

Literature Review Recommendation System Using Hybrid Method (Collaborative Filtering & Content-Based Filtering) by Utilizing Social Media as Marketing

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ABSTRACT

The recommendation system is an application model based on observations of the circumstances and customer desires. In the recommendation system, several methods are used to support how the system works in producing information. One method of recommendation system that is quite popular is the method Hybrid. Several researchers have successfully applied this method in developing a tourism recommendation system, therefore to achieve the goal of implementing a tourism recommendation, it is better to take advantage of a marketing technique such as promotion in order to increase sales and attract more comprehensive customers. Therefore, a literature review on the method hybrid (Collaborative Filtering & Content-Based Filtering) of this travel recommendation system is carried out to collaborate between methods, algorithms, and a tool or media marketing applied in a recommendation system.

Keywords: Recommendation System, Hybrid, Collaborative Filtering, Content-Based, marketing.

1. INTRODUCTION

Tourism is an industry that is growing quite rapidly these days. As a result, the tourism sector is the second largest contributor to foreign exchange after palm oil exports (BPS, 2021). In 2018, the tourism sector contributed USD 16,426 billion, increasing around 25 percent from 2017, amounting to USD 13,139 billion (BPS, 2021). Based on this fact, the tourism sector is an attractive sector for further development by a country.

Indonesia has various types and places as tourist destinations. Apart from its natural and cultural beauty, Indonesia is also rich in unique flora and fauna diversity. This becomes interesting if biodiversity is managed and becomes an educational tourism destination. In general, the management of flora and fauna diversity as a tourist attraction has been widely recognized in zoo representation. However, the zoo is now made more specific with the times, such as butterfly park and bird park.

The recommendation system is an application model based on observations of the circumstances and customer desires. Therefore, the recommendation system requires a suitable recommendation model so that the recommended one is by the customer's wishes and makes it easier for customers to make the right decisions in determining the product or service to be used [1]. This recommendation system can be applied in various industrial fields as a way or a tool to promote products or just what is offered. Several methods are used in the recommendation system to support

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how the system produces information, such as Hybrid, Collaborative Filtering, and Content-Based Filtering, TOPSIS, Deep Learning. [2].

This paper focuses on Collaborative Filtering and Content-Based Filtering methods, and social media as a marketing medium for a recommendation system. Collaborative Filtering is a recommendation system algorithm where recommendations are given based on data considerations from other users. Meanwhile, Content-Based Filtering is the provision of recommendations given by exploring the contents of user profiles, product descriptions, or things related to the formation of user choices for an item [1]. The disadvantage of these two methods is that they cannot recommend new types of items or have never been seen by the user before. This is because this method is based on the items that the user has rated. The method is a weakness of Collaborative Filtering that when an item is entered, and no one has given a rating at all, then the item cannot be recommended to any user [3].

So to cover the weaknesses of these methods, it can be done using the hybrid method, which is combining several methods found in the recommendation system to produce recommendation items according to the user's wishes. This literature review is the initial stage planned by the author to conduct research related to recommendation systems using the method Hybrid (Collaborative Filtering & Content-Based Filtering) by utilizing tools or media such as social media and search engines as an effort to increase sales and be able to attract more comprehensive visitors using data sources that come from scientific articles.

The next part of this paper is structured as follows: Part II discusses the literature review related to research. Part III discusses the methodology used. Part IV discusses the discussion of the results of the literature review. Finally, part V is the conclusion.

2. RELATED WORK

Based on a literature review of recommendation systems, many researchers have defined, categorized, and discussed recommendation systems as a solution in marketing to increase sales and attract more comprehensive customers. Several studies have successfully adopted a recommendation system using Hybrid Collaborative Filtering and Content-Based Filtering methods to calculate the similarity between variables [4]. In the development of the recommendation system, previous researchers combined several methods and algorithms, one of the examples is using K-Nearest Neighbor (K-NN), which is used for Collaborative Filtering (CF) and Content-Based Filtering (CB) calculations with results showing that the calculation results effective enough to provide recommendations to users [5], [6]. This method can also be combined with the Pearson Correlation to calculate user ratings on items [7].

The Nearest Neighbor (NN) algorithm is used to find closeness between new cases and old cases based on matching weights of existing attributes. Research that uses Nearest People intends to build a tourist recommendation system in determining trips using route information, time, accommodation, and nearby places by combining K-NN and Apriori algorithms for classification [8]. The Apriori algorithm performs frequent itemset searches using the association rule technique. In this study, Collaborative Filtering and Apriori algorithms are applied to build a

recommendation system based on information from users, which produces a relatively good level of accuracy [9].

Besides using the K-NN algorithm and Apriori algorithm, other research uses the collaborative filtering method by calculating similarity using the Cosine similarity measures by calculating the similarities between two items from the cosine angle [10], [11]. Variance analysis test (ANOVA) is also used [12] to test a hypothesis by comparing the average sample size of the Hybrid Collaborative Filtering and Knowledge-based Filtering methods. Results can provide recommendations for tourist destinations according to user wishes by determining tourist destinations, costs, and the category. Other algorithms such as the Genetic Algorithm [13] can help in increasing the computational efficiency in a visit, for example, and can shorten the calculation time compared to standard algorithms.

Collaborative Filtering is also considered inefficient in handling combined location preferences. It requires other methods to complement the shortcomings of collaboration so that the research adopts K-means to participate users into multiple filtering clusters [14]. The application of a recommendation model collaborative filtering based on the correlation coefficient of time and K-means for recommendations with the results of the trials conducted shows effective results to obtain fast and accurate recommendations that have also been successfully implemented [15].

Another research tries to combine Hybrid Collaborative Filtering, Content-based Filtering, and Location-Based Service (LBS) [16], aiming to improve the quality of tourism services by building an automatic recommendation system application can run on mobile devices. LBS itself is used to filter information based on the distance to the position of spots in a tourism area. This application built can integrate google maps virtual maps and tourist information services.

Another method that researchers often use to combine with Collaborative Filtering and Content-based Filtering is Demographic Filtering by classifying based on user information which aims to recommend visitors to specific places according to preferences of places previously visited [17][18][19].

In addition to using methods and algorithms, several studies also utilize social media as a recommendation, one of which is research [20] which utilizes Twitter by considering the number of URLs, hashtags, and some favorites value to a tweet. The results of the evaluation conducted by the researchers showed a predictive accuracy of 68%. Another study [21] utilized a google maps application to implement a recommendation system using real-time dynamic multimodal routes based on user preferences, point-of-view (POI), and route scenario. Search Engine Optimization (SEO) is a technique to maximize the value of a website, and it is better known or easily read by search engines which aims to increase the number of website visitors. This technique has been successfully applied [22]. This study aims to target keywords that align with the target and determine competitors in targeting these keywords.

3. METHODOLOGY

3.1. RESEARCH QUESTIONS

Based on the background, it is stated that the results of this literature review will be used as a consideration for the author to conduct research related to the tourism recommendation system using the method Hybrid (Collaborative Filtering & Content-Based Filtering). The data used comes from the UGM ETD (Electronic Theses Dissertations Gadjah Mada University).

This section determines the rules used to conduct a systematic literature review. The first step taken is to identify the research questions that will be answered in the following review:

RQ1. Can the recommendation system be implemented in any area?

RQ2. Does the Hybrid method (Collaborative Filtering & Content-Based Filtering) meet the standards in implementing the recommendation system?

RQ3. Can this method be combined with other techniques for promotion such as social media and google analytic?

RQ4. Can the proposed methods and techniques assist in increasing sales and attracting a wider audience?

A. How to Collect Library Reviews

The collection of literature reviews is done by searching online literature obtained from various online database accesses such as IEEE, Scopus, and Google Scholar. The steps in the search are as follows:

1. In IEEE and Google scholar, by going to a web page <https://ieeexplore.ieee.org/Xplore/home.jsp> for IEEE and <https://scholar.google.co.id/> for Google scholar, then write down the keyword "Recommendation System" or "Recommendation System" and specify the period from 2016.
2. In Scopus, by entering keywords in TITLE-ABS-KEY (recommendation AND system) and selecting the last five years from 2016 to 2021.

B. Literature Review Selection Criteria

Based on the results of searches that have been carried out, select articles that are related to the following criteria:

1. Research focuses on recommendation systems
2. Research on the methods that can be applied to the recommendation system
3. Research on Hybrid (Collaborative Filtering & Content-Based Filtering)
4. Research on marketing/promotion techniques to increase sales

4. RESULTS AND DISCUSSION

This chapter will discuss the results of the literature review search carried out and grouped by case. For example, the results of the search for the recommendation system in this literature review consist of 24 papers consisting of recommendation system papers, Hybrid, Collaborative Filtering, Content-Based Filtering, K-means, K-NN, utilization of social media as a recommendation system, TOPSIS, Search Engine Optimization (SEO), Dynamic Multimodal Route and

Travel Recommendation System, Deep Learning, travel recommendations. Table 1 shows the system can be applied in any field with the context of recommending something, such as tourism, [4][20][13], film [14].

TABLE 1.
Analysis of Library Review Results

Author	Method	Purpose
Tessy Badriyah, et al. [3]	Content-Based Filtering and Apriori Algorithm	Implement a product recommendation system based on shopping transactions
Bambang Tri Wahyu, et al. [4]	Hybrid (Collaborative Filtering & Content-Based Filtering) and Nearest Neighbor Algorithms	Implement a recommendation system to help tourists make decisions for a trip.
Jaime da Costa Soares, et al. [5]	Collaborative Filtering, Content-based Filtering, and the K-NN Algorithm	Implementing M-Guide by utilizing Location-Based Services with a Hybrid recommendation system in guiding tourists based on the results of
Hongzli Li and Dezhi Han's recommendations [6]	Collaborative Filtering and Spectral Clustering Algorithm	To overcome overload mation in internet applications that make it difficult for users to maintain what the user wants
Xiangshen Xu, et al. [7]	Hybrid Collaborative Filtering and Pearson Correlation	Make recommendations were suitable for the user and improve the quality of the algorithms recommended
Shrikant Kokate [8]	K-NN Algorithm and Apriori Algorithm	System recommendation applied to designing tourist destination in determining the trip by using route information, time, accommodation address, nearest place.
Albertus Bayu Aji Priyono [9]	Apriori Algorithm, Association rule, and Collaborative Filtering	Building a recommendation system using Apriori and Collaborative Filtering to predict an item based on information obtained from the user
Yudi Setiawan, et al. [10]	Collaborative Filtering and Cosine Similitiy Measures	Predicting certain items for a user based on previous user preferences and other user opinions similar to

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Zhiyang Jia, et al. [11]	Collaborative Filtering and Cosine	Build an online application capable of listing objects w data of personal preferences for tourists
Lutfi Ambarwati and ZKA Baizal [12]	Hybrid Collaborative Filtering and Knowledge-based Filtering and using the analysis of variance (ANOVA)	A recommendation system was built to determine tourist destinations according to user preferences by determining tourist destinations, costs, and categories of tourists
ChenYuan, et al. [13]	Genetic Algorithms	Utilizing genetic algorithms in the application of a travel recommendation system
Jiang Zhang, et al. [14]	Collaborative Filtering and K-means	Implementing a recommendation system using Collaborative Filtering and K-means to recommend
Zhihua Cui [15]	Collaborative Filtering and K-means	Implement Collaborative Filtering and K-means for IoT services
Assaf Arief [16]	Collaborative Filtering, Content-based Filtering, and Location-Based Services	Improve the quality of tourism services by building an automatic recommendation system application that can run on mobile
Maddaladevices Laksmi Bai, et al. [17]	Hybrid Filtering Content-based Filtering, Collaborative Filtering, and Demographic Filtering	Build a personalized recommendation system to combat cold starts by predicting new user ratings and new items in the recommendation system
Mohamed ELYes Ben Haj Kbaier, et al. [18]	Hybrid; Collaborative Filtering, Content-based Filtering, and Demographic Filtering as well as using a Decision tree	Build a recommendation system that will recommend visitors to a particular place according to their preferences, profiles, and appreciation based on places previously visited
Joseph Coelho, et al. [20]	Social media (Twitter)	Utilizing Twitter as a technique in the development of the recommendation system
Subramaniaswamy. V, et al [21]	DYNAMO	Implementing a recommendation system using the Dynamic Multimodal Route and Travel Recommendation System to recommend tours
Ahmad Sofyan, et al. [22]	Search Engine Optimization (SEO)	Implementing SEO in an online shop as a promotional medium

Nour Nassar, et al. [23]	Collaborative Filtering and Deep Learning	Use Collaborative Filtering and Deep Learning as a method in developing a travel recommendation system for
Xuesong Zhao and Kaifan Ji [24]	Collaborative Filtering and Association rule	Build a recommendation system to help online sellers better meet customer needs and maintain their loyalty

5. CONCLUSION

Based on the analysis of papers that meet the criteria, this concluding chapter will be discussed and answer the research questions that have been made.

RQ1. Can the recommendation system be implemented in any area?

Based on Table 1, it can be concluded that this recommendation system can be applied in any field with the context of recommending something, such as tourism, [4][20][13], film [14].

RQ2. Does the Hybrid method (Collaborative Filtering & Content-Based Filtering) meet the standards in implementing the recommendation system?

Based on the results of the literature review, many studies have used this method in implementing recommendation systems and producing efficient results

RQ3. Can this method be combined with other techniques for promotion such as social media and google analytic?

It can be seen in Table 1 that some researchers use social media as a technique in developing recommendation systems [20][22]. However, this does not rule out the possibility of collaborating with other methods to implement the recommendation system more optimally.

RQ4. Can the proposed methods and techniques assist in increasing sales and attracting a wider audience?

Based on the literature review results that the author has reviewed, this method, Hybrid (Collaborative Filtering & Content-Based Filtering), plays an essential role in the development of a recommendation system. Using this method, the recommendation system that is implemented can produce a system that helps users get recommendations according to what the user wants. For this reason, the goal of increasing sales and attracting more outside customers can be done by using marketing strategies such as promotions to introduce the products or services offered to the entire community.

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