**Purpose of Project**

In the context of personnel-job matching problems, currently popular algorithms include semantic analysis algorithms, which aim to analyze the semantic similarity between resumes and job descriptions. This paper does not delve into semantic analysis but rather focuses more on providing feasible recommendations under different data conditions. In the AHP algorithm, considering that users may not provide comparison matrices that satisfy consistency tests, we adopt a new calculation method: using the ratio of student ratings on factors to create a comparison matrix. The calculated weights are then applied to the scores for summer job selection. Subsequently, the K-Means clustering algorithm is employed to simulate feedback data from job search websites, outputting the best job options clusters to users.

Due to AHP's inability to extract user relevance and job relevance information, which are helpful for recommendations, we utilize decision trees and collaborative filtering to address this issue using AHP score data. However, collaborative filtering cannot handle sparse matrices. In the era where user privacy is of paramount concern, systems often cannot obtain user preferences or job evaluations, resulting in matrix sparsity. To tackle this problem, we adopt matrix factorization algorithms proposed in the Netflix movie recommendation algorithm competition [4].

These steps can be summarized as follows: using the improved AHP and K-means algorithms in the absence of user historical data, utilizing decision trees and collaborative filtering algorithms when multiple user historical data are available, and employing matrix factorization algorithms when the user rating matrix is highly sparse, i.e., in the later stages of the recommendation system operation, to systematically provide reasonable recommendations under various data conditions.