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Research Article

A Fundamental Analysis of the Relationship Between Review Counts and Ratings on Google Maps

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ABSTRACT

This study focuses on Google Maps as the platform to investigate the relationship between review counts and review ratings. Specifically, we conducted a questionnaire-based survey in which participants were asked to choose between two options, each presenting a different combination of review count and rating. Based on the questionnaire survey responses, we performed a correlation analysis, a random forest analysis, and an analysis of the impact of differences in review counts to explore the relationship between review quantity and quality. The results revealed that review ratings (qualitative information) tend to have a stronger influence on users' choices than review counts (quantitative information) when selecting tourist destinations. Furthermore, it was found that as the difference in review ratings increases, the ability of a higher review count to compensate for a lower rating diminishes.

1. Introduction

In recent years, online reviews have become a significant factor influencing user behavior, including the selection of tourist destinations, stores, and products [1], [2]. Studies have shown that a higher review count is associated with greater willingness to purchase and increased sales [3], [4]. However, merely having a large review count does not necessarily lead to favorable outcomes; a high volume of negative reviews can adversely affect users' purchase intentions. Furthermore, some studies [5], [6] suggest that the review counts may influence users' judgments more strongly than review ratings themselves. In other words, both review counts and ratings are considered important factors in user evaluations. Understanding the relationship between these two aspects is essential for gaining deeper insights into user behavior. It is important to accumulate knowledge to clarify the relationship between these two aspects, and it would be academically significant to empirically determine which has a stronger influence on user behavior.

In this study, we focus on Google Maps as the platform and aim to examine the relationship between review counts and ratings (defined as the average user rating on a five-point scale: 1, 2, 3, 4, or 5). Google Maps is reported to be the most frequently used platform for reviews in the context of international travel and is widely adopted across all age groups [7]. Moreover, 95% of travelers reportedly consult at least seven reviews before selecting a tourist destination [8]. To investigate this relationship, we conducted a questionnaire survey in which participants were asked to choose between two options with differing combinations of review counts and ratings. Based on the questionnaire survey responses, we conducted a correlation analysis, a random forest analysis, and an analysis of the impact of differences in review counts to verify the relationship between review counts and ratings. To the best of the author's knowledge, few studies have employed multiple analytical methods to examine user behavior from multiple perspectives, as this study does. The results revealed that review ratings generally have a stronger influence on user choice than review counts when selecting tourist destinations. This finding contrasts with the previous studies [5], [6], which suggested that review count may have a greater influence on user judgment than review rating. Furthermore, it was found that as the difference in review ratings increases, the ability of a higher review count to compensate for a lower rating diminishes.

The remainder of this paper is organized as follows. Section 2 describes the questionnaire survey. Section 3 presents the methods and results of the analysis of the

relationship between review numbers and ratings. Finally, Section 4 concludes the paper.

2. Questionnaire Survey

In the questionnaire survey, participants were presented with two choices (hereafter referred to as Option 1 and Option 2), each consisting of a review count and a review rating, and were asked to select the option they would prefer when choosing a tourist destination. The review counts ranged from 1 to 10,000, and the review ratings ranged from 1.0 to 5.0. For example, participants were shown the following options: "Option 1: 10 reviews, rating 4.2" and "Option 2: 1,200 reviews, rating 3.9".

The review counts were divided into four categories: 1–10, 11–100, 101–1,000, and 1,001–10,000. Similarly, the review ratings were divided into four categories: 1.0–1.9, 2.0–2.9, 3.0–3.9, and 4.0–5.0. Values were randomly generated within each category. As a result, 16 unique combinations of review counts and ratings were created for Option 1. Likewise, 16 combinations were also created for Option 2. This yielded a total of 256 possible combinations of Options 1 and 2.

From these 256 combinations, we excluded cases in which one option exceeded the other in both review count and rating. As a result, 183 unique combinations of Options 1 and 2 were retained. Participants were then asked to choose their preferred option from among these 183 combinations.

The questionnaire survey was conducted among individuals affiliated with University of Nagasaki between February 20 and April 8, 2024. A total of 107 participants took part in the survey. The age distribution was as follows: 23 participants were in their teens, 66 in their twenties, 5 in their thirties, 3 in their forties, 8 in their fifties, and 2 in their sixties. In terms of gender, 52 participants identified as male, 53 as female, and 2 as other.

3. Analysis of Relationship Between Review Numbers and Ratings

Based on the results of the questionnaire survey, we conducted correlation analysis, the random forest analysis, and the analysis of the impact of differences in review counts to examine the relationship between review counts and ratings. Prior to these analyses, the review counts and ratings were standardized so that their means were 0 and their standard deviations were 1.

3.1. Correlation Analysis

The correlation analysis was conducted between the number of participants who selected Option 1 for each combination (hereafter referred to as the selection count) and the review counts and ratings of Option 1. Similarly, for Option 2, the correlation analysis was conducted between the selection counts and the review counts and ratings. The results are shown in Table 1. For option 1, the coefficient correlation between the selection counts and the review counts was -0.102, and that between the selection counts and the review ratings was 0.550. For option 2, the correlation coefficient between the selection counts and the review counts was -0.125, and that between the selection counts and the review ratings was 0.499. Additionally, a chi-square test confirmed that all correlation coefficients were statistically significant at the 1% level. In both Options 1 and 2, the correlation coefficients with review counts were not statistically significant, while the correlation coefficients with review ratings were statistically significant at a confidence level of over 99.99%.

Table 1 Correlation coefficients with selection counts.

Option 1		Option 2	
Review count	Review rating	Review count	Review rating
-0.102	0.555	-0.125	0.499

These results indicate that there was little to no correlation between the selection counts and the review ratings, whereas a moderate correlation was observed between the selection counts and the review ratings. In other words, users appear to be more strongly influenced by review ratings (qualitative information) than by review counts (quantitative information) when selecting a tourist destination.

3.2. Random Forest Analysis

The random forest regression analysis was conducted using the review counts and ratings of both Options 1 and 2 as explanatory variables, and a binary value representing the selected option as the objective variable (1 for Option 1, 0 for Option 2). The responses from all participants in the questionnaire survey were used as training data for this analysis. The accuracy of the trained model was 0.919, where accuracy is defined as the number of correctly predicted samples divided by the total number of samples.

Random forest analysis provides an importance score that reflects the extent to which each explanatory variable contributes to the prediction of the objective variable [9]. The importance score indicates the influence of each explanatory variable on the objective variable (i.e., tourist destination selection); a higher score signifies a greater impact on the decision-making process. The importance scores of the review counts and ratings of Options 1 and 2 are shown in Table 2. The importance scores for Option 1 were 0.154 for review counts and 0.393 for review ratings, while those for Option 2 were 0.111 for review counts and 0.342 for review ratings.

These results indicate that review ratings have a greater influence on the objective variable than review counts. In other words, when selecting a tourist destination, users tend to place greater importance on review ratings (qualitative information) than on review counts (quantitative information). This finding is consistent with the results of the correlation analysis presented in Section 3.1. The results of this study differ from those of previous studies [5], [6], which suggested that review count may

have a greater influence on user judgment than review rating.

Table 2 Random forest importance score.

Option 1		Option 2	
Review count	Review rating	Review count	Review rating
0.154	0.393	0.154	0.393

3.3. *Analysis of the Impact of Differences in Review Counts*

Based on the results presented in Sections 3.1 and 3.2, we found that review count has a smaller effect on the selection of tourist destinations compared to review rating. However, this does not imply that review count has no influence; an option with a lower review rating may still be selected if the difference in review count is substantial. To investigate this, we divided the absolute difference in review ratings between Options 1 and 2 (hereinafter referred to as the rating difference) into ten groups, in increments of 0.1, ranging from 0.1 to 1.0. For each group, we calculated the number of cases in which the option with the lower review rating was selected (hereinafter referred to as the lower-rated selection count), as well as the mean and minimum of the absolute differences in review counts (hereinafter referred to as the count difference). The results are shown in Table 3.

Table 3 Lower-rated selection count, and the mean and minimum of the count differences.

Rating difference	Lower-rated selection count	Mean	Minimum
0.1	4	2498.8	7
0.2	5	3514.6	34
0.3	4	595.0	15
0.4	2	1676.0	1168
0.5	0	—	—
0.6	2	2056.5	665
0.7	2	4332.5	695
0.8	1	3404.0	3404
0.9	0	—	—
1.0	0	—	—

4. Conclusion

In this study, we focused on Google Maps as the platform and examined the relationship between review counts and review ratings. Specifically, we conducted a questionnaire survey in which participants were asked to choose between two options, each presenting different combinations of review counts and ratings. Based on the questionnaire survey responses, we conducted a correlation analysis, a random forest analysis, and an analysis of the impact of differences in review counts to investigate the interplay between quantitative and qualitative review information. The results indicated that review ratings (qualitative information) tend to have a stronger influence on users' choices in the context of tourism than review counts (quantitative information). This finding contrasts with previous studies [5], [6], which suggested that review count may have a greater influence on user judgment than review rating. Furthermore, it was found that as the review rating difference increases, it becomes more difficult for a higher review count to compensate for a lower review rating.

A future challenge lies in the limited scope of combinations analyzed in this study. While 183 combinations of Options 1 and 2 were examined, the total number of possible combinations is estimated to be approximately 160 billion. Therefore, expanding the range of combinations analyzed is necessary to improve the generalizability of the findings. Furthermore, since approximately 83% of the questionnaire survey participants were in their teens or twenties, it is also important to conduct future questionnaire surveys with a more diverse age demographic to better capture age-related differences in decision-making behavior. Additionally, increasing the number of participants is also a future challenge.

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