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1. INTRODUCTION

In the dynamic metropolitan environment of Bandung, cafes have transcended their traditional role as coffee shops and have become lively centers for business, relaxation, and social engagement. The city's flourishing cafe culture, characterized by a wide array of outlets catering to different tastes and preferences, poses a distinct problem for both inhabitants and visitors: finding the ideal cafe that suits their specific requirements and desires [1]. Bandung's cafes cater to a wide range of preferences, from intimate and simple venues to stylish and visually appealing locations that are popular on Instagram. If you are looking for a peaceful place to work or a vibrant environment to socialize with friends, the city's cafe culture offers a wide range of options.

Traditional methods of finding cafes, like relying on recommendations or generic web searches, often lack personalized suggestions that truly resonate with individuals. The constraints of these methodologies are especially evident in a city such as Bandung, where the cafe industry is continuously growing with the introduction of new establishments and shifting trends. Given the circumstances, the importance of an intelligent and personalized cafe recommendation system becomes crucial. This system provides users with a guided and carefully selected experience in exploring Bandung's ever-changing cafe scene [2]. An intelligent cafe recommendation system may effectively match individuals with cafés that coincide with their tastes and preferences by employing user preferences, geographic data, and feedback mechanisms. This not only improves the overall experience of consumers in discovering cafes but also helps local businesses by directing traffic to locations that could otherwise be overlooked.

Current cafe recommender systems frequently depend on individual methodologies, such as collaborative filtering or sentiment analysis of user reviews [3]. While these methods offer valuable insights, they frequently struggle to capture the full scope of user preferences and attitudes, limiting their effectiveness.

User-based collaborative filtering algorithms may have difficulties in generating appropriate recommendations in situations when there is limited user data or when new users join the system, which is sometimes referred to as the "cold start" problem [4]. Furthermore, these methods may overlook nuanced individual preferences, focusing more on general similarities among users. This can result in recommendations that are overly general or do not accurately reflect the distinct preferences of an individual user. However, it is important to note that sentiment analysis of user evaluations, although useful for assessing general contentment, may overlook the contextual elements that influence such attitudes [5]. A positive review may not provide information regarding the suitability of a cafe for working or its level of tranquility, which are important considerations for many customers.

In order to tackle these difficulties, we suggest a hybrid methodology that merges the advantages of item-based collaborative filtering (IBCF) with recurrent neural networks (RNNs) [6]. Item-based collaborative filtering (IBCF), which specifically considers the similarities between things (in this case, cafés), provides a strong and effective method for generating recommendations, even when there is a scarcity of user data [7]. Through the analysis of user-item interaction patterns, IBCF has the ability to discover cafes that have similarities to those previously chosen by a user. This allows the system to offer recommendations that are more customized to individual preferences. This method is especially advantageous for dealing with the cold start problem, as it may utilize item similarities even when there is limited user history. Conversely, recurrent neural networks (RNNs) are highly proficient at capturing sequential patterns in user preferences as they evolve over time. This enables the generation of more dynamic and tailored suggestions [8]. RNNs can enhance their accuracy in suggesting cafes by taking into account the temporal dimension of user interactions and adapting to changing preferences based on current behavior. In conclusion, the integration of collaborative filtering and recurrent neural networks (RNNs) offers a comprehensive solution for personalized cafe recommendations. This combination utilizes the advantages of both strategies to offer customers customized recommendations that consider both their past preferences and present actions.

In addition, recurrent neural networks (RNNs) have the capability to analyze sequential data and identify temporal relationships, making them a valuable tool for comprehending the changing patterns of user preferences [4]. RNNs may analyze user evaluations as word sequences to detect contextual nuances and changes in sentiment. This allows the system to offer recommendations that are more appropriate to the context and dynamically adapt to it. Having the capacity to capture the dynamic nature of user preferences is essential, as these preferences can vary depending on circumstances such as the time of day, event, or mood.

The basis of our study is a robust theoretical framework encompassing recommender systems, collaborative filtering, and natural language processing. Prior research has examined different methods for recommending cafes, with a particular emphasis on either collaborative filtering or sentiment analysis separately [9, 10, 11, 12, 13]. For example, Fakhri et al. [9] utilized a user-based collaborative filtering method to provide restaurant recommendations in Bandung. On the other hand, Gao et al. [10] improved item-based collaborative filtering by integrating user rankings. Xue et al. [11] introduced a deep learning technique for item-based collaborative filtering with the goal of enhancing the precision of top-N suggestions. Jiang et al. [12] presented a music recommender system that utilizes recurrent neural networks (RNNs) to enhance the accuracy of song recommendations. Alfarhood et al. [13] introduced the DeepHCF technique, which employs deep learning methods for collaborative filtering.

Nevertheless, these studies emphasize the necessity for a more all-encompassing strategy that integrates the advantages of several methodologies. The objective of our hybrid IBCF-RNN model is to close this disparity by utilizing both item similarities and contextual information derived from user reviews. This hybrid methodology is

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anticipated to produce more precise and tailored suggestions, particularly in situations where there is a scarcity of user data or tastes are subject to change.

The main goal of this project is to create and assess a cafe recommender system for Bandung that effectively overcomes the shortcomings of current methods. Our objective is to develop a system that utilizes a combination of IBCF and RNN techniques. This system will offer personalized recommendations that cater to individual user preferences, even when there is limited user data available [14]. Additionally, it will take into account the subtleties and emotions expressed in user reviews [15] and have the capability to adapt to changes in user preferences over time [4]. This novel approach seeks to improve the user experience by providing personalized recommendations that adjust to evolving preferences and consider the distinct subtleties in user feedback. The cafe recommender system for Bandung will enhance customer happiness and loyalty by combining the strengths of IBCF and RNN to offer precise and pertinent suggestions.

By doing thorough evaluation and analysis, our aim is to prove the efficacy of our hybrid strategy in improving the precision, pertinence, and overall user satisfaction of cafe recommendations in Bandung. This research aims to enhance the field of recommender systems by demonstrating the capabilities of hybrid models in effectively resolving the difficulties associated with personalization and contextual comprehension. Moreover, our objective is to offer insights that can be customized to other comparable metropolitan settings, with a particular emphasis on Bandung. The objective of this research is to establish a connection between conventional collaborative filtering and content-based techniques, thereby providing a more all-encompassing solution for tailored suggestions in the café business.

To summarize, this research focuses on meeting the increasing demand for customized and contextually appropriate café suggestions in Bandung's lively cafe industry. Our objective is to create a cafe recommender system that addresses the limits of current methods and offers personalized suggestions based on individual preferences and needs. This will be achieved by integrating the strengths of IBCF (Item-Based Collaborative Filtering) and RNN (Recurrent Neural Network) [6]. This technology has the capacity to greatly improve the user experience in discovering novel and captivating cafés in Bandung, while also benefiting cafe owners by facilitating their connection with their intended audience. We have full confidence that our research will provide a meaningful contribution to the field of recommender systems and establish the groundwork for more advanced and user-focused recommendation models in the future.