**Proposal for Optimizing Job Recommendations and Candidate Interest Prediction**

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### Background

The employment sector is continuously evolving, with job seekers and employers facing numerous challenges. Job seekers often struggle to find suitable job opportunities that match their skills and preferences, while employers find it difficult to attract qualified candidates for their job postings. With the advent of advanced data analytics and machine learning, there is an opportunity to enhance the job matching process, making it more efficient and effective for both parties.

### Introduction

In today's competitive job market, the ability to efficiently match job seekers with relevant job opportunities is crucial. Leveraging data from job postings and job seeker profiles, machine learning models can significantly improve the job search experience and the quality of job applications received by employers. This proposal outlines a plan to develop two machine learning models: one for optimizing job recommendations for job seekers and another for predicting the likelihood of job postings receiving a high or low number of applications.

### Business Understanding

For job seekers, finding the right job that matches their skills, preferences, and career aspirations is a challenging task. Similarly, employers face difficulties in creating job postings that attract the right candidates. By addressing these challenges through advanced machine learning models, we can create a more efficient job market, benefiting both job seekers and employers.

### Problem Statement

Despite the vast amount of job postings available online, job seekers often find it challenging to identify the most relevant opportunities. Conversely, employers struggle to understand what factors contribute to the attractiveness of their job postings, leading to a **mismatch** between job offers and applications. This proposal aims to solve these issues by:

1. Providing personalized job recommendations to job seekers to match them with the most suitable job postings.
2. Developing a machine learning model that predicts whether a job posting will receive a high or low number of applications, helping employers improve their job postings.

### Research Questions

1. How can job seekers' preferences and qualifications be effectively matched with available job postings to provide personalized recommendations?
2. Which factors most significantly influence the number of applications a job posting receives?
3. What specific improvements can employers make to their job postings to increase their attractiveness based on model predictions?

### Objectives

1. **Optimize Job Recommendations**: Provide personalized job recommendations to job seekers to match them with the most suitable job postings.
2. **Predict Candidate Interest**: Develop a machine learning model to predict whether a job posting will receive a high or low number of applications, enabling companies to understand which factors attract candidates the most and improve their job postings.
3. **Improvements**: Identify specific improvements employers can make to their job postings to increas88e attractiveness based on model predictions.

### Success Metrics

**Application Rate**: Percentage of job postings receiving applications**.**

**Qualified Application Rate**: Percentage of applications meeting job requirements.

**Precision**: Measure the proportion of recommended jobs that are relevant to the job seeker's input skills.

**Recall**: Measure the proportion of relevant jobs that are successfully recommended to the job seeker.

**F1 Score**: Balance precision and recall to provide a single metric that evaluates the model's performance.

**AUC (Area Under the Curve)**: Measure the model's ability to distinguish between high and low application likelihoods.

**User Satisfaction**: Evaluate the job matching system based on user feedback and satisfaction with the recommendations provided.

### Proposed Models

1. **Candidate Interest Prediction Model**
   * **Input**: Job posting features (e.g., title, description, salary, location, experience level, etc.).
   * **Output**: Likelihood of receiving a high or low number of applications.
   * **Method**: Implement a classification model (e.g., Random Forest, Gradient Boosting) to predict application likelihood based on historical data of job postings and applications received.
2. **Job Recommendation Model**
   * **Input**: Job seeker's skills and preferences.
   * **Output**: List of recommended job postings.
   * **Method**: Use a TF-IDF vectorizer to process job descriptions and a cosine similarity measure to match job seekers' skills with job descriptions. Enhance recommendations using collaborative filtering based on job seekers' past interactions.

### Conclusion

By implementing these models, we aim to create a more efficient job market that benefits both job seekers and employers. The success metrics will ensure that the models are evaluated rigorously, leading to continuous improvement and refinement of the job matching and candidate interest prediction processes.