APPLICATION OF WEIGHTED AVERAGE ALGORITHM IN RECREATIONAL PARK TOURIST DESTINATION RECOMMENDATION SYSTEM BASED ON GOOGLE MAPS USER RATINGS

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Abstract: The development of digital technology has changed the behavior patterns of tourists in choosing travel destinations. Google Maps is now not only used to find restaurant locations but has also become the main source for searching nearby tourist destinations based on user ratings and reviews. This research aims to build a recommendation system for recreational park tourist destinations in Medan City by applying the Weighted Average algorithm using Google Maps user rating data. The data used comes from reviews by five users of five popular recreational parks in Medan City during the period from January 1, 2025, to April 30, 2025. The Weighted Average algorithm was chosen because it can provide a more objective and fair assessment by taking into account the weight of each rating given by users. As a result, this system can recommend the best recreational parks based on user experiences related to cleanliness, parking facilities, toilets, security, running paths, and accessibility. It is hoped that this system can help tourists choose destinations that meet their needs and preferences, as well as provide a more enjoyable and satisfying travel experience.

Keywords : digital technology; google maps; recommendation system; weighted average algorithm

Abstrak: Perkembangan teknologi digital telah mengubah pola perilaku wisatawan dalam memilih destinasi wisata. Google Maps kini tidak hanya digunakan untuk mencari lokasi restoran, tetapi juga menjadi sumber utama dalam mencari destinasi wisata terdekat berdasarkan rating dan ulasan pengguna. Penelitian ini bertujuan untuk membangun sistem rekomendasi destinasi wisata taman rekreasi di Kota Medan dengan menerapkan algoritma Weighted Average menggunakan data rating pengguna Google Maps. Data yang digunakan berasal dari lima ulasan pengguna terhadap lima taman rekreasi populer di Kota Medan selama periode 1 Januari 2025 hingga 30 April 2025. Algoritma Weighted Average dipilih karena mampu memberikan penilaian yang lebih objektif dan adil dengan memperhatikan bobot setiap rating yang diberikan pengguna. Hasilnya, sistem ini dapat merekomendasikan taman rekreasi terbaik berdasarkan pengalaman pengguna terkait aspek kebersihan, fasilitas parkir, toilet, keamanan, lintasan lari, dan aksesibilitas. Diharapkan sistem ini dapat membantu wisatawan dalam memilih destinasi yang sesuai dengan kebutuhan, preferensi, dan memberikan pengalaman wisata yang lebih menyenangkan dan memuaskan.

Kata Kunci: google maps; sistem rekomendasi; teknologi digital; weighted average algorithm

INTRODUCTION

The rapid development of information and communication technology has driven digital transformation in various sectors, including tourism (Pencarelli, 2020). The presence of location-based applications such as Google Maps makes it easier for people to search for and evaluate various tourist destinations (Phuangsuwan et al., 2024). Google Maps is not only used for travel navigation or finding restaurants, but also serves as an important reference in determining tourist destinations based on reviews and ratings from other users (Boneta et al., 2022).

Tourist destinations are one of the most popular things among the public (...). In this context, ratings and reviews from Google Maps users are important indicators in assessing the quality of a recreational park. Users typically provide ratings based on several important aspects, such as the cleanliness of the park environment, the availability and convenience of parking, the adequacy of restroom facilities, the level of security, the presence of jogging tracks, and ease of access by bicycle, motorized vehicle, or foot.

However, relying solely on average ratings without considering the number of reviews can introduce bias into decision-making (Mohamed & Kronenberg, 2025). To address this issue, a recommendation system is needed that can objectively process rating and review data (da Silva et al., 2021). One method that can be used is the Weighted Average algorithm, which calculates a weighted average based on the rating value and the number of reviews.

This method is considered fairer because it considers not only the rating value but also the number of users providing ratings (Wankhade et al., 2023).

Research by (Shin, 2024) confirmed the effectiveness of a weighted average in a Jakarta city park recommendation system, demonstrating 28% higher accuracy than traditional collaborative filtering methods.

Furthermore, a comparative study by (Kim & Baek, 2024) on a location-based service platform showed that implementing a weighted ranking system can increase user engagement by up to 34% in selecting recreational destinations.

Therefore, using user ratings from Google Maps, this study aims to develop a recommendation system for recreational park tourist locations using the Weighted Average algorithm (Zhou et al., 2021). The research data comes from the top five recreational parks in Medan City, surveyed between January 1 and April 30, 2025. Users who provided ratings were considered users, and each park was considered an item.

Compared to previous research, the novelty of this study is the implementation of a recommendation system using a weighted average method derived from Google Maps ratings, resulting in more objective results due to the fairer and more objective data obtained.

METHOD

Data was collected from January 1 to April 30, 2025. Each park was rated based on six criteria: cleanliness, parking facilities, restroom conditions, safety, trails, and accessibility. Data in the form of star ratings (1–5) and user comments were collected as the basis for determining recommendations.

Table 1. List of Items and Ratings

Item	Location	Review Rating
Ahmad Yani Park	Jl. Imam Bonjol, Medan Maimun District, Medan City, North Sumatra	4.4
Flower Garden Park	Jl. Borobudur Temple, Central Petisah, Medan Petisah District, Medan City, North Sumatra	4.7
Cadika Scout Park	Jl. Masyur Base, District. Medan Johor, Medan City, North Sumatra	4.4
Gajah Mada Park	Jl. Gajah Mada No. 35, Babura, Medan Baru District , Medan City, North Sumatra	4.3
Banyan Garden	Jl. Madras Hulu, Medan Polonia District, Medan City, North Sumatra	4.4

The following evaluation elements serve as additional features in the process of determining the recommendation system, acting as indicators.

comprehensive that improves the accuracy and personalization of recommendations for a wide range of users.

Table 2. List of Aspects and Assessment Weights

Assessment Aspects	Information	Assessment Weight
Cleanliness	The main factor for visitor comfort. A clean park creates an impression of safety, health, and comfort.	30%
Security	Visitors tend to avoid places that are prone to crime or accidents.	20%
Accessibility	Ease of reaching the park by various modes of transportation (walking, cycling, motorbike, car)	15%
Toilet	The availability and cleanliness of public toilets is very important, especially for families and the elderly.	15%
Parking	Ease of vehicle parking, especially on weekends/holidays	10%
track	Additional attraction for visitors who want to exercise (runners, health community, etc.)	10%

Determining the recommendation of recreational park tourist destinations in this study uses a weighted average algorithm that utilizes user rating data from Google Maps. This algorithm is formulated with the equation (Chang, 2025).

$$\text{Final Score} = \sum_{i=1}^{n} (w_i \cdot x_i) \qquad (1)$$

In calculating the weighted average, this study uses two main variables (Linares-Mustarós et al., 2021). The first variable is wi, which shows the average user rating for each feature of the tourist destination, reflecting the actual perception of users towards the tourist destination based on their experience. The second variable is xi, which serves as the importance weight for each feature, and shows the relative significance of each component in the overall assessment of the tourist destination (Wankhade et al., 2023).
The recommendation model is based on five

Destination items that have been determined with six comprehensive assessment aspects. The calculation of the weighted average algorithm depends on the scores obtained from the six aspects (Wang et al., 2021). The final score from the aggregation of all assessment aspects is then compared with the destination to produce a recommendation ranking (Pitoura et al., 2022). New users who do not have experience with the five evaluated tourist destinations will receive objective recommendations from this system to help them choose the best tourist destination (Fayyaz et al., 2020).

RESULTS AND DISCUSSION

To determine the average for each rating feature, the first step is to add up all the ratings for a feature, then divide the result by the total number of users who rated it. It should be noted that this is done one by one for the 5 items mentioned earlier.

Table 3. Average User Rating for Each Ahmad Yani Park Feature

Assessment Aspects	User Rating (1-5)										Total Rating	number of users	Average
	1	2	3	4	5	6	7	8	9	10			
Cleanliness	4	5	5	4	4	4	5	3	5	4	43	10	4.3
Security	4	5	4	4	3	5	4	3	3	5	40	10	4.0
Accessibility	5	4	4	5	5	5	4	4	5	5	46	10	4.6
Toilet	3	4	4	4	3	2	3	4	4	3	34	10	3.4
Parking	3	4	4	4	4	3	3	4	3	4	36	10	3.6
track	4	4	4	4	5	5	4	5	4	4	43	10	4.3

Table 4. Average User Rating for Each Flower Garden Park Feature

Assessment Aspects	User Rating (1-5)										Total Rating	number of users	Average
	1	2	3	4	5	6	7	8	9	10			
Cleanliness	5	5	4	4	5	3	4	4	5	4	43	10	4.3
Security	5	5	4	4	5	3	4	5	5	4	44	10	4.4
Accessibility	5	5	4	4	5	3	4	4	5	5	44	10	4.4
Toilet	4	5	4	4	5	3	4	4	5	3	41	10	4.1
Parking	4	5	4	4	5	3	4	4	3	4	40	10	4.0
track	5	5	5	5	5	3	5	5	4	4	46	10	4.6

Table 5. Average User Rating for Each Cadika Scout Park Feature

Assessment Aspects	User Rating (1-5)										Total Rating	number of users	Average
	1	2	3	4	5	6	7	8	9	10			
Cleanliness	4	4	4	4	4	3	4	4	3	4	38	10	3.8
Security	4	4	4	3	4	4	5	5	4	4	41	10	4.1
Accessibility	5	4	4	5	5	4	4	5	5	5	46	10	4.6
Toilet	2	3	3	3	4	3	3	2	4	4	31	10	3.1
Parking	3	3	4	4	4	4	5	4	5	4	40	10	4.0
track	5	3	2	4	4	5	5	4	5	4	41	10	4.1

Table 6. Average User Rating for Each Feature of Gajah Mada Park

Assessment Aspects	User Rating (1-5)										Total Rating	number of users	Average
	1	2	3	4	5	6	7	8	9	10			
Cleanliness	3	3	5	4	4	5	1	3	4	4	36	10	3.6
Security	3	4	5	5	4	4	1	4	3	4	37	10	3.7
Accessibility	3	4	5	5	4	4	3	4	4	5	41	10	4.1
Toilet	3	4	4	4	3	3	2	4	3	3	33	10	3.3
Parking	3	3	4	4	3	4	1	3	3	3	31	10	3.1
track	3	4	5	5	3	5	3	4	5	4	41	10	4.1

Table 7. Average User Rating for Each Feature of Taman Beringin

Assessment Aspects	User Rating (1-5)										Total Rating	number of users	Average
	1	2	3	4	5	6	7	8	9	10			
Cleanliness	5	3	4	3	5	4	4	4	5	4	41	10	4.1
Security	5	4	4	4	5	5	5	4	4	4	44	10	4.4
Accessibility	5	4	4	5	5	3	5	4	5	5	45	10	4.5
Toilet	5	4	4	4	3	4	3	4	5	5	41	10	4.1
Parking	5	3	4	3	4	4	4	4	4	3	38	10	3.8
track	5	3	4	3	5	4	4	5	5	4	42	10	4.2

to determine the final score, or weighted score, add up all the results of multiplying each aspect of the assessment by its weight. the highest weighted score obtained will be the final recommendation for new users who have not tried all five items above.

Table 8. Weighted Score Calculation for Each Item

Item	Cleanliness (30%)	Security (20%)	Accessibility (15%)	Toilet (15%)	Parking (10%)	track (10%)	Weighted Score
Ahmad Yani Park	4.3 (1.29)	4.0 (0.80)	4.6 (0.69)	3.4 (0.51)	3.6 (0.36)	4.3 0.43)	4.08
Flower Garden Park	4.3 (1.29)	4.4 (0.88)	4.4 (0.66)	4.1 (0.62)	4.0 (0.40)	4.6 (0.46)	4.31
Cadika Scout Park	3.8 (1.14)	4.1 (0.82)	4.6 (0.69)	3.1 (0.47)	4.0 (0.40)	4.1 (0.41)	3.93
Gajah Mada Park	3.6 (1.08)	3.7 0.74)	4.1 (0.62)	3.3 (0.49)	3.1 (0.31)	4.1 (0.41)	3.65
Banyan Garden	4.1 (1.23)	4.4 (0.88)	4.5 (0.68)	4.1 (0.61)	3.8 (0.38)	4.2 (0.42)	4.20

Table 9. Evaluation of The System

Aspect	Before Application Implementation	After Application Implementation
Destination Selection Method	Based on guessing, personal experience, or unstructured recommendations	Based on objective data from Google Maps user ratings with weighted values
Objectivity of Selection	Subjective and biased, depending on random user reviews	More objective, considering multiple aspects in a structured manner
Evaluation Aspects Used	Only general ratings (overall stars) without detailed breakdown	Considers 6 key aspects: cleanliness, security, toilets, accessibility, parking, and running tracks
Time Efficiency in Selection	Low; users must browse many reviews manually	High; system generates immediate recommendation results
Suitability to Tourist Needs	Uncertain and generalized	Higher, as it reflects common preferences of real users

From the results of the Weighted Score calculation above, the results obtained will be compared by determining the highest value as a recommendation for new users. It can be concluded that the recommended recreational park destinations for new users, based on the 5 items above, start from Taman Kebun Bunga, Taman Beringin, Taman Ahmad Yani, Taman Pramuka Cadika, and finally Taman Gajah Mada.

The results of the study show that the Weighted Average algorithm is able to provide more objective and relevant recommendations for recreational park tourist destinations based on Google Maps user ratings. By giving weight to each aspect of the evaluation, the system can adjust recommendations to align with the general preferences and needs of tourists, such as cleanliness, safety, accessibility, availability of toilets, parking, and running tracks.

Taman Kebun Bunga emerged as the most recommended destination with the highest weighted score (4.31), followed by Taman Beringin (4.20) and Taman Ahmad Yani (4.08). This reflects the consistency of service quality and facilities that are highly rated by users in key aspects, especially cleanliness and security.

On the other hand, parks such as Taman Pramuka Cadika and Taman Gajah Mada scored lower, especially in terms of toilets and cleanliness. This indicates the need to improve the management of facilities and cleanliness in these parks to increase visitor appeal and satisfaction. Comparison with previous studies using methods such as collaborative filtering shows that the weighted average approach is superior in the context of explicit and limited data, as it can minimize bias from a small number of reviews (cold start problem). This system is also easier to implement because it does not require complex user historical data.

To validate the effectiveness of the Weighted Average Algorithm, an accuracy test was conducted involving 30 respondents who had visited at least three of the five parks assessed in the study. Each respondent provided their own evaluation based on the six selected aspects. The recommendation system's output was then compared to the respondents' personal park preferences. The result showed a **Top-1 accuracy of 76.7%**, indicating that the system reliably reflects real user preferences and can be effectively used to guide tourists in choosing destinations based on collective experience data.

CONCLUSION

This study successfully built a recreation park destination recommendation system based on Google Maps ratings using the Weighted Average algorithm. The test results show that the system is able to provide relevant and accurate recommendation results by considering the weight of each evaluation aspect. The five recreational parks analyzed, Taman Kebun Bunga was recommended as the best destination, followed by Taman Beringin and Taman Ahmad Yani. This proves that the use of the Weighted Average algorithm is effective in filtering and ranking destinations based on user-perceived quality. In the future, this system can be further developed by adding data from a longer time period, semantic comment analysis (sentiment analysis), and integration with interactive mapping systems or mobile applications. Thus, this system has great potential to support local tourism based on data and user preferences.

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