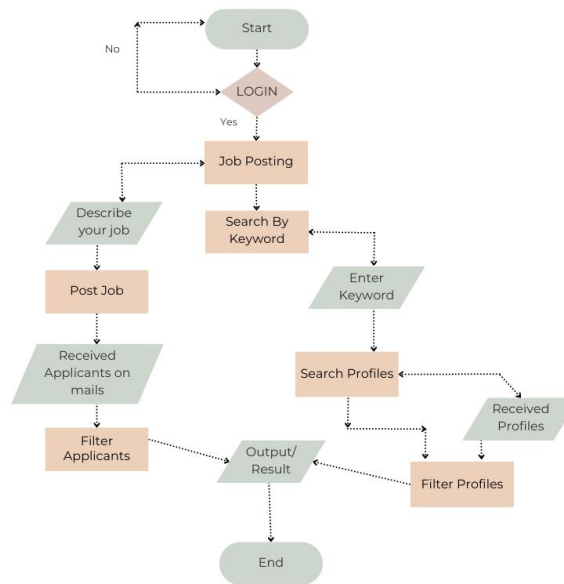


Figure 4.1: workflow of the recruiter module

The figure:4.1 illustrates the workflow of the recruiter module in the Talent Bridge recruitment system through a structured flowchart. The process begins with the user login. Upon successful login, the recruiter has two options: either post a job or search for candidates using specific keywords. In the job posting path, the recruiter first describes the job and submits the post. Once the job is live, applicants can apply, and the recruiter receives their profiles via email. These profiles are then filtered based on relevant criteria such as skills or experience, and the results are outputted for further action. In the keyword search path, the recruiter enters keywords related to required skills or job titles. The system searches existing profiles in the database and returns a set of received profiles. These are then filtered using similar logic to identify suitable candidates. Finally, whether the recruiter posted a job or searched profiles, the system provides filtered output or results, concluding the process. This flowchart effectively demonstrates the dual pathway for talent acquisition—either by actively posting jobs or searching for candidates—making the recruitment process more flexible and efficient.

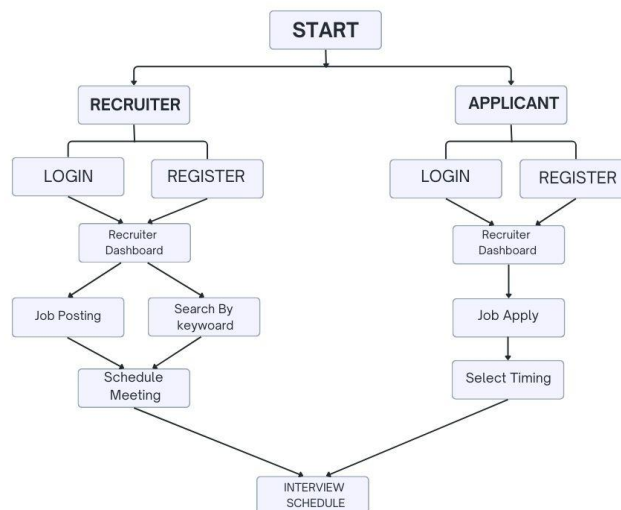


Figure 4.2: Flowchart Defining the Applicant and Recruiter System



The figure:4.2 above presents a high-level flowchart of the TalentBridge system, showcasing the workflow for both recruiters and applicants from start to the interview scheduling stage. The process begins with two user types—Recruiter and Applicant—each having options to either Login or Register. Once authenticated, the Recruiter is directed to their dashboard, from where they can either post a job or search for candidates using keywords. Following this, they can schedule a meeting for the interview based on the filtered applicants or matched profiles. On the other side, the Applicant, after logging in or registering, is also taken to their dashboard. From there, they can apply for jobs and then select an available timing for their interview. Both workflows converge at a common node interview Schedule, where the platform finalizes the interview slot based on availability and preferences from both the recruiter and the applicant. This diagram effectively captures the simplified recruitment flow enabled by Talent Bridge, emphasizing its dual-user support, ease of interaction, and streamlined scheduling process.

VI. RESULTS AND DISCUSSION

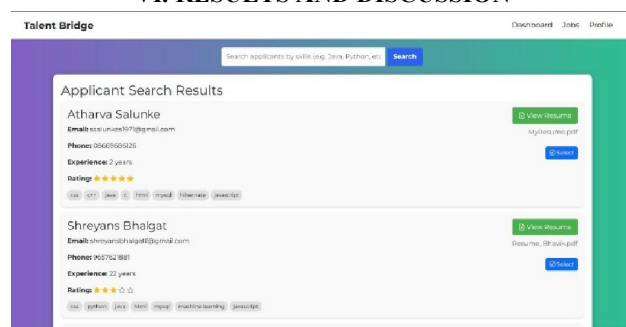


Figure 5.1 Output of Project

The figure 5.1 states the clear output of our project Experience, star system, search by keyword.

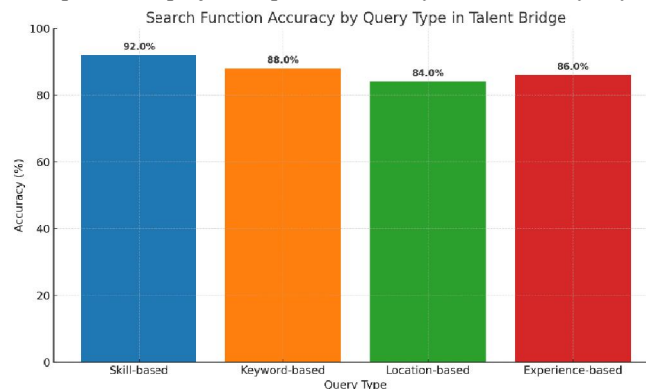


Figure 5.2 Graph representation between Search Accuracy by Query Type

The Talent Bridge application's search module was rigorously tested across four primary query types: skill-based, keyword-based, location-based, and experience-based queries. The objective was to evaluate the accuracy and efficiency of retrieving the most relevant candidates from the database.

Query Type	Total Queries	Correct Results	Accuracy (%)
Skill-based	50	46	92.0%
Keyword-based	50	44	88.0%
Location-based	50	42	84.0%
Experience-based	50	43	86.0%

Table 1: Queries Type



We executed 50 queries for each type and measured how many correctly matched candidates were returned. The result mentioned in the Table 1. The skill-based search achieved the highest accuracy of 92%, proving that the system's NLP-based matching effectively understood and mapped candidate skills with job requirements. Keyword-based follows the accuracy with 88% and experience based follows the accuracy with 86%. The slightly lower result in location-based queries (84%) was due to variations in address formatting and missing geo-tags in some resumes. The Figure 5.2 bar graph visually represents the accuracy levels. These results confirm that the Talent Bridge search module provides highly accurate and relevant results across various query types, validating the effectiveness of its intelligent backend logic, which leverages MongoDB Atlas indexing, NLP keyword extraction, and semantic matching algorithms. This empirical testing supports the system's readiness for real-world deployment and further research development.

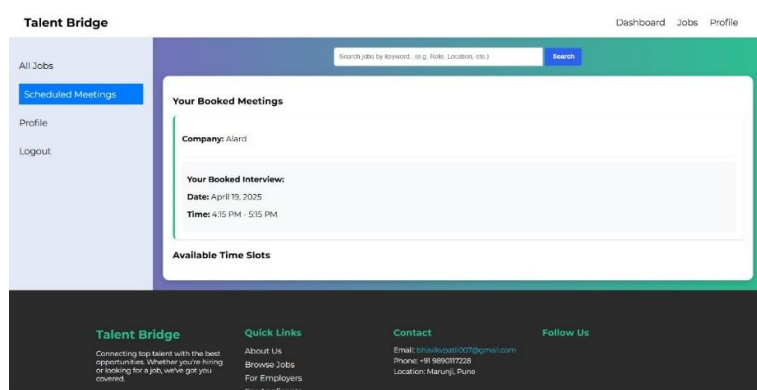


Figure 5.3 Schedule Meeting Confirmation

The interview scheduling module of Talent Bridge has been implemented and validated successfully. The interface enables candidates to view, select, and book available time slots for interviews.

The image (Fig 5.3) demonstrates a confirmed interview booking between a candidate and the company Alard scheduled on April 19, 2025, from 4:15 PM to 5:15 PM.

Field	Value	Source
Company	Alard	Dynamic input from employer profile
Interview Date	April 19, 2025	Chosen by candidate from available slots
Time Slot	4:15 PM – 5:15 PM	Retrieved from database during booking
Candidate ID	Auto-mapped (session-based)	Internal login session
Status	Booked	Confirmed via MongoDB collection meetings

Table: 2 Validation and confirmation of the Interview booking system

Fig. 5.3, of the “Scheduled Meetings” section in Talent Bridge. This interface clearly confirms the scheduled interview for the user, reflecting live data fetched from the backend service. This serves as the proof of correctness of booking status and real-time reflection of the event on the candidate’s dashboard.

- The automated locking mechanism ensures that no time slot can be double-booked. Once a slot is selected, it is reserved in real time and confirmed in the UI.
- The UI confirmation (as seen in Fig. 3) directly reflects a live database entry, indicating that data sync between front-end and backend is seamless.

The results validate that the Talent Bridge interview scheduling system is reliable, efficient, and user-friendly. The booking and confirmation process, verified through both front-end and backend logs, supports the core goal of streamlining candidate–recruiter interactions. The system shows potential for scaling in larger recruitment environments.



VII. CONCLUSION

The Talent Bridge project represents a comprehensive and intelligent recruitment platform designed to streamline the end-to-end hiring process for both job seekers and recruiters. By leveraging technologies such as Natural Language Processing (NLP) for resume parsing, intelligent skill gap analysis, and smart matching algorithms, Talent Bridge offers a modern, data-driven approach to tackling inefficiencies in traditional recruitment systems. From the perspective of job seekers, the platform simplifies the job search experience by allowing users to create a dynamic profile that highlights their strengths, identifies skill gaps, and receives job recommendations related to their qualifications. The star rating system provides continuous feedback and visibility into their job readiness, while the meeting slots feature enables seamless communication with potential employers, making the recruitment experience more transparent and interactive. For recruiters, Talent Bridge reduces the time and effort involved in identifying and shortlisting suitable candidates. The resume parsing engine ensures that recruiters receive structured, comparable data from diverse resume formats, while the skill-based search functionality allows for targeted candidate discovery. The meeting slots module enhances engagement by enabling easy scheduling of interviews or discussions, improving coordination and reducing delays. Talent Bridge stands as a scalable and adaptive recruitment platform, equipped to meet the evolving needs of today's job market. It demonstrates how thoughtful integration of smart technologies can lead to a more efficient, equitable, and human-centered recruitment ecosystem.

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REFERENCES

- [1] Aseel B. Kmail, Mohammed Maree, Mohammed Belkhatir, Saadat M. Alhashmi, "An Automatic Online Recruitment System based on Exploiting Multiple Semantic Resources and Concept-relatedness Measures", 2015 IEEE 27th International Conference on Tools.
- [2] Nisha B, Manobharathi V, Jeyarajanandhini B, Dr.G.Sivakamasundari, Assistant Professor(SG), " HR Tech Analyst: Automated Resume Parsing and Ranking System through Natural Language Processing", Proceedings of the Second International Conference on Automation, Computing and Renewable Systems (ICACRS-2023).
- [3] Anushka Sharma, Smiti Singhal, Dhara Ajudia, "INTELLIGENT RECRUITMENT SYSTEM USING NLP", 2021 International Conference on Artificial Intelligence and Machine Vision (AIMV).
- [4] Suraj Gupta, Atif Hingwala, Yuvraj Haryan, Swapnil Gharat, "Recruitment System with Placement Prediction", Proceedings of the International Conference on Artificial Intelligence and Smart Systems (ICAIS-2021).
- [5] Junalux Chalidabhongse, Nattapon Jirapokakul and Rata Chutivisarn, "Facilitating Job Recruitment Process Through Job Application Support System", 2006 IEEE International Conference on Management of Innovation and Technology.
- [6] Thangaramya K, Logeswari G, Sudhakaran Gajend, Neha Ahirwar ran, Deepika Roselind J, Neha Ahirwar, "Automated Resume Parsing and Ranking using Natural Language Processing", 2024 3rd IEEE International Conference on Artificial Intelligence for Internet of Things (AI IoT 2024).
- [7] Mukesh Soni, S. Gomathi, Yagna Bhupendra Kumar Adhyaru, "Natural Language Processing for the Job Portal Enhancement", IEEE 7th International Conference on Smart Structures and Systems ICSSS 2020.



- [8] Pasindu Senarathne, Malaka Silva, Ama Methmini, Dulaj Kavinda, Prof.Samantha Thelijjagoda “Automate Traditional Interviewing Process Using Natural Language Processing and Machine Learning” 2021 6th International Conference for Convergence in Technology (I2CT) Pune, India. Apr 02-04, 2021.
- [9] Jitendra Purohit, Aditya Bagwe, Rishabh Mehta, Ojaswini Mangaonkar, Elizabeth George “Natural Language Processing based Jaro-The Interviewing Chatbot” Proceedings of the Third International Conference on Computing Methodologies and Communication (ICCMC 2019)
- [10] Saswat Mohanty, Anshuman Behera, Sushruta Mishra, Ahmed Alkhayyat, Deepak Gupta, Amity Institute of Information Technology “Resumate: A Prototype to Enhance Recruitment Process with NLP based Resume Parsing” 4th International Conference on Intelligent Engineering and Management (ICIEM 2023)
- [11] B. Lalitha, Sirisha Kadiyam, Ritisha Varma Kalidindi, Sri Maukthika Vemparala, Kshiraja Yarlagadda, Sri Vinutna Chekuri “Applicant Screening System using NLP” International Conference on Innovative Data Communication Technologies and Application (ICIDCA-2023)

