

# INVESTIGATING THE IMPACT OF REVIEW VISIBILITY ON REVIEW HELPFULNESS

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## ABSTRACT

Through e-commerce platforms, individuals can perform various activities such as the search for product information and read consumer opinions, place orders for items they are interested and make payments, as well as enjoy after-sales services and leave feedbacks to products. The thriving of Web 2.0 makes this choice process available to all internet users. These consumers take benefits of the social network to share their experiences and opinions toward products, and other consumers can obtain information of products or services through their online reviews. This information can serve as a reference for consumers in their purchase decisions.

This tremendous amount of reviews provide consumer valuable information of products or services; nevertheless, they also derive problems of information overload. Consumers have to screen a number of reviews in a limited time when they search for useful information to help them make decisions. An effective review filtering mechanism of online social websites can be adopted to identify the most valuable reviews promptly for consumers to save their time. Therefore, how to determine the helpfulness (i.e., helpful votes) of online reviews has become an interesting research topic. Constructing an effective review helpfulness prediction model not only assists reviewers to write more desirable reviews and receive higher helpfulness votes, but also supports online social medias to manage the content qualities of their reviews.

Previous studies have investigated the relationships between review helpfulness and related features including review content, review sentiment, reviewer, and product features. Their results show that these features affect review helpfulness at various levels. Most of the current studies simply collect a set of reviews and develop a unified prediction model for all reviews and ignore the issue that the likelihoods of reviews being explored (i.e., review visibility) are significantly different. A review with higher visibility will have higher possibility to receive a positive vote (i.e., higher helpfulness). For example, a well-known product usually has a huge amount of reviews, which resulting in decreasing the possibility that each review being read and voted as well. By contrast, a less popular product which has fewer reviews will have higher review visibility for each review. Therefore, the number of reviews at the time

when the latest review has being posted and the number of days the review stay on the first page of the searching results will affect the possibility of the review being explored and voted.

Based on the observations above, the aim of this study is to investigate the effect of review visibility-related features on review helpfulness. That is, how can the review visibility-related features be used to predict if reviews receive helpful votes? It is a difficult task to extract review visibility-related features from online social websites since different websites provide various review filtering methods. The review visibility can be affected by filtering methods that the user selected. In addition, when new reviews are added to the review list, the visibilities of current reviews will be affected. Therefore, our study utilizes all possible filter methods provided by the online social websites to determine the review visibility and continuously observe the reviews positions on the web pages.

This research collected online reviews for both search goods and experience goods on Amazon.com. Product reviews of six distinct search goods and six experience goods are collected using the crawling tool. The independent variables are compositing by four categories of Review Quality (RQ), Text Characteristic (TC), Review Author (RA), and Review Visibility (RV). The dependent variable is the variation of helpfulness ratio of reviews when they were crawled at the first day and the 90<sup>th</sup> day. If reviews were read by more consumers after 90 days but with the same number of helpfulness votes, the helpfulness ratio of the reviews are decreased. In this study, two classification techniques, linear regression (LR) and regression tree (RT), are applied in the construction of this prediction model on review helpfulness. The outcomes of the prediction model above are then evaluated with a widely accepted set of metrics including correlation coefficient (CC), mean absolute error (MAE), and root mean squared error (RMSE).

Evaluations are conducted considering each independent variables, RQ, TC, RA, and RV separately, as well as considering them together (ALL). The case of including all features except RV (noRV) is also considered in order to examine the effect of RV. The CCs using LR of the independent variables related to the review title and content, RQ, TC, RA, and noRV, are 0.151, 0.2637, -0.1733, 0.2688, respectively; in addition, the CCs using RT for these variables are 0.2343, 0.1792, 0.287, 0.2556, respectively. However, when the RV is taking into account, the CCs using LR of RV and ALL are 0.2211 and 0.314; and the CCs using RT are 0.581 and 0.5723. The results indicate that the review visibility had better performance in prediction.

The MAE using LR of RQ, TC, RA, noRV are 0.151, 0.2637, 0.2874, 0.2842, respectively; the MAE using RT are 0.2343, 0.2664, 0.2489, 0.1845, respectively. On the other hand, the MAE using LR for RV and ALL are 0.2842 and 0.2741; and the MAE using RT are 0.1845 and 0.1887. The prediction accuracy of RT is the highest among all techniques we use in this research. Similar results are showed in the case of RMSE: the RMSE using LR of RQ, TC, RA, noRV are 0.3931, 0.383, 0.3967, 0.3839, respectively; the RMSE using RT are 0.3886, 0.3919, 0.3816, 0.3896, respectively. For the RV group, the RMSE using LR for RV and ALL are 0.3857 and 0.3781; and the RMSE using RT are 0.3226 and 0.3246. The results of RMSE confirmed our observations that RT has better prediction accuracy. Of two techniques in this study, RT had the best performance in prediction accuracy than LR. The results show that the dataset including RV can improve prediction accuracy and RV plays an important role in the online review helpfulness prediction.