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REVIEW OF TRAINING AND PLACEMENT MANAGEMENT SYSTEM: A MERN STACK SOLUTION FOR COLLEGE WEBSITES

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Abstract: The Training and Placement Management System (TPMS) developed for college websites using the MERN stack presents an innovative approach to streamline and optimize training and job placement processes within collegiate environments. This review paper synthesizes existing literature on training and placement management systems, explores methodologies employed in predictive analytics and machine learning for placement prediction, and discusses the architecture and implementation of the proposed MERN-based system. By leveraging MongoDB, Express.js, React, and Node.js, the TPMS aims to offer a user-centric and feature-rich experience for students, recruiters, and administrators alike. Key functionalities include student profile management, job listings, application tracking, and administrative controls. This review paper examines the significance of TPMS in bridging academia-industry gaps, improving placement rates, and enhancing career prospects for college students.

Index Terms - Training and Placement Management System, MERN stack, MongoDB, Express.js, React, Node.js, Role-based access, Student portal, Recruiters, Administrators, User-centric design, Data security.

I. INTRODUCTION

In the rapidly evolving landscape of education and employment, the Campus Placement project represents a pivotal innovation: a MERN-based website designed to redefine the way students transition from their academic journey to the professional world. This comprehensive platform caters to the dynamic needs of both students and college administrators, providing an efficient and user-friendly solution for job placement within educational institutions.

For students, the platform offers a gateway to a world of opportunities. Through simple registration and login procedures, students can effortlessly create, manage, and showcase their CV profiles. These profiles serve as a digital reflection of their academic achievements, skills, and experiences, ensuring they stand out in the competitive job market. More significantly, students can browse, evaluate, and apply for a diverse array of placement opportunities provided by the college. This not only streamlines the application process but also ensures that students are well-informed and adequately prepared for their career endeavors.

On the administrative side, the Campus Placement project empowers college staff with the capability to manage and update job listings on behalf of partnering companies. This functionality eases the process of liaising between educational institutions and recruiting organizations, promoting a more cohesive and effective placement process.

In a world driven by technology and connectivity, this MERN-based Campus Placement project emerges as a catalyst for students' professional growth, providing them with the tools and resources to succeed in a highly

competitive job market. Moreover, it empowers college administrators with an efficient mechanism to forge meaningful industry connections and enhance students' prospects, thereby bridging the gap between academia and career achievement.

1.1 ADVANTAGES OF TPMS

- *Efficient Process:* The project makes the placement process easier and more organized for everyone involved.

- *Easy for Students:* Students can register, make CV profiles, and apply for jobs all in one place.

- *All Info in One Place:* All the important placement info is in one spot, so it's easy to find and use.

- *Better Communication:* The platform helps students, administrators, and companies communicate clearly about job opportunities.

- *Helps Students Prepare:* The platform helps students think about their skills and experiences, which can help them do better in job interviews.

- *Control for Administrators:* Administrators can easily manage job listings, making sure students see the right opportunities.

- *Saves Time and Money:* The platform automates many tasks, saving time and money for the school.

- *Keeps Data Safe:* The platform safely stores sensitive data.

- *More Job Opportunities:* The easier placement process might attract more companies, giving students more job options.

- *Helpful Reports:* Administrators can use the system's reports to track how well the placement program is working.

- In short, the Campus Placement project makes the job placement process easier and more effective for students and administrators.

II. LITERATURE SURVEY

The high rates of unemployment in India can be combated by increasing the employability of people. The 20–24 age group is one of the largest groups of unemployed people, of which college graduates constitute a significant portion. Colleges can drastically reduce the number of unemployed graduates by introducing courses and altering the curriculum to help develop the skills that employers look for in graduates. We built a system that helps analyze the difference in the skill sets of placed and not placed students. It predicts whether a student with a given skill set would be able to secure a job or not. It considers not only technical skills but also other soft skills which are essential to land a job. The accuracy obtained is 87% and 90% for the SVM model and XGBoost model, respectively. We found that the technical skills, projects, certified courses taken, and the internships of the student are the most important parameters. The results are promising and are sure to improve placement rates in colleges.[1]

In Exploratory Data Analysis (EDA), the given large data is visually analyzed to extract the embedded depth. The application of the technique has a wide range and aids in the informed decision-making abilities of the managers. In an educational institution, the success of its teaching model is usually measured using the career opportunities of the graduates. Hence, the placement data has significant relevance for future planning and growth. A good amount of information can be gained by all stakeholders by carefully examining this information. In this context, the technique of EDA can be used to visually analyze the placement of students in a higher educational institution. In this paper, the data about the placement of students is visually analyzed to generate inferences using mathematical models. Based on the study, it was found that students with an MBA specialization in Mkt&Fin are highly placed, and a vast majority of the students have Commerce and Management degrees. The score on the employability test doesn't seem to have a major impact on the placement of students.[2]

Finding jobs is a challenging task, but with slight changes in the existing process, we can make it more convenient, which can result in several positive outcomes. Many job options are provided by various job recommendation sites, however, not all those options may be helpful to everyone. Hence, a job recommendation engine that can recommend the best job matching the profile of the applicant will be a very beneficial application. We have implemented our proposed application using a deep neural network and logistic activation function with several features like percentage of marks, specialization, and work experience. We have compared our results with logistic regression, Gaussian Naïve Bayes, and have analyzed using various performance measures. The experimental results show that the deep learning algorithm gave an accuracy of 97.60% and an area under the receiver operating characteristic curve (ROC-AUC) score of 99.83%, which is better than other compared algorithms.[3]

In this research, Machine Learning (ML) techniques are applied to the dataset of previously placed students to predict the placement of upcoming batch students. In this work, we followed the Cross-Industry Standard Process (CRISP) methodology with the help of ML model building processes such as Feature Selection, Label Encoding, Feature Scaling, Normalization, and Standardization. We have selected the ML models for the prediction of placement by experimenting and comparing a suite of ML classification algorithms using the K-fold cross-validation method and Ensemble Learning (EL) ML method. The suite of ML algorithms covers Logistic Regression, K-Nearest Neighbors, Decision Tree Classifier, Random Forest Classifier, Naive Bayes, and Support Vector Machine classifiers. Under EL, we have tested Adaptive Boosting, Extreme Gradient Boosting (XGBoost), and Grid Search CV methods. EL methods are advanced and popular, and hence they give the best performance on a predictive modeling project. The performance of the XGBoost algorithm is the best in predicting students' placement in the early stage compared to that of different algorithms employed in the study, with the support of relevant input features.[4]

The purpose behind this placement prediction system is to help students improve their results, academic performance, and also develop other soft skills that will help them maximize their chance of getting placed. Such a study will help the faculties of the college to train the students accordingly and improve the placement department of their institutions. This will give an idea about how students are doing and will ensure their institution can satisfy the needs of recruiters. For this, supervised machine learning, especially logistic regression, is better. Logistic model designing plays a key role in getting correct predictions. This process includes the selection of tuples for training data and their pre-known outcome, often known as real data.[5]

III. EXITING SYSTEM

The current campus placement process in educational institutions is often plagued by inefficiencies, manual paperwork, and a lack of streamlined communication between students and administrative staff. Students face challenges in creating professional CV profiles, applying for job placements, and staying informed about available opportunities. Simultaneously, college administrators find it cumbersome to manage and update job listings provided by recruiting companies. These issues call for a comprehensive solution. The problem statement for the Campus Placement project lies in the absence of an efficient and user-friendly platform that facilitates student registration, CV profile creation, and job application processes while allowing college administrators to seamlessly add and manage placement listings. The lack of such a platform hampers students' access to job opportunities and inhibits educational institutions from offering a robust and modernized placement service. To address this challenge, there is a pressing need to develop a MERN-based website that bridges the gap between students and administrative personnel, simplifying and enhancing the entire campus placement process.
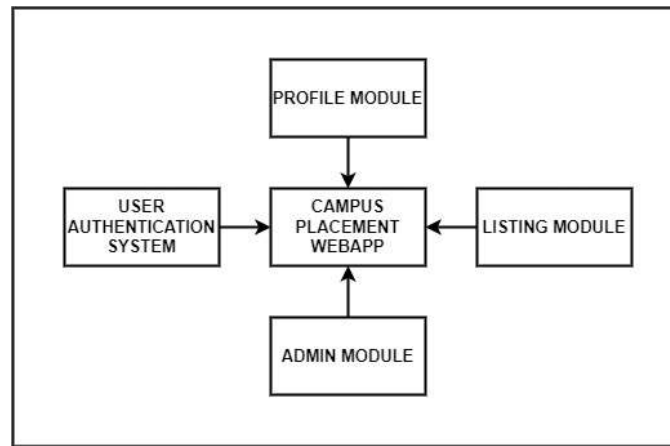
IV. PROPOSED SYSTEM

figure 1: block diagram

Developing a MERN-based Campus Placement website involves several key steps to ensure its functionality and usability for students and administrators. The first step is Requirement Analysis, which involves understanding the specific needs of students, administrators, and companies involved in the placement process. Features such as student registration, CV creation, job listings, and admin controls need to be identified.

The next step is System Design, which involves designing the architecture of the MERN application, including the database schema for student profiles, job listings, and any other relevant data. Wireframes and user interface designs are created during this phase.

Front-end Development follows, where the front-end of the website is developed using the MERN stack, which includes React for the user interface, Redux for state management, and other front-end libraries. This phase also involves implementing student registration and login functionality.

Next, a student dashboard is created in the Student Profiles phase, where users can fill in their personal and academic information, upload a resume, and build a professional CV profile. Features for editing and updating profiles are implemented in this phase.

In the Job Listings phase, a job listings section is developed where admin users can add, edit, and manage job opportunities from various companies. This section includes features for specifying job requirements, application deadlines, and other details.

The Application System phase involves implementing a job application system that allows students to apply for listed jobs by submitting their CVs and other required documents. This system ensures that students receive confirmation of their applications.

User Authentication and Security is another crucial phase where user authentication features are incorporated to ensure secure logins and data protection. Industry-standard security practices are applied to safeguard user information.

In the Admin Controls phase, an admin panel is created with user roles and permissions, allowing college administrators to manage job listings, review student applications, and oversee the entire placement process.

The website is then rigorously tested for functionality, usability, and security in the Testing and Quality Assurance phase. Any bugs or issues that arise during testing are addressed.

The Deployment phase involves deploying the MERN-based website on a secure hosting platform, ensuring that it is accessible to students, administrators, and potential employers.

In the User Training phase, training and support are provided for users, including students, administrators, and companies, to ensure they can navigate and use the platform effectively.

Finally, the Ongoing Maintenance phase involves planning for regular maintenance and updates to keep the website current, secure, and compatible with new technologies.

By following this proposed methodology, the Campus Placement MERN-based website can be effectively developed to cater to the needs of students and college administrators, streamlining the placement process and enhancing the overall experience for all stakeholders.

V. PROPOSED SYSTEM

The flowchart provides a visual representation of a job application or management system. The initial step is 'Registration', where users are expected to register themselves in the system. Following registration, users' 'Login' to their accounts. The system then verifies the login credentials. If the verification fails users are prompted to re-enter their 'Username & Password'.

Upon successful verification, users have multiple pathways. They can 'Search Job' and 'Apply Job', after which they 'LogOut'. Alternatively, they can 'Manage Account', which includes 'Update Website', before the process 'STOP's.

Another pathway for users post-verification is to 'Post Job'. After posting a job, they can 'Choose Student', 'Send Mail', and finally 'LogOut'.
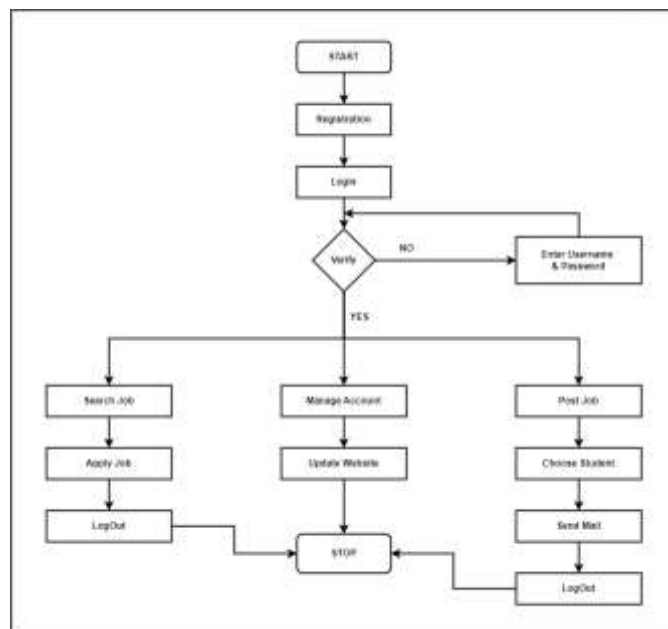

figure 2: flow chart

This flowchart effectively outlines the user journey and the functionalities of the system, providing a clear understanding of the steps a user might take when interacting with a job application or management system. It serves as a valuable tool for both developers and users to comprehend the workflow of the system.

VI. CONCLUSION

In this paper, we can conclude that the MERN-based Campus Placement website presents an innovative and invaluable tool for both students and college administrators in the pursuit of a seamless and efficient placement process. This project not only simplifies student registration, login, and CV profile creation but also provides a user-friendly platform for students to apply for various placements offered by the college.

For college administrators, the website offers a centralized and organized system to effortlessly manage and add job listings on behalf of partner companies, streamlining the communication and coordination between educational institutions and potential employers.

The use of modern web technologies ensures accessibility and ease of use for all stakeholders involved. This project not only bridges the gap between academic learning and professional success but also enhances the overall efficiency and effectiveness of the campus placement process.

In an era where career development is paramount, the MERN-based Campus Placement website stands as a pivotal bridge connecting students to promising job opportunities and empowering educational institutions to efficiently manage the placement process, thus contributing to the bright futures of aspiring students.

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