

# Predictive Placement Readiness and Career Insights Framework Using Machine Learning

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**Abstract**—Campus placement is essential for judging the academic competency of educational institutions. Conventional methods of campus placement assessment consider by taking into account very few academic parameters and do not provide a live analysis of the readiness of students. This paper introduces a new AI-Powered Placement Prediction & Readiness Assessment System that utilizes a multi-parameter assessment technique to judge the placement feasibility of students. The system incorporates ML algorithms in combination with ATS-level resume parsing technologies, answer forms, and academic parameters that provide a prediction algorithm for campus placement readiness, in addition to pinpointing at-risk students at a very early stage. A Random Forest Classifier algorithm calculates placement scores, while a hybrid rule-based-NLP resume parser extracts attributes from certified resumes. The system offers live analysis in the form of a results platform for students and Training & Placement Officers.

**Index Terms**—Placement Prediction, Resume Parsing, Machine Learning, ATS Score, Student Analytics, Risk Classification.

## I. INTRODUCTION

When it comes to campus recruitment, companies are now looking for students who are ready to work in the industry. They do not only look at how a student is in college. Campus recruitment teams want to know if students have the skills required for the job. They check if students have completed projects, had internships, can communicate well, and have a resume. The problem is that most colleges do not have a way to look at all these factors together. Campus recruitment requires a system that can determine whether a student is ready for a job. This would help students get placed in a manner. Campus recruitment is important for students and colleges.

The way we usually evaluate student placements is not very effective. It is mostly done manually, which means it is not organized and only occurs after a problem arises. This makes it hard for Training and Placement Officers to keep an eye on how students are doing find out what skills they are missing and take action before it is too late. These things are often done to help students get placements after it is already too late to make a difference in how well they do. Training and Placement Officers have a time, with the traditional placement evaluation methods because they are manual and unstructured and only occur after something has gone wrong. This affects student placements and the Training and Placement Officers who are trying to help the students with their placements. The student placement prediction and readiness assessment system is helpful. It provides a single location to access all the information we require. This system looks at how ready a student is by checking things such as their college records, resumes, and answers to questionnaires. The system uses machine learning to determine which students might have trouble and which ones are ready for placement. The student placement prediction and readiness assessment system does this in an easy-to-understand manner. The student placement prediction and readiness assessment system can tell us early on which students are at risk and which are ready for placement.

## II. SYSTEM ARCHITECTURE

The system comprises three parts: presentation, application, and data layers. These three layers work together to ensure that the system functions properly. The presentation layer is what the user sees, the application layer is where the work is done, and the

data layer is where all the information is stored. The system follows a three-tier architecture.

The presentation layer was created using HTML5, CSS3, and JavaScript. This helps create user interfaces that work well on devices and display information in real time. We have dashboards for students and TPO users. These dashboards are designed to be easy to use for both students and TPO users. The presentation layer is important for displaying information.

The application layer was built using Flask REST APIs. It performs many functions. The application layer handles authentication and resume parsing. It also performs score computation and machine learning inference. The application layer performs analytics aggregation. The application layer also manages automated alert mechanisms for at-risk students, which is important for the application layer.

The data layer uses SQLite to store student information. This includes student profiles and authentication credentials of the students. The data layer also has a way to store files, such as resumes and marksheets. Student profiles and authentication credentials were stored in SQLite.

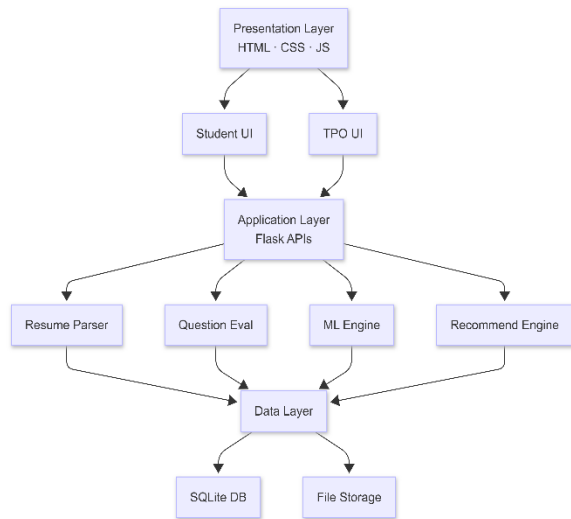


Fig : System Architecture of the Placement Readiness Platform

### III. METHODOLOGY

#### A. Resume Parsing and Feature Extraction

When we look at a resume, we use a way to understand what is written. This method is a combination of natural language processing and rule-

following. We extract text from files such as PDF and DOCX. We used tools called pdfplumber and python-docx to extract the text from these files.

Then, we look at each part of the resume, such as the parts that talk about Skills, Projects, Experience, Certifications and Activities. We ensure that we do not mix these parts. We do this so that the resume analysis of the Skills section does not have information from the Projects section, and the Projects section does not have information from the Experience section, and so on. This helps us to understand the resume, Skills and Experience and Projects and Certifications.

#### B. Questionnaire-Based Assessment

When we look at communication and coding skills, we use a set of questions to figure out how good someone is. For communication, we asked five questions. They were scored them from 0 to 20. The coding part was slightly different. It looks at how someone knows a language if they understand data structures if they are good at debugging, and how often they practice. We also looked at the persons resumes to see if it should give their coding score a boost. Communication and coding skills are important; therefore, we carefully evaluated them.

#### C. Machine Learning Model

Therefore, we used a Random Forest classifier to determine whether a student is ready for placement. We prefer the Random Forest classifier because it is really good at handling a lot of information, and it is easy to understand what is going on.

We look at things like the students CGPA, how good they are at coding, how well they communicate, what their resume looks like, what skills they have, what projects they have worked on, and if they have done any internships.

The Random Forest classifier provides a score that indicates how ready a student is for placement. This score is similar to a probability, as it shows how likely it is that the student will get placed. The Random Forest classifier is really good at giving us this score because it can look at all the information we have about the student.

Therefore, we plan to score things using mathematics. This is the case when the machine learning model does not work. We do this to ensure that everything continues to run. The machine

learning model and the mathematical scoring formula are two ways to get the job done. If the machine learning model is not available, we use the scoring formula instead.

Register Number	Branch	Year	Resume ATS Score	Overall Readiness
101	CSE	1st	38	34
102	CSE(AI)	2nd	52	44
103	ECE	3rd	72	71
104	EEE	4th	82	82

*D. ATS Score Computation*

When a job description is provided, the ATS score is calculated. The ATS score is based on factors such as how well the skills match, how similar the words and meanings are, and how complete the resume is. This helps to see if a resume is a fit for a specific job, which is what really happens when people are hired. The ATS score makes this possible by looking at the skill match percentage, the similarity of words and meanings, and the resume completeness metrics to give a picture of the resume.

IV. IMPLEMENTATION

The new system is built in a way that makes it easy to add and fix if something goes wrong. It is composed of small parts that work together to ensure smooth and rapid operation. The part of the system that users do not see is created using Python. Something called Flask. This makes it easy to build paths for the system to communicate with other systems.

The backend is split into parts, each of which performs one function. One part checks whether users are who they claim to be. Another part looks at resumes and cover letters. It extracts important information. There is also a section that asks users questions and checks their answers. The system can even perform tasks such as determining which features are important and making predictions using machine learning. It can also examine all the information it possesses. This way of developing the system makes additions or updates on old stuff easy without disrupting the complete system. Each system part can exist independently, which also makes understanding and working with the entire system easier. The reliability and real-time operation of the new system were assured using a modular and

scalable software architecture. SQLite was used in the system as its database to keep information safe. We chose SQLite because it is very handy and requires little initial setup. In addition, SQLite can work seamlessly without a server required for the database. Therefore, it will be great in colleges or when access to the Internet is not provided. All of these reports contain plenty of information on students, ranging from their profiles and scores on questionnaires to data on resumes and readiness for a job. We tracked the background events. For instance, if you uploaded a document like a resume, it should be stored somewhere on your computer and hooked to the appropriate information in the database. The system uses methods to look at documents like PDF and DOCX files. This helps the system determine the skills of a user and the projects they have worked on. It also considers internships and certifications. The system collects all this information. Turns it into numbers. These numbers help decide how good a resume is and whether it will work with computer systems.

The system also considers what a student has studied and other information from their resume. It even looks at what they say in the questionnaires. All this information is put together to get a picture of how ready a student is to take the test. The system performs this for each student to create a profile that shows their readiness. The profile is based on the students resumes and other details, such as records and questionnaire responses. The system has a part that users can see and interact with. This part was made using HTML5, CSS3, and JavaScript. This makes the system look nice and works well on devices. The system user interface communicates with the backend services using the Fetch API. This means that the system can obtain and send data without reloading the page. The system also has pictures of data, such as bar charts and pie charts, that help people understand things. These images were created using Chart.js. Students and training and placement officers (TPOs) can use these pictures to see how ready students are, what risks there are, and how placements are going. They can view this information for departments and years. The system shows data in a way that is easy to understand, such as trend graphs, so students and TPOs can make sense of it.

The system helps manage student placement by sending alerts. It uses email to notify the Training and Placement Officers when students are not doing well. This occurs when students receive readiness scores or have other academic problems. The system sends these emails using a service provider. When the Training and Placement Officers get these alerts they can help the students away. They can provide students with training, mentor them, or help them improve their resumes. In this way, students can get back on track. Do better. The system is really good at letting the Training and Placement Officers know when students need help so they can step in. Overall, the focus of the implementation remains on real-time processing, traceability, and scalability, so that all data relating to placements must be updated at all times. Based on well-integrated backend services, data management, and frontend analytics capabilities, the application remains effective for both individual students and institutions.

Component	Technology Used
Frontend	HTML5, CSS3, JavaScript
Backend	Python, Flask (REST APIs)
Database	SQLite
Machine Learning	Random Forest Classifier
Resume Parsing	PDFPlumber, python-docx
NLP Techniques	TF-IDF, Cosine Similarity
Email Alerts	SMTP

### V. RESULTS AND DISCUSSION

The system was tested using student information from several branches and academic years. It worked well. The Random Forest model was able to predict placement results approximately 9% of the time when it looked at old data. When it looked at resumes, it was able to find the skills, projects, and internships that students actually had without making anything up. The Random Forest model and resume parsing were very good, at doing their jobs. The college can use this to look at important information that shows information about the whole

college, each department, and each year. This helped the college identify students who were having trouble. Therefore, colleges should provide these students with assistance in their studies and skills. The college could do this because they saw the problems early and knew what the students needed. Students who were having trouble received help to improve their academic work and learn new skills.

### VI. ADVANTAGES AND APPLICATIONS

#### Advantages

##### Early Risk Identification:

The system identifies students who are at risk of not doing well in college when they are still in the early stages. This means that teachers and staff can give these students help with their college work and skills before it is time for them to get a job. The system does this so that students who are having trouble can get the help they need with their studies and skills before they start looking for a job. This is important because it helps students who are struggling with the things they need to know to be successful. The system is a help to students who are, at risk because it gives them the support they need to do better in college and to get the skills they need to be successful.

Readiness Score Range	Category
0 – 40	High Risk
40 – 70	Medium Risk
70 – 100	Placement Ready

##### Explainable AI Scoring:

The system is different, from models because it shows you exactly how ready you are. It gives you a score. Explains what that score is based on like your College Grade Point Average, the skills you have the projects you have done and how well you can communicate. This way you can see what you need to work on to improve your readiness scores, like your CGPA, skills, projects and communication ability.

##### Real-Time Analytics and Updates:

When students upload their resumes or answer questionnaires the student readiness scores and the analytics dashboards get updated away. The student readiness scores and analytics dashboards are always current because they change soon as we get new

information from the students. This new information includes things like resume uploads and questionnaire responses, from the students.

Department-Wise and Year-Wise Insights:

We can look at how students are doing in different departments and, over the years. This helps colleges see how they are performing and make their training better. They can compare the placement trends across departments and academic years to get an idea of what is working and what is not. This way colleges can make changes to help students do better in the future. Placement trends are really important for colleges to know what they need to do to improve.

Reduced Manual Effort for TPOs:

Using automation for resume analysis and scoring and also for reporting really helps to cut down on the work that administrators have to do. It also helps to reduce mistakes that people make. Automation of resume analysis and resume scoring and resume reporting is very useful.

Data-Driven Decision Making:

We can plan training programs and placement initiatives using information instead of just guessing or relying on what we did before. This way training programs and placement initiatives will be based on facts, not just assumptions or old methods that may not work anymore. Training programs and placement initiatives will be better because they are planned with data.

Personalized Student Guidance:

Each student gets advice that is just for them, based on the things they are good at and the things they need to work on which helps them to learn and grow in a way that is just right for them. The student receives these targeted recommendations so that the student can think about the things the student does well and the things the student needs to improve. This helps the student to focus on getting better at the things the student is not so good, at and the student can work on self-development.

Improved Placement Outcomes:

The system helps students get ready, for jobs in a way that's what the industry wants. This makes it more likely that students will get jobs when they finish. The system does this by making sure student preparation is what the industry expects from students. This means the student preparation and the industry expectations are basically the thing.

Applications

Campus Placement Readiness Assessment:

Used by colleges to continuously evaluate student readiness throughout academic years.

Training & Placement Office (TPO) Analytics:

Enables TPOs to monitor placement trends, risk distribution, and department-wise performance.

Personal Skill Development Tracking:

This thing helps students see how they are doing in skills, communication skills and the quality of their resume, over time. It is a way for students to track their growth in these areas. Students can use it to look at their skills and also their communication skills and the quality of their resume to see how they are getting better.

Resume Quality and ATS Optimization:

Assists students in improving resume structure and keyword relevance for applicant tracking systems.

Predictive Placement Planning:

Supports institutions in forecasting placement outcomes and planning corrective actions in advance.

Institutional Performance Evaluation:

Provides management with insights into the effectiveness of academic programs and training initiatives.

## VII. CONCLUSION

This paper is about a system that helps students get jobs in their college. It is called an AI-Powered Placement Prediction and Readiness Assessment System. This system helps fix the problem of students not being ready for the jobs that're available. The system uses machine learning. Looks at resumes to figure out what students are good at.

The system is good for colleges because it helps them get their students ready for jobs. It also helps colleges come up with plans to get their students hired. The AI-Powered Placement Prediction and Readiness Assessment System is a tool for colleges to use. It helps students and colleges work together to get students ready, for the job market.

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