A Recommendation System for Prewedding Location Selection using Count Vectorization and Cosine Similarity

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***Abstract*— Choosing the right pre-wedding location is a concern for many couples due to the many options available, which often causes confusion and is time-consuming in decision-making. Therefore, a recommendation system is needed to assist couples in determining the prewedding location that suits their preferences. This research aims to provide alternative recommendations for prewedding locations and simplify the process of selecting a suitable location. This system integrates the Content-based Filtering method by applying Count Vectorization and Cosine Similarity to calculate the similarity between locations based on features in the dataset. These algorithms were chosen for their effectiveness in handling categorical text data and identifying similar items, making them suitable for generating relevant prewedding location recommendations. The dataset used consists of 75 entries, each representing a unique location with the following variables: venue, address, distance (in kilometers), price, theme, and type. Based on the similarity scores, the system generates a ranked list of 5 recommended locations that closely match the selected venue. The Rapid Throwaway Prototyping method ensures the system development is done iteratively and involves direct feedback from users. The recommendation system is evaluated using the Mean Reciprocal Rank (MRR) metric to measure the effectiveness of the recommendations provided by the system. The results show that the developed prewedding location recommendation system can provide relevant location recommendations with good performance, as evidenced by the Mean Reciprocal Rank (MRR) value of 0.88, which indicates that the system is effective in placing the most relevant locations at the top of the recommendation list. The high MRR value shows the system's effectiveness in providing relevant recommendations, improving customer experience, and supporting the company's competitiveness in the prewedding documentation industry.**

Index Terms*— Content-based Filtering; Cosine Similarity; Count Vectorization; Prewedding; Recommendation System.

I. INTRODUCTION

Marriage is a sacred event of binding the marriage vows made by a couple to formalize the marriage bond based on applicable religious, legal, and social norms [1]. In addition, there is a procession that is usually carried out before the wedding, namely a prewedding photo session[2]. Photo sessions at the moment before and during the wedding for most are important things that must be done because these moments may not be repeated[3]. As a moment that precedes the wedding day, these sessions are often used to express the unique character, theme, or love story of each couple[4]. In the documentation of these moments, especially prewedding, location selection is a crucial factor that can affect the results of both photo and video documentation[5]. The right location can not only enhance visual aesthetics but also add meaningful value to a moment[6].

Hazen Pictures, a company focusing on photography and videography services for event documentation, understands the importance of choosing the right venue for client satisfaction. Hazen Pictures, located on the island of Batam with its abundant natural beauty, is committed to providing exemplary service to couples by providing aesthetically pleasing venues that match the preferences and desires of couples in their pre-wedding moments. In addition, Hazen Pictures strives to be a reliable partner for couples to create meaningful prewedding documentation for each couple. But prewedding location selection is still challenging for every couple and Hazen Pictures. Most of Hazen Pictures' clients experience confusion due to the variety of location options. From exotic beaches with beautiful white sands, green parks, urban locations, or charming cities, each location offers a different atmosphere and aesthetic. Therefore, a recommendation system is needed to assist in making decisions about a prewedding location and provide a list of recommendations based on each couple's preferences.

The correct algorithm is needed in making the recommendation system [7].

A study by [8] focused on building a restaurant recommendation system to help users identify dining places that suit their preferences, such as type of cuisine and proximity. The method used in this study is content-based filtering, supported by cosine similarity to measure the closeness between restaurant attributes like address and category. This technique allows the system to provide tailored recommendations for each user. To support the system, data was collected through web scraping from popular platforms such as TripAdvisor and Google Maps, resulting in a diverse and representative dataset of restaurants. The system was developed as a web application and evaluated through trials involving 30 participants. The testing showed that the system achieved an accuracy of 88%, proving its capability to deliver relevant and useful restaurant recommendations based on user preferences.

The second research conducted by [9] focusing on developing a recipe recommendation system aimed at assisting housewives in deciding what to cook based on available ingredients. The researcher implemented a content-based filtering approach using Term Frequency-Inverse Document Frequency (TF-IDF) and cosine similarity in this study. The TF-IDF method was applied to numerate ingredient data, while cosine similarity was used to measure the similarity between user-input ingredients and existing recipes. The dataset used in this study consisted of 30 recipes obtained from the website makapahariini.com. The system is designed to recommend recipes most relevant to the ingredients users enter through a search form. Based on the Root Mean Square Error (RMSE) evaluation, the system scored 0.356, indicating that the recommendation results were fairly accurate and relevant in suggesting suitable recipes.

The third research was conducted by [10] which focused on developing a web-based application called Nongkies to recommend coffee shops and restaurants as hangout spots, primarily targeting university students in Bandung. It used a content-based filtering approach with cosine similarity to match user preferences with place attributes. The dataset included 55 coffee shop entries from the Trakter.id website. Results showed the system provided accurate and relevant recommendations, with 52.3% of students hanging out once a week and an average satisfaction score of 4.153 out of 5. The system proved effective in helping users discover suitable locations, improving their decision-making and social experiences.

The fourth research conducted by [11] he made a recommendation system for choosing an electric car in his research. This research uses content-based filtering by comparing the TF-IDF method with Count Vectorization. Both methods have the same two functions, namely obtaining the number of occurrences of words in the document. The difference is that TF-IDF, in addition to calculating the occurrence of words this method performs weighting on each word that appears in the document to obtain its level of importance. The attributes include model, price, manufacturer, range, max-speed, horsepower, car type, drive type, release year, and manufactured. The results of this study show that the system can provide electric car recommendations for users. In terms of accuracy in this study using a confusion matrix with the results for TF-IDF, the accuracy value is 64%, while for Count Vectorization, the accuracy value is 75%.

The fifth research conducted by [12] in his research, he made a recommendation system for choosing a movie. This study uses two methods, namely the first method of content-based filtering, which consists of count vectorizer and cosine similarity. The second method is collaborative filtering. Both methods are methods used for recommendation systems. Content-based filtering is used to generate similar recommendation items, and then collaborative filtering is used to generate recommendations that can reduce errors and be more personalized. The attributes used in this research regarding movie recommendation systems include genres, cast, keywords, directors, titles, users, and ratings. This research shows that the hybrid filtering method produces a small error value of 0.68 and can present relevant user recommendations.

Based on research references, this research will create a recommendation system for prewedding location selection at Hazen Pictures with novelty from research on prewedding location selection before, so using the Count Vectorization algorithm is an option because based on research [11], in his research comparing the TF-IDF and Count Vectorization methods to calculate the occurrence of words in a document, he found that the Count Vectorization method is better than the TF-IDF method in terms of accuracy. After encoding the count vectorization method, calculations with cosine similarity are performed to find similarities in the data in the system. Data similarity is obtained from the calculation of the closest value distance [12]. This study adopts the Rapid Throwaway Prototyping method, which facilitates the iterative development of the recommendation system through early prototyping, user feedback evaluation, and continuous improvement [13]. The data used includes prewedding locations around Batam Island with attributes such as venue, address, distance (in kilometers), price, theme, and type, all sourced from Hazen Pictures. The recommendation system will be implemented using a content-based filtering approach incorporating Count Vectorization and Cosine Similarity. System evaluation will be carried out using Mean Reciprocal Rank (MRR), chosen for its effectiveness in assessing the top-ranked relevance of the recommendations provided [14]. This research aims to develop a recommendation system that provides relevant prewedding location suggestions based on client preferences, supports Hazen Pictures and their clients in making faster and more informed decisions,

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and streamlines the selection process by offering ranked recommendations based on similarity calculations.

II. METHODOLOGY

The Rapid Throwaway Prototyping Model method was used in this study, which is one variant of the prototyping model [15]. This method allows rapid prototyping to provide a visual picture of how the system works [16]. The stages involved in this method include formulating outline requirements, developing a prototype, evaluating a prototype, specifying the system, developing software, and validating the system.

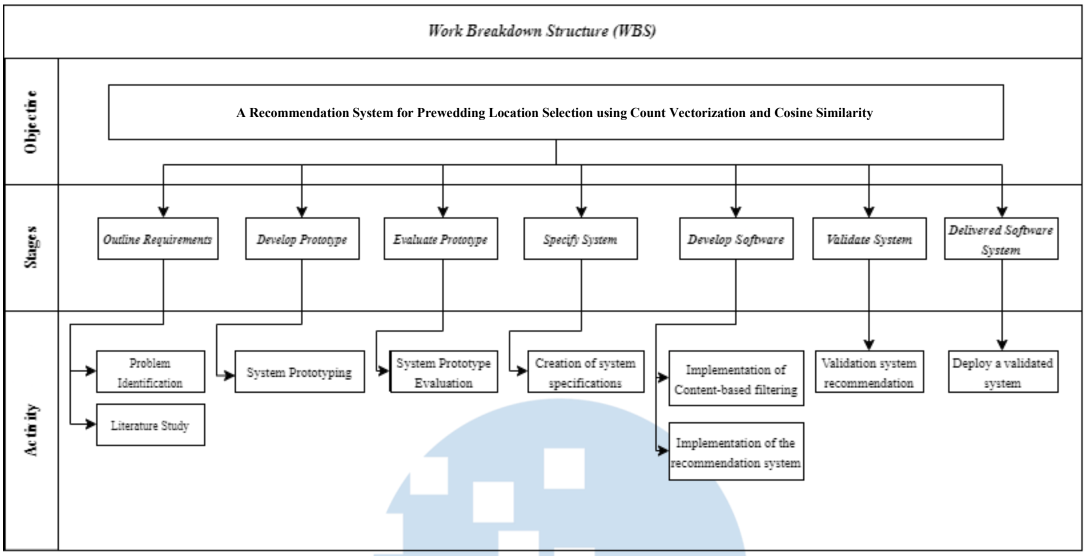

Fig. 1. Research Stages

Based on Figure 1, the research stages can be explained as follows:

1) Outline Requirements, at this stage, the identification process is carried out by understanding the problems at Hazen Pictures regarding selecting prewedding locations by conducting interviews. In addition, literature studies from journals, books or other related support are also carried out.
2) Develop a Prototype. At this stage, an initial prototype is made to produce a system prototype based on the problems identified.
3) Evaluate Prototype, this stage evaluates the system prototype with Hazen Pictures to get feedback on the suitability of the design to the needs.
4) Specify System, at this stage, specifications are made for the system to be built based on the evaluation stages carried out on the earlier prototype.
5) Develop Software. At this stage, the activity of implementing Content-based Filtering by implementing Count Vectorization to convert text into numeric by counting the occurrence of words in the text [11]. The count vectorization formula is presented below.

$$Count\ Vectorizer = V(i, j) \quad (1)$$

With V=number of frequencies; i=word; and j=document.

Furthermore, the results of Count Vectorization are calculated using Cosine Similarity to calculate the similarity between locations [17]. The cosine similarity formula is presented as follows.

$$A \cdot B = A[0] \times B[0] + \cdots + A[n] \times B[n] \quad (2)$$

$$\sqrt{A} = \sqrt{(A[0]^2 + A[1]^2 + \cdots + A[n]^2)} \quad (3)$$

$$\sqrt{B} = \sqrt{(B[0]^2 + B[1]^2 + \cdots + B[n]^2)} \quad (4)$$

$$\frac{A \cdot B}{\sqrt{A} \times \sqrt{B}} \quad (5)$$

A and B are two vectors or documents. Next, the recommendation system is built based on the system specification and the evaluated prototype.

6) Validate System: This stage is carried out to validate the system that has been built with Hazen Pictures to find out whether the recommendation system has met the needs and specifications of the system. And measuring performance on recommendation results using the Mean Reciprocal Rank metric. The formula for Mean Reciprocal Rank is presented as follows:

$$RR = \frac{1}{First\ relevan\ position} \quad (6)$$

$$MRR = \frac{1}{N} \sum_{i=1}^{N} RR_i \quad (7)$$

7) Delivered Software System, at this stage, the application is deployed and submitted to Hazen Pictures.

III. Result And Discussion

A. RESULTS

1) Outline Requirements

The first stage is outline requirements, where two activities are carried out: problem identification and literature review.

a) Problem Identification: At this stage, it was discovered that although Batam has many attractive prewedding locations, the abundance of choices confused clients when choosing the most suitable location. Hazen Pictures plans to add a prewedding location recommendation feature on its website to assist clients in choosing a location based on the desired theme. This feature is expected to simplify the selection process, although the final decision remains in the hands of the client. Some of the simple system requirements identified include:

- The system needs to display information about each location.
- The system can help provide alternative locations according to preference.

b) Literature Study: A literature study was conducted to gain in-depth insight into relevant technologies and methods in developing the recommendation system. This activity includes reading and reviewing related literature to understand the problem and reviewing approaches used in previous research to address similar problems. Count Vectorization allows the system to measure the occurrence of words in location descriptions, while Cosine Similarity calculates the similarity between client preferences and available locations. In addition, the Mean Reciprocal Rank (MRR) evaluation metric was chosen for its ability to measure the performance of the recommendation system, especially in assessing the relevance of the generated location list and ensuring that the most relevant recommendations are at the top.

2) *Develop Prototype*

This stage is carried out by making a prototype of the system that has been planned previously. This step is carried out based on the need to visualize and test how the recommendation system's flow will work. The prototype was created using Figma design software, and the following is an iteration process in prototyping, which includes iterative stages to adjust the design to the needs, as seen in Figure 2.

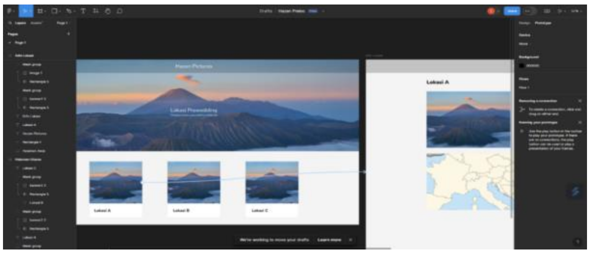

Fig. 2. Prototyping Process

Figure 2 shows the prototyping process, which was done in two iterations. Once the prototype was completed and evaluated based on feedback from users and Hazen, the evaluation was used to refine the second prototype. The prototype focused on testing the basic concepts of the system, mainly navigation, and functionality, with the results shown in Figure 3 and Figure 4.

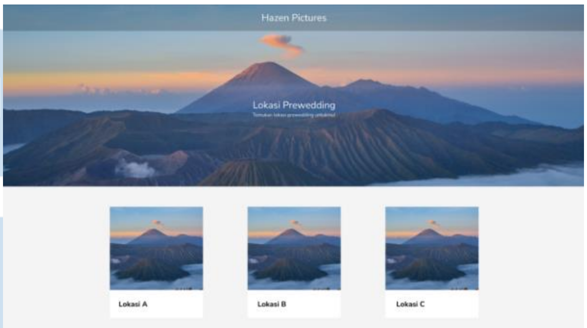

Fig. 3. First prototype of the home page

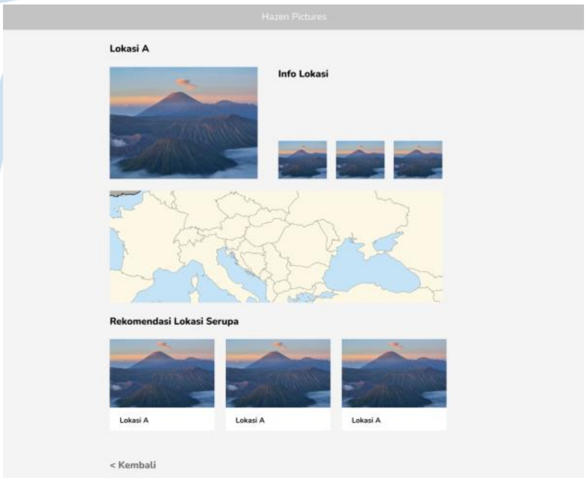

Fig. 4. Prototype of the location page

Figures 3 and 4 show the prototype which includes two main pages: a home page with a list of prewedding locations and a location page that displays information and recommendations of similar locations. Based on the evaluation and feedback, a second prototype was developed to correct shortcomings and improve features, with the improvements shown in Figures 5 and 6.

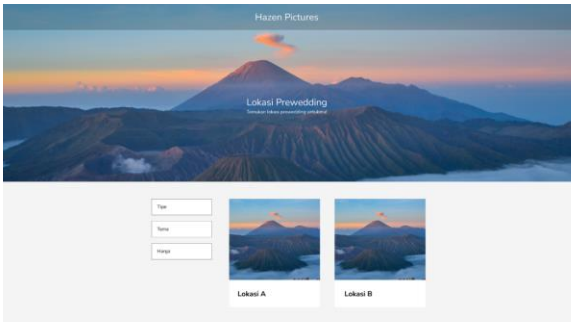

Fig. 5. Second prototype of the home page

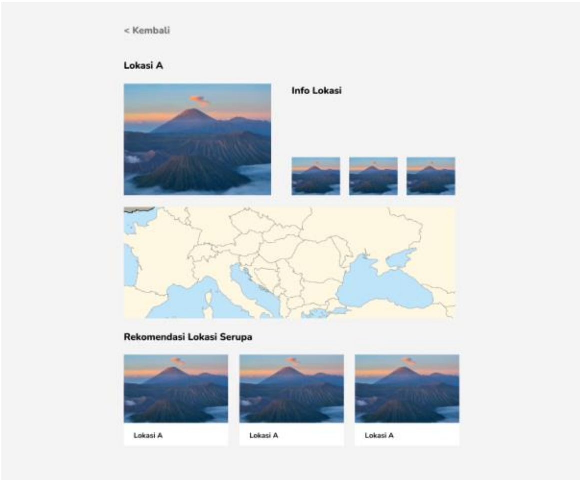

Fig. 6. Second prototype of the location page

The system prototype created in Figures 5 and 6 can be accessed through the link https://s.id/hazenlocprototipe. Based on the prototype results, the prototype consists of two pages. The first page displays all prewedding location queries, and users can view all prewedding locations and sort them by theme, type, and price based on user preferences. The second page displays info from the prewedding location and 5 recommendations that are similar to the location the user views.

3) *Evaluate Prototype*

The evaluation prototype stage evaluates the previous prototype by researchers and Hazen Pictures. This evaluation stage aims to update and get input from users to proceed to the next stage. The prototype evaluation process is carried out online as shown in Figure 7.

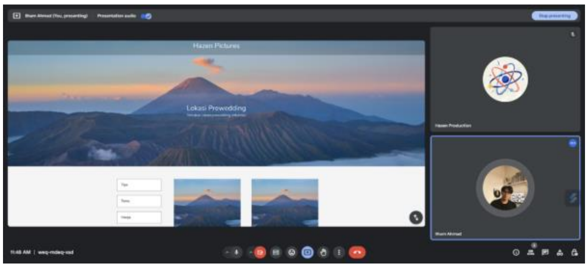

Fig. 7. Prototype Evaluation

Figure 7 shows an evaluation of the prototype conducted online via Google Meet between the researcher and Hazen Pictures. Discussions covered the functionality and design of the prototype, with user feedback used for improvement. The evaluation was conducted twice. The following input is based on the first evaluation stage, including:

- Added dropdowns to sort locations by theme, type, and price.
- Remove the navbar from the location page.
- Moved the position of the back button on the location page.

The prototype was improved according to the feedback and re-evaluated. The results of the second evaluation showed that the prototype had met the criteria and was ready to proceed to the Specify System stage.

4) *Specify System*

The specified system stage is when researchers compile a recommendation system specification based on prototype evaluation and user needs analysis. This specification guides the development of a recommendation system ready to be implemented. The results of this stage are functional requirements, which include:

- The system can display all prewedding locations
- When a location card is clicked, the location info and a list of recommendations should be displayed at the bottom.
- The recommendation system displays a list of alternative recommendations for a maximum of 5 prewedding locations.
- The system can sort prewedding locations by type, theme, and price.

In addition, non-functional requirements are also determined, namely, the user interface must be easy to use by users.

5) *Develop Software*

The development software stage transforms the prototype and specifications into a functional recommendation system. Researchers implement the algorithm along with the features that have been planned previously. The following are the steps taken at the development software stage.

a) Implementation of Content-based Filtering (CBF): Content-based filtering (CBF) is a recommendation method that provides suggestions based on the similarity of attributes or content between items that users and other items in the dataset have selected [18]. The application of the Content-based Filtering method in the prewedding location recommendation system is used to provide recommendation results that have similarities in items [19]. The following are the implementation steps of Content-based Filtering presented in Figure 8.

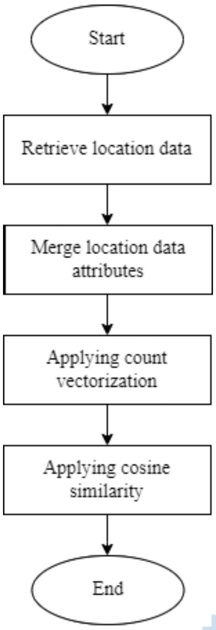

Fig. 8. Implementation steps

Based on Figure 8. The process starts with retrieving location data. After that, the attributes in the data are combined into one text. Next, the merged text data is converted into a numerical representation by counting the number of word occurrences [20] using Count Vectorization. After the numerical representation is determined, the data's similarity is calculated using Cosine Similarity. The following is a complete explanation of the implementation of content-based filtering.

1. Retrieve and merge location data
   Each attribute of the location data is merged into one text. This merging aims to represent each location comprehensively in text form. The following is a sample of data combined in Table I.

TABLE I. SAMPLE DATA FOR COUNT VECTORIZATION

No	Document
1	Viovio Beach Outdoor Beach Sijantung Galang Batam City Riau Islands
2	Melur Beach Outdoor Beach Sijantung Galang Island Batam City Riau Islands

Table I presents sample data from two documents, which is then used as input for the count vectorizer process.

2. Applying Count Vectorizer
   The merged text is converted into a numerical representation using Count Vectorization. This method counts the number of word occurrences in each document (location) and produces a word-document matrix representing the frequency of word occurrences in each location. The following are the results of the application of Count Vectorization presented in Table II.

TABLE II. COUNT VECTORIZATION RESULTS

No	Word	Document	
		1	2
1	Batam	1	1
2	City	1	1
3	Galang	1	1
4	Islands	1	1
5	Melur	0	1
6	Outdoor	1	1
7	Pantai	2	2
8	Pulau	0	1
9	Riau	1	1
10	Sijantung	1	1
11	Viovio	1	0

Table II displays the results of count vectorization, where each unique word that appears in the document is given the value of the frequency of occurrence in each document. From the table, the vectors formed are, $D1 = [1,1,1,0,1,2,0,1,1,1]$ and $D2 = [1,1,1,1,1,2,1,1,1,0]$.

3. Applying Cosine Similarity
   After the Count Vectorization results are prepared, the next step is to calculate the similarity between the two documents using equations (2), (3), (4), and (5). The calculated similarity of 0.88 indicates a fairly high level of similarity between the two documents or items being compared.

After knowing how the similarity between locations is calculated, the system process for providing prewedding location recommendations is shown in Figure 9.

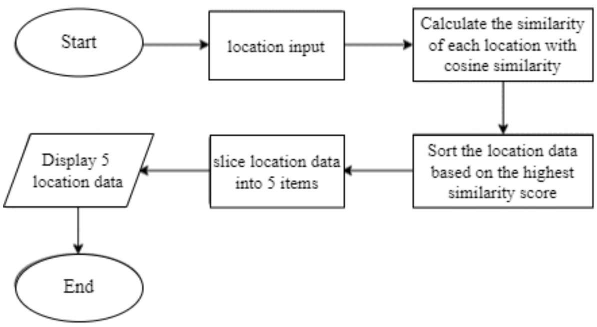

Fig. 9. Recommendation system flow

Based on Figure 9, the system flow provides the following recommendations:

- The system receives input in the form of a prewedding location
- The system looks for a similarity score against all other locations in the data.
- The similarity score calculation uses Cosine Similarity.
- The list of prewedding location recommendations will be sorted based on the highest or most similar similarity score.
- The system will set restrictions on the list of prewedding locations. Only five alternative prewedding locations are displayed.
- The system will present feedback on five alternative prewedding location recommendations.

b) Implementation of the recommendation application: At this stage, coding activities are carried out, which include implementing Content-Based Filtering using Count Vectorization, calculating Cosine Similarity, and creating functions to generate recommendations. The following is the result of the recommendation system presented in Figure 10.

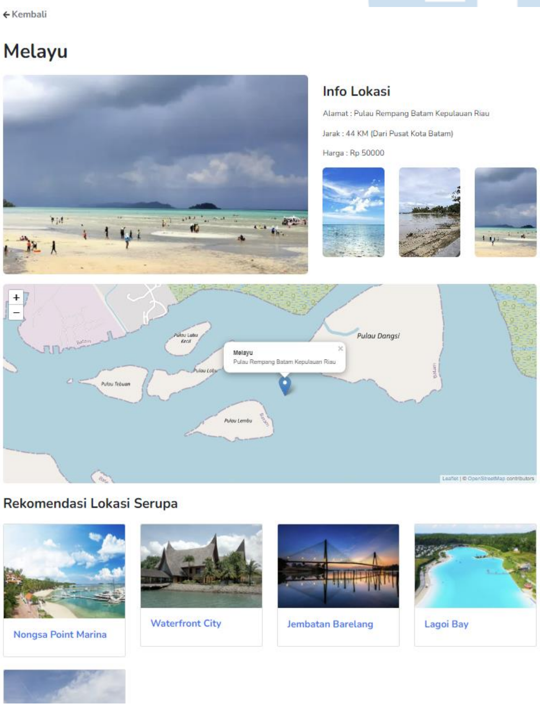

Fig. 10. Result of the recommendation system

On this page, the system will display information about the location after the user selects and enters one of the prewedding location pages. In addition, to enhance the user experience, the system will also display a list of similar prewedding location recommendations. In this way, users can easily find other relevant options that match their preferences, assisting them in making more informed decisions and expanding their choices.

6) *Validate System*

The validate system stage is where researchers test the recommendation system that has been developed to evaluate whether the system functions as expected and meets user needs. The company conducted experiments on the recommendation system that had been built. The results of the test can be seen in Table III.

TABLE III. TEST RESULTS

No.	Test Activity	Test Result	Status
1	Access the home page	All prewedding locations are displayed	Successfully
2	Click on a prewedding location	The prewedding location info is displayed, and a list of 5 similar prewedding locations is shown	Successfully
3	Click the dropdown to select a location prewedding by theme	Prewedding locations by theme theme are displayed	Successfully
4	Click the dropdown and select prewedding location by type	Prewedding location by type displayed	Successfully
5	Click the dropdown and select prewedding locations by price	Prewedding locations by price from lowest to highest and vice versa are displayed	Successfully
6	Interface navigation test	Users can access all pages without difficulty.	Successfully

The table above shows that the prewedding location recommendation system functions as expected is easy to use and meets the functional and non-functional requirements that have been set.

Testing the performance of the recommendation system in producing a list of alternative recommendations in the first relevant order [14] using Mean Reciprocal Rank in equations (6) and (7). The results of the MRR calculation are presented in Table IV.

TABLE IV. MRR CALCULATION RESULTS

No.	Location	RR
1	Nongsa Point Marina	0.2
2	Ocarina Park	1
3	Pantai Viovio	1
4	Mangrove Pandang Tak Jemu	0
5	Waterfront City	1
6	Pantai Melayu	1
7	Jembatan Barelang	1
8	Lagoi Bay	0.5

No.	Location	RR
9	Laguna	1
10	Ria Bintan	0.5
…	…	…
75	Jembatan Barelang 6	1
	Mean Reciprocal Rank	0.**88**

The test results using the Mean Reciprocal Rank metric are known to be 0.88, which shows that, on average, relevant recommendation results are found at the top of the recommendation list. This high MRR metric system can provide appropriate recommendations [21] satisfy user needs, and ensure a better user experience in choosing a prewedding location.

7) *Delivered Software System*

The validated recommendation system is handed over to the company for operational use. The system is uploaded to the chosen host platform, and access is granted to the company so they can use it directly. After the system is handed over, initial monitoring is done to ensure the system is functioning correctly and delivering the results expected by the company. The recommendation system can be accessed through https://s.id/hazenpreloc.

B. DISCUSSION

This research successfully developed a recommendation system for prewedding location selection using the Content-based Filtering recommendation method by applying Count Vectorization and Cosine Similarity calculations. These two things are used to convert and calculate the similarity between prewedding locations based on location features in the dataset. Using the prewedding location data from Hazen Pictures, the recommendation system can provide recommendations and compile a list of relevant locations. The implementation of Count Vectorization and Cosine Similarity worked quite well in measuring the similarity between different locations.

This research aligns with the challenges identified in the background, where prewedding location selection can be difficult and time-consuming due to the many available options. This research is consistent with the findings of [3], who noted challenges in location selection but did not use clear evaluation metrics. This study makes up for that shortcoming by applying Count Vectorization, Cosine Similarity, and Mean Reciprocal Rank. In addition, this research differs from research by [2], which uses the Vikor and Borda methods but is not implemented in a user-accessible system. This research develops an algorithm-based model implemented in a practical system, provides solutions that can be used immediately, and offers improvements and additions in prewedding location recommendation technology.

Based on the test results with the company, the recommendation system functions by expectations and meets the needs that have been set. The evaluation results using the MRR metric of 0.88 show that, on average, relevant recommendation results are found at the top of the list. This high MRR metric allows the system to provide recommendations that match and satisfy user needs and ensure a better user experience when choosing a prewedding location.

With the results of this research, the recommendation application is expected to help brides-to-be choose a prewedding location that suits their wishes, reduce confusion, and speed up the decision-making process.

IV. CONCLUSIONS

Based on the research results, the prewedding location recommendation system implemented with the Content-based Filtering method using Count Vectorization and Cosine Similarity effectively provides relevant recommendations. The system successfully converts and calculates similarities between prewedding locations based on features in the Hazen Pictures dataset, resulting in recommendations that match user preferences. Evaluation using the Mean Reciprocal Rank (MRR) metric with a value of 0.88 indicates that the recommended locations are high on the list, which makes it easier for brides-to-be to choose suitable prewedding locations and speeds up the decision-making process. For future research and development of recommendation systems, it is recommended that the dataset be expanded by adding more location features, number of locations, and user reviews. This will help improve the relevance and personalization of recommendations. In addition, combining multiple recommendation methods can improve system performance and provide results better suited to individual user needs.

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