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Implementation Graph Sampling and Aggregation (GraphSAGE) Method for Job Recommendation System

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Abstract−Finding job is currently a challenge, especially for final-year students. Career Development Centre (CDC) is a service that is provided by a university for its students. However, a more sophisticated system is needed that not only provides job information but provides job recommendations based on their interests, skills, and experience. Developing a GraphSAGE-based job recommendation system can help provide suitable jobs according to user preferences. GraphSAGE works by embedding nodes or feature vectors at each node or node in a graph. GraphSAGE aggregates information from neighbouring nodes and propagates that information using different model layers. By combining the feature information of each node, the resulting representation can be richer in information and also more accurate. The development of the GraphSAGE system uses a dataset from the "Job Recommendation Challenge" from Kaggle which consists of 3 data, namely job data, user dataset, and applicant dataset. This study also uses GAT to provide a value or weight for each node before GraphSAGE process the graph. Based on experimental results, this GraphSAGE model has an accuracy value of 97.5% and this value is 13% greater than its comparison, namely FNN (Feedforward Neural Network) commonly used at tabular dataset. This comparison helps us know that which the best model we have to use to the dataset. The model also tested on the Movie dataset, Food dataset, and Epinions dataset.

Keywords: Recommendations; Jobs; GraphSAGE; Embedding; Graph Attention Network; Feedforward Neural Network.

1. INTRODUCTION

The rapid development of Information Technology, especially web technology, has caused major changes in the process of searching for job information by final-year students, fresh graduates, or alumni who have just graduated in the range of 0 - 2 years at a university. Finding job information is a very important thing to pay attention to in the current era. In February 2016, the number of unemployed university graduates in Indonesia reached more than 695 thousand people, which increased by 20% compared to the previous year [1]. To get job-related information, students prefer to search for job information online. Career Development Centre better known as CDC is one of the most widely used platforms in a university because it is a resource provided by the university to assist students in developing their careers after graduating from the university. The way this CDC works is by providing several available jobs where users, in this case students, can later choose the job according to their wishes. These jobs have certainly been considered in advance by the university to be uploaded on the CDC platform.

In practice, the CDC is just an ordinary website that provides job vacancy information. Of course, browsing through many jobs is time-consuming coupled with the doubt that arises whether the job matches the student's interest or not because after all, browsing through thousands of jobs to find a few relevant jobs can be a tedious task for many applicants [2]. Both final-year students and fresh graduates want a job that matches their interests, skills, and experience. Not only that, from the job provider's point of view, it will also raise doubts and question marks whether the applicant is a suitable candidate so that screening must be carried out

Therefore, a system that can efficiently recommend jobs that help users find the right job is needed. With the recommender system, it can be a solution when users get too much or excessive information [3]. Problems from the job provider side can also be handled because, with this recommendation system, job provider companies do not need to carry out excessive screening processes on candidates. The recommendation system will utilize user information such as user data, occupation, and interest or experience [4]. So that users can find suitable jobs without having to choose from thousands of available jobs.

Previously, there have been platforms that provide job recommendation systems. The purpose of implementing a recommendation system is to provide personalized results or outputs for each user [5]. To obtain appropriate results and outputs, recommendation systems use information about the user, such as demographics or personal preferences [6]. The system provides recommendations using an algorithm that collects data from the user's profile, activities, and job search preferences [7]. The system also provides a job search feature that allows users to find jobs that match their qualifications and interests as well as a feature to recommend or provide references for others in the user's network [8]. However, this system works very broadly and is not focused on job vacancy management for alumni of a university. Therefore, it is necessary to develop a local recommendation system for a college which will make it easier for fresh graduates and alumni to find relevant jobs. In its development, the recommendation system uses several approaches such as collaborative filtering, content-based filtering, hybrid filtering, and knowledge-based filtering [9]. However, some approaches can be used in recommendation systems such as graph-based approaches that utilize user and item correlations [10].

The concept of each approach is actually the same, namely predicting an item that has never interacted with the user.

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