

***Comparative Analysis of Content-Based, Collaborative and Hybrid Filtering
Methods to Address the Cold Start Problem in the DiKantin Application***

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ABSTRACT

The DiKantin application at Politeknik Negeri Jember, which provides 190 menu variations from 13 canteens, often causes user confusion as the current recommendation system remains random and unpersonalized. The absence of relevant suggestions prolongs decision making time and introduces the Cold Start problem for new users lacking an interaction history. Therefore, this study aims to implement and compare the performance of Content Based Filtering (CBF), Collaborative Filtering (CF), and Hybrid Filtering using a Switching mechanism to address the Cold Start problem and determine the most optimal method. This research utilizes a comparative experimental approach by processing explicit and implicit data directly from the DiKantin database. Users implicit interaction activities are subsequently converted into a preference weight scale using the AIDA (Attention, Interest, Desire, Action) framework. The algorithms performance is mathematically evaluated through MAE, RMSE, Precision, Recall, F1-Score, and NDCG metrics. Meanwhile, system acceptance is measured via a before and after User Acceptance Testing (UAT) involving 103 respondents from the academic community. Based on the evaluation, the Hybrid Filtering method with a threshold of 20 interactions proved to be the most superior. This method successfully achieved a Precision of 0,044, an Recall value of 0.151, an F1-Score of 0.059, an Category Precision of 0,710 and an NDCG of 0.175, surpassing the CBF method's NDCG score of 0.166. The prediction evaluation of the CF method also indicated a stable and low error rate with an MAE of 0.1709 and an RMSE of 0.2130. The implementation of this optimal algorithm is proven to deliver a direct positive impact on user experience, demonstrated by a significant increase in the respondent satisfaction metric by +1.01, rising from an initial score of 3.26 to 4.27 after the system was applied.

Keywords: Recommendation System, Content Based Filtering, Collaborative Filtering, Hybrid Filtering, Cold Start, DiKantin Application.