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AI-Powered Resume Matching and Recommendation System

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Abstract - The Resume Matching and Recommendation System takes the hassle out of resume analysis. It uses natural language processing and machine learning to review your resume automatically, making it easier to see where you stand and what you can do next in your career. Just upload your resume—any format works. The system pulls out the key details—your education, work experience, skills, and personal info. Then it matches you to the best-fit career roles using a smart classifier trained on different job categories.

It doesn't stop there. You get a score that tells you how accurate and relevant your resume is. Plus, the system gives you personalized advice—how to make your resume stronger, which online courses fit your background, even sample interview questions to help you prepare. It shows you visual summaries that highlight your strengths and predict career matches, wrapping it all together as one complete, easy-to-use resume analysis and career guidance tool. The real aim? Helping you move your career forward with practical, targeted feedback.

Keywords – Resume parser, Natural Language Processing (NLP), Job Matching, SBERT, TF – IDF (Term Frequency- Inverse Document Frequency) Machine Learning (ML), Applicant Tracking System (ALP)

I.INTRODUCTION

Finding a job these days is tough, and standing out from the crowd takes more than just a generic resume. With companies using software to weed out applications before a human ever sees them, you really need a resume that grabs attention and fits the job you want. Sifting through stacks of resumes the old-fashioned way takes forever, and let's be honest—people have their own biases. That's why the Intelligent Resume Evaluation Tool came into play. It cuts out the guesswork by using machine learning to assess resumes quickly and fairly.

Here's how it works: after pulling information from a resume, the program uses a classifier trained for specific job types—including fast-growing fields like AI, Data Science, Cloud Architecture, and Cybersecurity. The tool looks for patterns in the resume's text with a TIDF vectorizer and figures out which job fits best. It doesn't stop there—it even gives tips on how to polish your resume, like using stronger verbs, showing real results with numbers, and making sure it gets through automated filters.

Artificial Intelligence powers the whole process. The system checks skills, education, work history, and keywords, matching candidates with job openings that really suit them. It even suggests jobs that might be a good fit. This makes hiring smoother, faster, and more exact, saving everyone time and hassle.

Using Natural Language Processing (NLP) for parsing and ranking resumes brings big benefits. For starters, it speeds up recruiting so companies find good people faster. It's also fairer—AI judges everyone by the same standards, leaving

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personal bias out of it. And it can handle tons of resumes at once, which is a lifesaver for big organizations.

We built a tool called RESUMATE to put all of this into action. RESUMATE taps into advanced NLP algorithms to read, analyze, and rank resumes automatically. This means managers spend less time guessing and more time meeting the right candidates. The process is more precise, efficient, and scalable than ever before. In short, RESUMATE transforms how companies hire, making sure the best people don't slip through the cracks.

II. LITERATURE SURVEY

Over the years, a lot of research has gone into using AI and machine learning to automate recruiting. People started with pretty basic systems—these just looked for certain keywords in resumes to match what employers listed in job descriptions. If your resume had the right words, you'd get flagged. The problem? This method missed out on a ton of great candidates who described their skills in different ways. Context mattered, and those early systems just couldn't pick it up.

So, things moved forward when researchers brought in Natural Language Processing, or NLP. With NLP, these tools actually try to understand what's being said, not just hunt for specific words. Techniques like tokenization, stemming, and entity recognition dig out key details like skills, education, or job experience. Then you have methods like TF-IDF and cosine similarity, which compare resumes and job descriptions for deeper matches. More advanced models, like RNNs, LSTMs, and especially those new Transformer models (think BERT), do a much better job making sense of language in context.

Because of these advancements, matching people to jobs got a lot better—but that's not all. Now, recruitment platforms use recommendation systems too. Using content-based or collaborative filtering, they suggest jobs to candidates and flag great candidates for recruiters. Hybrid approaches combine these methods for even better results.

One big issue in all this is bias in recruitment AI. Researchers noticed the data used to train these systems often had built-in biases—like favoring certain genders, ages, or backgrounds. To fight this, people are working with smarter algorithms and data processing steps to make recruiting as fair as possible.

All things considered, there's a clear need for an AI-powered system that matches people to jobs accurately and recommends the right options, while avoiding bias. That's what the latest systems aim to do—blend advanced NLP, machine learning, and smart recommendations into one powerful tool.

III. METHODOLOGY

A. Proposed Undertaking:

The Resume Matching and Recommendation System works in several steps—starting with data collection and moving through preprocessing, feature extraction, matching, and finally, recommendation. Every step matter if you want the system to be both accurate and efficient.

First up, the system grabs resumes and job descriptions. Users upload their resumes, usually as PDFs or Word documents. Job descriptions get entered either by hand or pulled from job portals. This is the raw material the system works with.

Next, the system cleans things up. Since resumes and job descriptions are all over the place—different formats, random details, lots of fluff—it has to preprocess the text. That means taking out stop words and punctuation, stripping away anything not helpful, and making sure everything looks the same format-wise.

After things are cleaned, the system digs into the text using Natural Language Processing. It pulls out key points like skills, education, work experience, and other important keywords. Tools like TF-IDF turn all this text into numerical data, which makes it easier for machine learning models to handle.

Now the matching starts. The system uses algorithms like cosine similarity to see how close a resume matches a job description. Every match gets a score—the higher the number, the better the fit.

There's also a recommendation piece. The system doesn't just show you raw matches; it suggests jobs based on the extracted features and those matching scores. Using content-based filtering, it delivers recommendations tailored to each user. As more people use the system, machine learning kicks in to keep sharpening its suggestions.

Finally, everything shows up in a simple, clean interface. Users get to see their match scores, job recommendations, and a breakdown of how their resume stacks up. The goal: Help people make better choices and fine-tune their resumes for future applications.

IV. IMPLEMENTATION

The AI-Powered Resume Matching and Recommendation System aims to streamline hiring with smart technology. Instead of HR teams slogging through piles of resumes—and making mistakes along the way—this system steps in to do the heavy lifting. It automatically scans resumes and matches candidates to jobs by checking their skills, experience, and qualifications.

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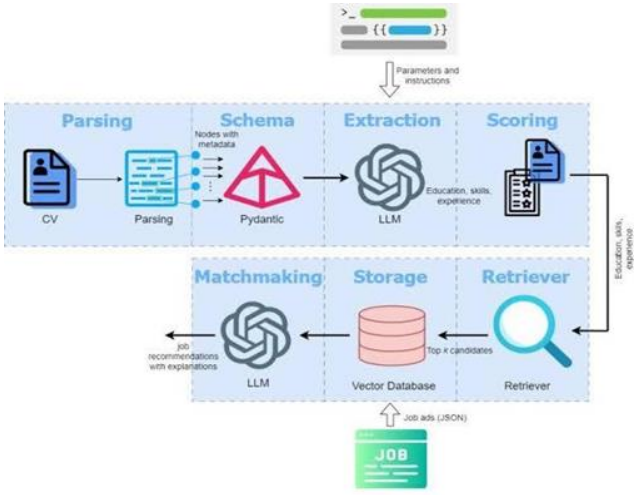
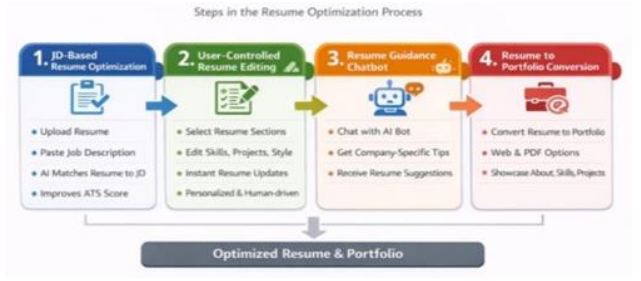
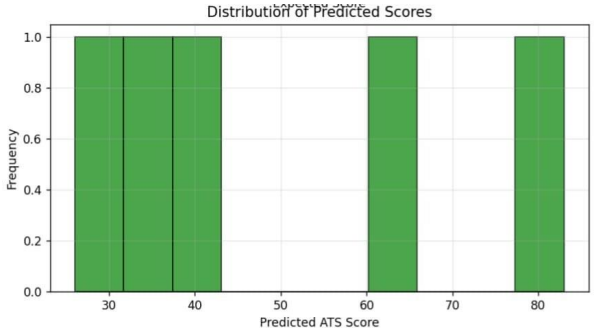


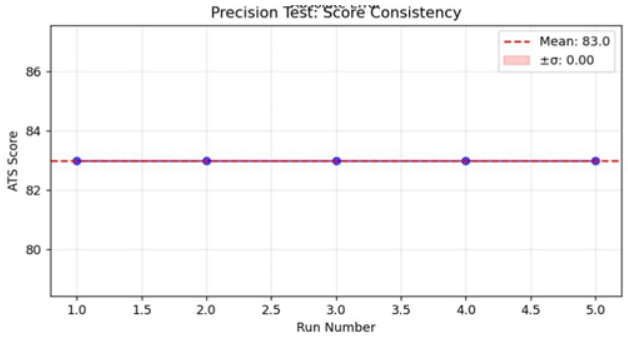


Here's how it works: The system uses Natural Language Processing (NLP) to pull out key details from both resumes and job descriptions—things like skills, education, experience, and important keywords. After grabbing all that information, it turns the text into numbers by using methods like TF-IDF or word embeddings. This way, the system can figure out how closely a candidate's background matches what a job requires.

Next, the system runs a similarity check—think Cosine Similarity—to see which candidate line up best with each job. Then, it ranks all the resumes by their match scores. The top scorers get recommended to recruiters as the best fits for the job. But it doesn't just help companies. If you're a job seeker, the system can analyze your resume and suggest jobs that fit your profile.

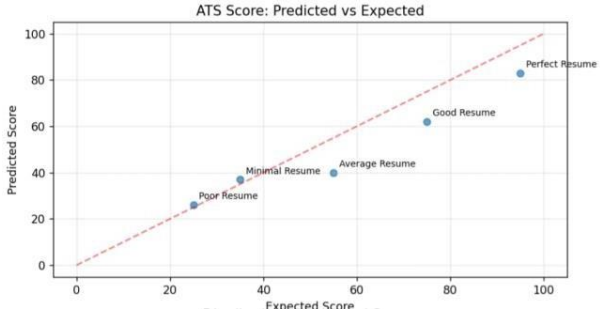
This whole approach speeds up the hiring process, cuts down on manual effort, and takes some of the guesswork out of finding the right people. It also gives job seekers a better shot at landing roles that actually suit them—making the process faster and more focused for everyone.



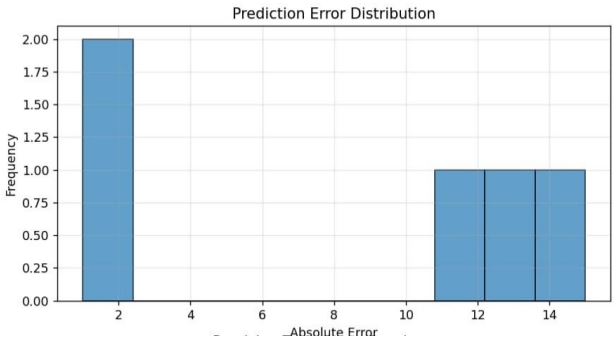


Under the hood, the frontend runs on HTML, CSS, and JavaScript. The backend is built with Python, and Firebase handles database storage and authentication.

V. EXPERIMENTAL RESULTS



The experimental results (Fig. 1) show a close alignment between predicted and expected ATS scores for different resume categories, indicating the model's effectiveness in evaluating resume quality.



The model exhibits a Mean Absolute Error (MAE) of 8.0 and a Root Mean Square Error (RMSE) of 9.38, indicating moderate prediction accuracy with notable outliers.

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The histogram indicates predicted ATS scores are clustered at 30, 40, 60, and 80 with uniform frequency

VI. CONCLUSION

The AI Powered Resume Matching and Recommendation System uses artificial intelligence and natural language processing to make hiring easier. Instead of recruiters sorting through piles of resumes, the system scans each one and compares it directly to job descriptions. It pulls out key details like a candidate's skills, education, and work experience and then matches those to what the job posting asks for. The end result? Companies get a shortlist of the best-fit candidates, all backed by clear similarity scores and actionable recommendations.

This project shows how AI can really unclutter the hiring process and help organizations make smarter choices, faster. Down the road, adding deeper learning models, using more data, and syncing up with real-time job portals will only make the system sharper and more effective.

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