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Assessing Tourist Interest Based on Gender Perceptions in Kayutangan Heritage through Sentiment Analysis of Google Point of Interest (POI)

Syahira Aulia Shalsabilla*[1], Titik Poerwati[2], Annisaa Hamidah I.[3], Firman Afrianto[4]

[123] Program Study of Urban and Regional Planning, Institut Teknologi Nasional Malang,
Jl. Sigura-gura, Sumbersari Village, Lowokwaru District, Malang City, Indonesia, 65145
[4] East Java Association of Planners (IAP Jawa Timur),
Griya Shanta Housing, J 295, Mojolangu Village, Lowokwaru District, Malang City, Indonesia, 65142
e-mail: [1]2224046@scholar.itn.ac.id, [2]tpurwati@rocketmail.com, [3]nisa_pwk@yahoo.com,
[4]firmanafrianto@mail.ugm.ac.id
*Corresponding Author

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Abstract

This study evaluates tourist interest in the Kayutangan Heritage area in Malang City based on gender perceptions, using sentiment analysis of Google reviews for Point of Interest (POIs). The research employs a big data approach, collecting Google Maps reviews via web scraping and processing them with the TextBlob algorithm to classify sentiment into positive, neutral, and negative categories. A total of 2,198 reviews were analyzed from six food and beverage (F&B) points across six spatial clusters of the Kayutangan Heritage area. The data were divided into two datasets—overall and gender-labeled—to identify sentiment tendencies among male and female tourists. The results indicate that female tourists tend to prefer Café Lafayette (Cluster 1.A), which offers women-friendly facilities such as separate restrooms and prayer rooms, with a positive sentiment of 67.6%. Meanwhile, male tourists are more interested in Kedai Sedjiwa (Cluster 2.B), which provides a clean environment, modern architecture, and a comfortable ambiance, generating 77.1% positive sentiment. The findings indicate that men and women prioritize different aspects of a destination, as evidenced by their varying preferences for facilities, ambience, and spatial characteristics within the Kayutangan Heritage area. These results reinforce the importance of considering gender-specific tendencies when developing tourism strategies.

Keywords: Kayutangan Heritage; Sentiment Analysis; Gender Perception; Tourists; Text Blob.

1 Introduction

Inclusive tourism has now become one of the main agendas in sustainable development, emphasizing equal access, participation, and tourism experiences for all social groups regardless of gender, age, or social background. In this context, gender perception in tourism experiences is a complex and multidimensional phenomenon. Each gender has a different way of approaching, experiencing, and interpreting travel.

Research by (Pung et al., 2020) shows that although both men and women experience personal transformation through travel, women place greater emphasis on emotional experiences and self-awareness, while men tend to be in a "flow" state and demonstrate higher levels of social adaptation to new communities. Meanwhile, (Carballo et al., 2022) found that women perceive risk more strongly and are more likely to adjust their travel plans in response to it. Similar results were reported by (Remoaldo et al., 2020), who identified statistically significant differences in creative tourism intentions, experience evaluation, and overall satisfaction between male and female tourists. (Mitra & Sankar, 2021) further assert that tourism is a "gendered activity," in which gender strongly influences travel perceptions and decision-making.

Although awareness of these differences continues to grow, the issue of gender inclusivity in tourist destinations remains a major challenge. (Calderón Fajardo & Rodríguez Rodríguez, 2024)

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found that the tourism sector still maintains traditional gender stereotypes, often depicting women as passive objects. Meanwhile, (Castillo et al., 2025) highlight security risks and discrimination faced by LGBTQ+ tourists, indicating that equal travel experiences are still difficult to achieve. However, several recent studies reveal a more positive direction. (Thipayasothorn et al., 2025) found increasing social acceptance through gender-inclusive public space design in tourism areas, while (Osman & Brown, 2024) emphasized the importance of creating destinations that uphold equality and accessibility for all visitors.

Alongside these developments, the digitalization of tourism has encouraged the emergence of sentiment analysis approaches based on digital data as a new way to understand tourist perceptions. The use of Natural Language Processing (NLP) and Machine Learning enables researchers to extract tourist opinions from online reviews in real time (Manosso & Ruiz, 2021). This approach not only reveals trends in positive or negative perceptions but can also serve as a basis for decision-making in destination marketing and communication strategies (Gupta & Kumar, 2024) In tourism research, the TextBlob algorithm has been widely used due to its high accuracy in sentiment classification. (Rachman et al., 2022) reported an accuracy rate of up to 94% in sentiment analysis of tourism reviews in Madura. At the same time, Bulkrock & Alsharman (2024) successfully used it to analyze 15 years of hotel reviews to understand variations in tourist experiences across regions.

In the domain of urban heritage tourism, tourist behavior is shaped by complex interactions between spatial, psychological, and environmental factors. (Md Khairi & Ismail, 2015) Highlight the importance of integrating spatial and psychological data to understand tourist movement patterns, while Liu et al. (2025) show that physical and social environmental stimuli significantly influence behavioral intention. (Martinez-Garcia et al., 2018) add that tourism time consumption is affected by cultural factors and visitor motivation, while (Domènech et al., 2020)assert that urban attractiveness and function shape tourist mobility patterns in historical areas.

Within this context, Kayutangan Heritage Village in Malang City serves as an interesting case study. The area is known as a cultural tourism destination with Dutch colonial architectural heritage and community-based management. Kayutangan offers a variety of attractions, including visits to old houses, heritage photo spots, traditional game areas, antique galleries, and local culinary experiences (Khakim et al., 2019; Pramono et al., 2021). Despite its great potential, several studies indicate that its development has not yet been optimal due to limited promotion and less integrated policies (Murtikasari & Tukiman, 2021; Sari & Muta'ali, 2025). The area's sustainability index, rated "fairly sustainable" with a score of 54.31, also indicates room for improvement in its management (Idris et al., 2023).

Theoretically, this study refers to the model of (Chebli et al., 2020), which categorizes tourist preferences into three levels: primary needs, secondary needs, and additional elements. This model shows that tourists' perceptions of destination attractiveness are strongly influenced by personal factors such as gender, age, and motivation. Chebli emphasizes that gender has a significant influence on the evaluation of urban attractions — men and women demonstrate different hierarchies of importance regarding destination elements such as culture, recreational facilities, and supporting infrastructure.

Based on this framework, this study aims to evaluate tourist interest in the Kayutangan Heritage area by gender, using sentiment analysis of Google Point of Interest (POI) reviews. The primary focus of this research is to:

1. Identify sentiment tendencies of male and female tourists toward various culinary-based POIs in Kayutangan Heritage.
2. Compare gender differences in tourism experiences; and
3. Examine the alignment of the findings with the gender-based preference model proposed by Chebli et al. (2020).

Through a big data-based approach, this research is expected to make an empirical contribution to the development of gender-inclusive tourism strategies and strengthen the literature on tourist behavior segmentation within the context of urban heritage destinations in Indonesia.

2 Research Methods

This research uses data collected via Google Maps crawling with the Google extension "Instant

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Data Scraper". Data were collected from Google Maps using the *Instant Data Scraper* Chrome extension (latest stable release as of 2025). The crawling process used the *infinite scroll* function with a randomized delay of **1-20 seconds** to prevent request blocking by Google. The extension automatically scrolled through the review section without manual interaction until no further reviews were loaded. These parameters ensure reproducibility of the scraping procedure despite frequent updates to the Google Maps interface. Afterward, preprocessing and data labeling were performed. The data were then processed in Google Colab using the TextBlob algorithm for sentiment analysis.

Sentiment analysis using TextBlob has been applied across various fields, particularly social media, including Twitter. Several studies have explored its effectiveness in analyzing tweets related to events such as the 2022 World Cup (Dewi & Arianto, 2023) and product services (Kevin Perdana et al., 2021). The analysis process typically involves data collection, preprocessing, and model training (Jawale, 2023). Overall, TextBlob has demonstrated potential in sentiment analysis, with opportunities for optimization through hybrid approaches.

The research framework is presented as follows in Figure 1. The research framework outlines the sequential workflow for processing and analyzing Google Maps review data. The process begins with data scraping, in which review data from locations with more than 1,000 reviews is extracted. This step is followed by preprocessing, which includes data cleansing to remove irrelevant information, data reduction to convert files into analyzable formats, and data transformation to translate Indonesian text into English so that it can be processed by TextBlob. Cluster delineation also plays a role at this stage, as each spatial cluster determines which Point of Interest (POI) is selected and how samples are proportionally taken. After preprocessing, the dataset is labeled by gender to enable gender-based sentiment classification.

The processed dataset is then analyzed using the TextBlob algorithm in Google Colab, which automatically assigns polarity scores and classifies each review into positive, neutral, or negative categories. The input to this stage consists of raw text reviews, while the output consists of sentiment distributions for each cluster and gender group. These outputs allow the study to compare male and female sentiment tendencies and identify which aspects of the destination are evaluated differently by the two genders. This aligns with the theoretical argument that gender influences perceptions and preferences in tourism settings, thereby supporting the interpretation of the results within a gender-responsive analytical framework.

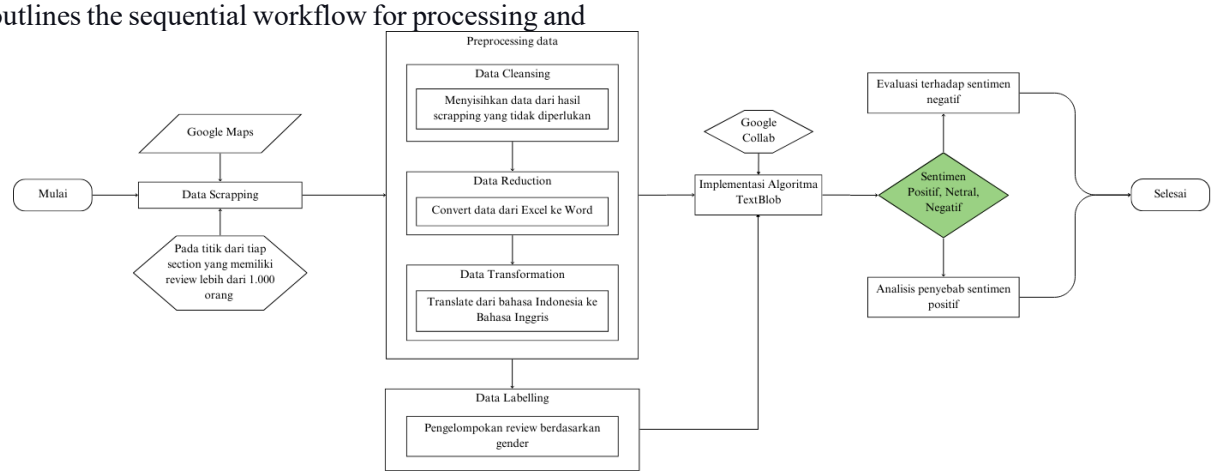

Figure 1. Research Framework
Source: Researcher, 2025

2.1 Data Collection Methods

The data collection process was carried out using a web scraping technique without time restrictions. Before data collection, a delineation process was conducted to divide the analysis area into six clusters to facilitate the identification of analysis points. The following is the map of the cluster division used:

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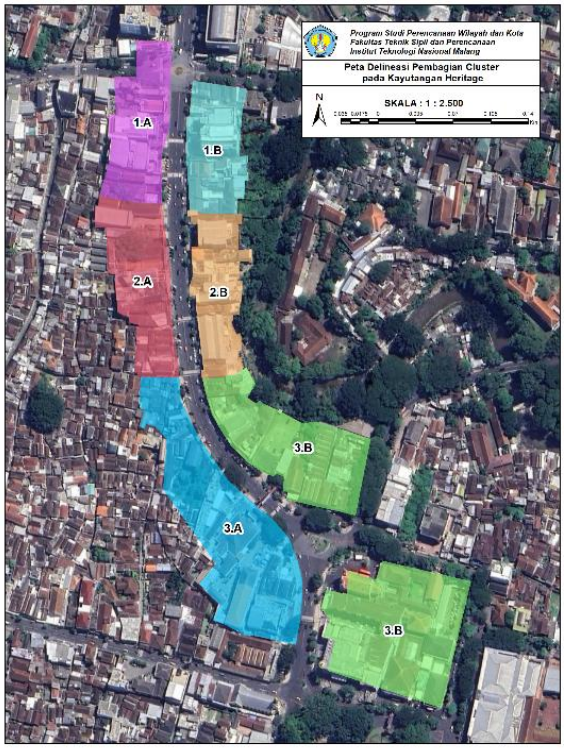

Figure 2. Delineation Map of Cluster Division in Kayutangan Heritage
Source: Researcher, 2025

The figure above shows the cluster division in the Kayutangan Heritage area. Each cluster is identified and represented by one analysis point selected based on a specific criterion, namely, a location with more than 1,000 reviews. For each analysis point, a 10% sample of the total number of reviews was selected to ensure adequate representation of the available review data. The following table presents the details of the cluster division and the number of samples taken from each analysis point:

Tabel 1. Cluster Division in Kayutangan Heritage

No.	Color	Cluster	Code	Location	Reviews (>1,000)	10%	Samples Obtained
1	Purple	North, Left	1.A	Lafayette	3,895	390	390
2	Red	Central, Left	2.A	Kopi Lonceng	1,36	136	136
3	Blue	South, Left	3.A	OEN	7,356	736	448
4	Tosca	North, Right	1.B	Pork & Barrel	1,349	135	135
5	Orange	Central, Right	2.B	Kedai Sedjiwa	1,233	123	123
6	Green	South, Right	3.B	MCD Pengyu	5,5	550	410
TOTAL						**2,198**	

Source: Researcher, 2025

Based on the scraping results, several points did not reach 10% of the total available reviews. For example, in the Central, Left cluster with code 2. For A (Kopi Lonceng), the scraping process yielded only 448 reviews out of the 736 available. Similarly, in the South, the Left cluster has code 3. B (MCD), 410 reviews were collected out of 550 available reviews. However, an exception occurred in the Central, Right cluster with code 2. B, where no location met the criterion of having more than

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1,000 reviews. As an alternative, the available review data from the web scraping process were collected, totaling 123 of the 183 existing reviews at that location. For the remaining points, the sampling process selected 10% of the total number of reviews available on Google Maps. The selected data were then used for sentiment analysis to obtain insights into general and gender-based perceptions of each location in Kayutangan Heritage.

2.2 Data Processing Stages

a) Pre-Processing Data

Data pre-processing is a crucial step in the data mining process, where raw data are transformed into a usable format for analysis (Malik et al., 2010; Singh & Gaur, 2019). This step improves data quality by addressing issues such as inconsistency, missing values, and noise (Hossen, 2020; Jamshed et al., 2019).

In this study, the data pre-processing stage was carried out through several essential steps, namely:

1. Data Cleansing: At this stage, irrelevant or unnecessary scraped data were removed, leaving only data that truly support the analysis.
2. Data Reduction: This step involved converting data from Excel format into a form that can be read by machine learning, such as text files (words). This process enables machine learning algorithms to recognize and analyze data effectively.
3. Data Transformation: At this stage, the text data, initially written in Indonesian, was translated into English. This process is essential so that the data can be analyzed using tools and algorithms that may be more effective in English.

After these stages were completed, there were two possible subsequent processes. The first option was to process the data directly using the TextBlob algorithm in machine learning to generate sentiment analysis. The second option involved a data labeling process in which tourist reviews were categorized by gender. This labeling process aims to obtain a more specific sentiment analysis based on gender perception at the predetermined analysis points.

b) Data Processing

The data that had undergone preprocessing, including those that had been labeled, were then analyzed using the TextBlob algorithm on the Google Colab platform. The purpose of this analysis was to identify emerging sentiments, both from data that were not separated by gender and from data that had been classified by gender. The results of this analysis yield distributions of positive, neutral, and negative sentiment for each analysis point. The analysis was conducted using two approaches: first, overall sentiment analysis without gender labeling; and second, sentiment analysis based on gender grouping.

3 Result and Discussion

The results of this research consist of sentiment outputs divided into two categories: overall sentiment and gender-based sentiment for male and female tourists. These sentiments are then used to identify gender-based perceptions for each cluster that has been established, namely, which clusters are more preferred by male tourists and which clusters are more preferred by female tourists.

To strengthen the interpretation of gender-based differences, an additional statistical test was conducted using a simple chi-square test to compare the distributions of positive sentiment between male and female visitors at each Point of Interest (POI). The test was performed using the number of male and female reviewers shown in Table 2, together with the proportion of positive sentiment in each cluster. This statistical check was used to determine whether the observed differences in sentiment tendencies between genders were likely to occur by chance or reflected meaningful variation. The results support the descriptive findings, indicating that gender-based differences are evident across several POIs, though their magnitude varies by location. This strengthens the conclusion that gender influences perception and preference in tourism settings.

For the collected review data, a labeling process was carried out to enable sentiment analysis based on gender perception. The following are the reviews that have been categorized by gender

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Tabel 2. Gender-Based Review Classification

No.	Cluster	Code	Location	M (Male)	F (Female)	Unidentified	Total Reviews Collected
1	North, Left	1.A	Lafayette	159	203	28	390
2	Central, Left	2.A	Kopi Lonceng	64	61	11	136
3	South, Left	3.A	OEN	184	221	43	448
4	North, Right	1.B	Pork & Barrel	63	57	15	135
5	Central, Right	2.B	Kedai Sedjiwa	50	66	7	123
6	South, Right	3.B	MCD Pengyu	199	179	32	410
			Pengyu	40	78	11	129
			TOTAL				**1,771**

Source: Researcher, 2025

During the data labeling process, several Google users or reviewers' names could not be identified by gender, such as "it's meee", "advancednewbie", "My Body My Choice", and others. These usernames were excluded from the sentiment analysis.

3.1 Overall Sentiment Analysis

In the overall sentiment analysis, sentiment was obtained from several representative points within each analyzed cluster. The following figure presents the sentiment map along with its interpretation in the overall sentiment analysis:

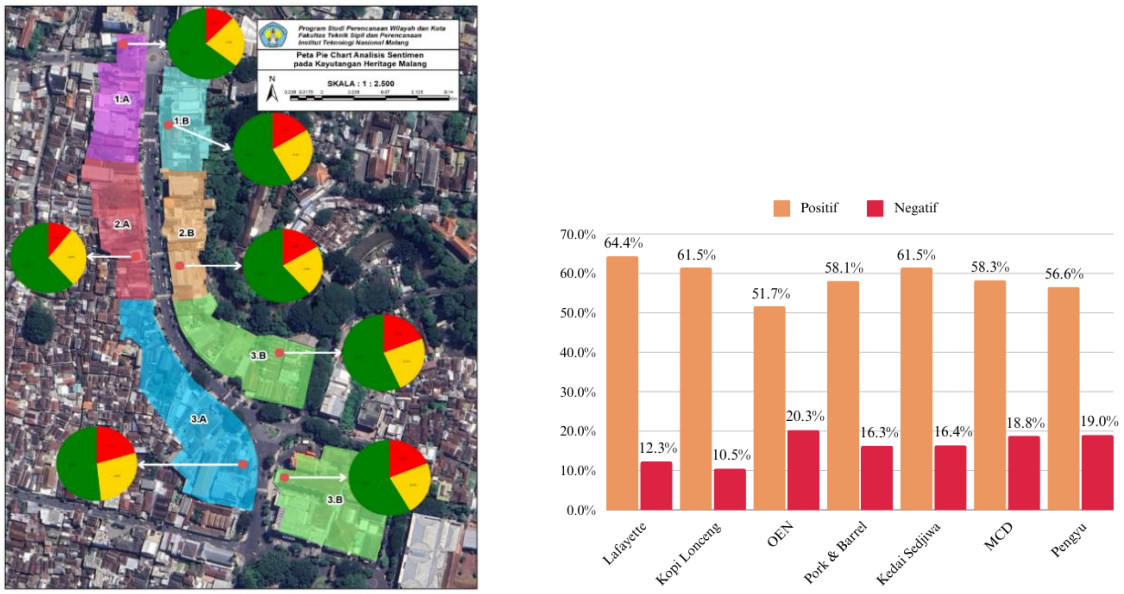

Figure 3. Pie Chart and Bar Chart of Sentiment Analysis at Kayutangan Heritage, Malang
Source: Researcher, 2025

Based on the sentiment analysis conducted on Kayutangan Heritage in Malang, the point with the highest proportion of positive sentiment is 1.A Lafayette, with 64.4%. Meanwhile, the point with the highest proportion of negative sentiment is 3.A Toko OEN, with 20.3%.

Based on field observations, Lafayette Café, located in Kayutangan Heritage, Malang, has received many positive reviews from visitors on Google Maps. One of the main factors that makes it appealing is the availability of various seating areas, both in the outdoor rooftop area and in a comfortable indoor space, which allow visitors to enjoy different atmospheres.

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Figure 4. Several Indoor and Outdoor Seating Options
Source: Researcher, 2025

In addition, the café's policy requiring visitors to dress neatly and modestly creates a luxurious, elegant atmosphere, making Lafayette a fancy, classy destination. Supporting facilities, such as a clean prayer room (musholla), also enhance visitor comfort, especially for those who require a place of worship.

Figure 5. Dress Code Policy at Lafayette
Source: Researcher, 2025

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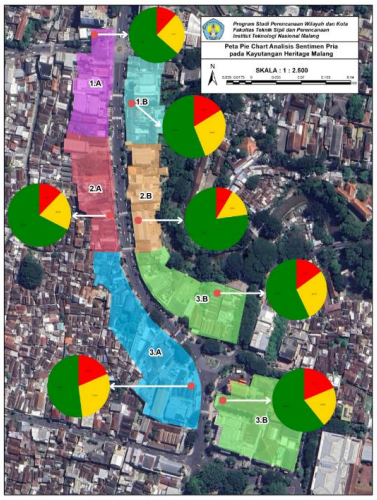
Figure 6. Valet Parking Area at Lafayette*Source: Researcher, 2025*

3.2 Male Sentiment Analysis

In the sentiment analysis results for the male gender, sentiment values were obtained from several representative points within each analyzed cluster. The following figure presents the sentiment map along with its interpretation for the male sentiment analysis:



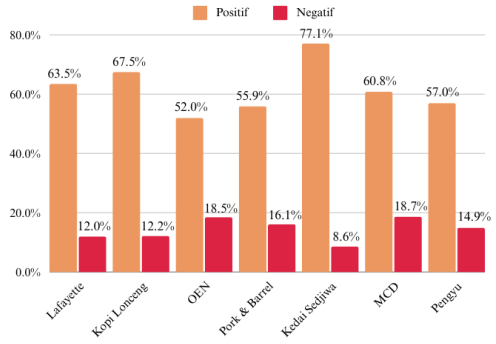


Figure 7 Pie Chart and Bar Chart of Male Sentiment Analysis at Kayutangan Heritage, Malang
Source: Researcher, 2025

Based on the sentiment analysis conducted on Kayutangan Heritage Malang for the male gender, the point with the highest proportion of positive sentiment is 2 B Kedai Sedjiwa, with 77.1%. Meanwhile, the point with the highest proportion of negative sentiment is 3. B MCD, with 18.7%.

Kedai Sedjiwa, located in Kayutangan Heritage, Malang, received numerous positive

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reviews from male tourists on Google Maps. One of the main factors contributing to its appeal is the comfortable and supportive ambiance, which creates a pleasant dining experience for visitors.

Figure 8 Comfortable Ambiance at Kedai Sedjiwa
Source: Researcher, 2025

In addition, the prices offered are considered proportional to the quality of the food, providing added value for tourists seeking a satisfying culinary experience. Cleanliness is also a vital aspect appreciated by visitors, making Kedai Sedjiwa not only a comfortable but also a hygienic place.

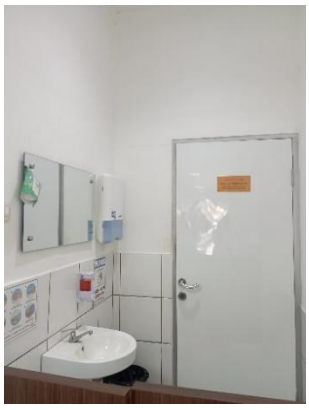

Figure 9. Guaranteed Toilet Cleanliness
Source: Researcher, 2025

In terms of architecture, Kedai Sedjiwa's building design conveys a modern, neat impression, and the availability of an outdoor smoking area adds to its visual appeal, making it increasingly popular among male tourists. The combination of these factors makes Kedai Sedjiwa one of the recommended culinary destinations in this area.

Figure 10. Smoking Area at Kedai Sedjiwa
Source: Researcher, 2025

3.3 Female Sentiment Analysis

Figure 11. Pie Chart and Bar Chart of Male Sentiment Analysis at Kayutangan Heritage, Malang
Source: Researcher, 2025

Based on the sentiment analysis conducted on Kayutangan Heritage Malang for the female gender, the point with the highest proportion of positive sentiment is 1.A Lafayette, with 67.6%.

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Meanwhile, the point with the highest proportion of negative sentiment is 2 B Kedai Sedjiwa, at 23.3%.

Lafayette Café has received a significant number of positive reviews from female tourists on Google Maps, due to various facilities and services that cater to their needs. One highly appreciated aspect is the dedicated women's restroom, separate from the men's restroom. This arrangement creates an enhanced sense of security and privacy, particularly for hijab-wearing women, making their visit more comfortable.

In addition, the café also provides a comfortable prayer room (musholla), which is very important for Muslim visitors who wish to perform their worship. This facility demonstrates Lafayette's attentiveness to the spiritual needs of its visitors, adding positive value to their overall experience.

Figure 12. Signage Indicating Separate Locations for Women's and Men's Restrooms
Source: Researcher, 2025

Figure 13. Women's Prayer Room Located Inside the Restroom, Providing a Sense of Safety
Source: Researcher, 2025

Lafayette's attentiveness to the spiritual needs of its visitors, adding positive value to their overall experience.

Lafayette Café offers a variety of desserts and sweet menu options tailored to women's preferences, making it an attractive choice for those who enjoy indulging in sweet treats. In addition, the numerous aesthetic photo spots allow female visitors to enjoy the café's ambiance while taking pictures against visually appealing backgrounds. All of these aspects contribute to Lafayette Café's popularity among female tourists.

Figure 14. Availability of Desserts and Sweets that Suit Female Tourists' Preferences
Source: Researcher, 2025

4 Discussion

(Chebli et al., 2020) State in their research that male and female tourists assign different levels of importance to certain attractions. In the ranking of tourism attractions, it can be seen that male and female tourists place varying degrees of importance on specific categories. The differences between

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men and women are particularly significant in the categories of anthropology and folklore, public places, shopping resources, nightlife, and diversity of transportation facilities.

The levels of importance are presented below:

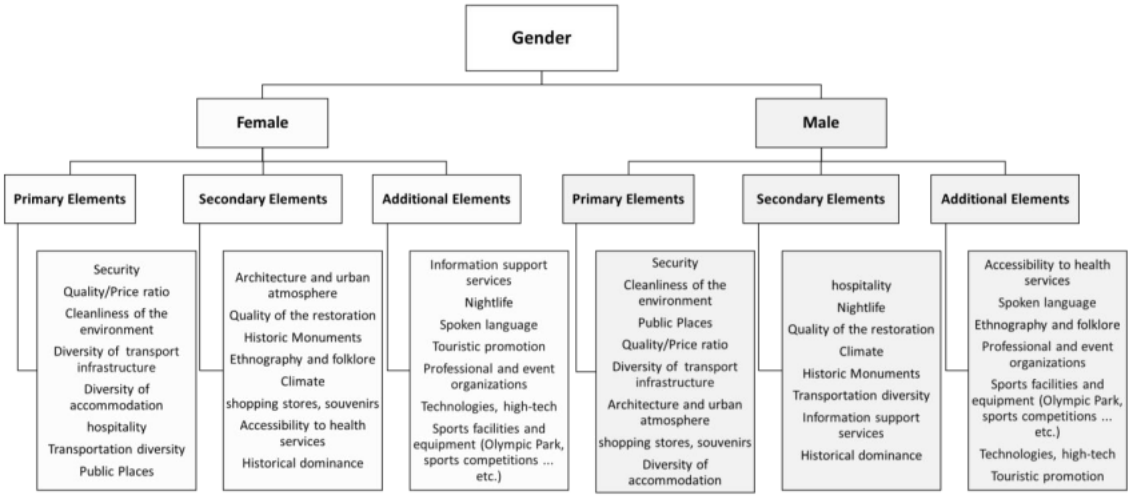

Figure 15. Tourist Importance Levels for Male and Female Visitors
Source: Chebli et al., 2020

In their study, Chebli et al. (2020) explain that, according to the diagram, female tourists tend to prioritize security, environmental cleanliness, and hospitality. These findings are consistent with the high number of positive reviews from female tourists for Lafayette Café. Lafayette consistently prioritizes comfort and safety for female visitors, reflected in facilities such as separate restrooms for women and men, as well as a women's prayer room located in an enclosed space separate from the men's prayer room.

Cleanliness at Lafayette Café is also a key factor in attracting female tourists, as noted by Chebli et al. (2020), who state that cleanliness is a significant attraction for female visitors. This is demonstrated through restrooms that are consistently kept clean and fragrant. In addition, Lafayette's staff's friendliness plays a vital role in shaping positive visitor experiences. Café employees consistently serve guests politely and courteously, especially when explaining the menu, which reinforces Lafayette's positive reputation among female tourists.

Kedai Sedjiwa has received numerous positive reviews from male tourists, consistent with Chebli et al. (2020), who found that men tend to prioritize environmental cleanliness, architecture, and urban atmosphere, as well as the quality-to-price ratio. Cleanliness at Kedai Sedjiwa is evident in the well-maintained restroom facilities, complete with soap and tissues, which provide comfort for visitors. In terms of architecture, Kedai Sedjiwa offers an appealing visual experience, with an artistic design dominated by white tones that creates a clean, pleasant impression. In addition, the menu quality is considered proportional to the price, making it a popular choice among men as it offers delicious food at an affordable cost.

5 Conclusion

The use of big data in this study provides significant advantages, particularly in handling large data volumes, analysis speed, and a broader range of perspectives. By leveraging big data, thousands of tourist reviews from diverse gender backgrounds were analyzed, offering a deeper understanding of how gender influences tourism experiences in Kayutangan Heritage. This approach creates opportunities to uncover insights that conventional methods may not reveal, resulting in a more comprehensive, data-driven analysis.

The findings show that female tourists are more attracted to Cluster 1. A, represented by Lafayette. This preference is associated with facilities that prioritize women's comfort, such as separate restrooms and prayer rooms for men and women, as well as numerous aesthetic photo spots that suit their preference for self-photography. In addition, the variety of desserts offered by

Lafayette aligns with the culinary preferences of female tourists.

On the other hand, male tourists are more inclined toward Cluster 2. B, represented by Kedai Sedjiwa. This venue offers a clean environment, a modern, tidy architectural design, a comfortable ambiance, and a smoking area—all key attractions for male visitors. However, this study has limitations, particularly in identifying the gender of some Google Maps user accounts, which led to the exclusion of a portion of the data due to classification constraints.

For future research, the analysis can be expanded by incorporating non-gender factors, such as age and socioeconomic status, to provide a more comprehensive understanding of tourist interests. Comparative studies between Kayutangan Heritage and other heritage destinations would also be beneficial to determine whether similar patterns are observed elsewhere. Additionally, using more advanced machine learning algorithms, such as SVMs or Random Forests, could further improve sentiment analysis accuracy.

Overall, this study demonstrates that using big data and sentiment analysis of online reviews offers new opportunities to evaluate tourist perceptions more broadly and in real time. This enables destination managers to continuously update marketing strategies that are more effective and relevant, taking into account diverse visitor preferences, particularly based on gender.

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