The Effect of Online Reviews on Movie Box Office Sales:
An Integration of Aspect-Based Sentiment Analysis and Economic Modeling

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ABSTRACT

Due to the rapid growth of social media, potential moviegoers always depend on the online reviews to make their purchase decisions. Film companies need to know what aspects of reviews will drive sales up or down. This study proposes a framework that integrates an aspect-based sentiment analysis and econometric modeling to explore the relationships between the information features in online reviews and movie ticket sales. The empirical results indicate that whereas the rating does not matter to moviegoers and does not affect movie revenues, additional textual reviews, both positive and negative contents, do have a positive impact on moviegoers and further prompt the movie revenues. These findings have significant implications for movie producers as well as advertisers to target promotions at their audience accordingly.

KEYWORDS

Aspect-Based Sentiment Analysis, eWOM, Movie Box Office Revenues, Random Effect Model

1. INTRODUCTION

The rapid growth of diverse social media has allowed consumers to share experiences and details about products on online platforms. Research has shown that consumers consult online reviews before making purchase decisions. Grover et al. (2018) proposed a framework focusing on building the capabilities of "big data and analytics" (BDA) to assist organizations in creating strategic business value. In particular, they suggested understanding customers' feelings through a review analysis for product innovation and service improvement. The key task is to translate original big data into valuable business information and insights via BDA. We follow the conceptual scaffold of BDA and propose a functional value module to explore the relationship between product attributes and sales. Here we use the movie industry as a case study owing to the availability of its sales data.

Due to short life cycles, there is intense competition in the movie industry. Box-office revenues may be affected by various factors, including the movie genre, director, actors, and

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plot summary, as well as the marketing strategies used to promote the movies. Previous studies indicate that most potential moviegoers read movie reviews, and electronic word-of-mouth (eWOM) impacts box-office performance (Hyunmi et al., 2017; Liu, 2006; Rui et al., 2013; Zimbra et al., 2017). For instance, Nielson reported that 70% of customers would reference eWOM before making purchase decisions, implying that eWOM has become a reliable source of information for movie consumers (Xiao et al., 2016).

Typical eWOM comprises two types of information—the numerical rating and the text of the review (Li et al., 2019). Most sentiment research has focused on simple numerical metrics such as the rating, the number of theaters in which the movie is shown, and the number of reviews (Gu et al., 2013; Li et al., 2019; Yu et al., 2012). However, movie reviews provide rich information about viewers' opinions on movies. A large number of studies applied sentiment analysis to detect the polarity of an overall text for understanding customers' thinking (Hu & Chen, 2016; Hu et al., 2018; Liu, 2012). Recently, a useful technique called Aspect-based Sentiment Analysis (ABSA) has been employed (Zhao et al., 2016). ABSA is a method that defines the terms related to the aspects and identifies the sentiment associated with each aspect. Customers could express their attitudes toward aspects which were the attributes of the product. Different aspects can produce different sentiment responses. By utilizing ABSA, there is the possibility to capture detailed information about objects of interest.

In our previous work, we suggested a tool for mining aspect -opinion pairs from eWOM sentences (Cheng & Huang, 2019). In this study, we further propose an innovative framework that integrates ABSA and economic modeling to explore the various features that influence box office revenues. First, we define five aspects that summarize movie features, such as overall impression, screenplay, special effects, director, and principal characters, and develop a novel ABSA tool to address the different aspects of eWOM in terms of positive and negative opinions. In addition, to offer a comprehensive view of the information features of reviews that may affect the box office revenues, the model considers two other main factors including movie-related variables, such as genre, and volume variables, such as number of theaters, rating, and number of reviews. Next, we apply economic modeling to investigate the relationship between these variables and the movie box office sales. In particular, this study evaluates whether taking into account the above-mentioned aspects of movie reviews improves the prediction of movie box-office performance. Our findings are particularly relevant for movie companies, which may refine marketing strategies by focusing on these particular aspects of eWOM.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature. Sections 3 and 4 introduce the data and research methods used in this study. Section 5 presents the empirical results and discusses their implications. The last section provides conclusions and discusses the study's limitations and avenues for future research.

2. RELATED WORK

2.1 Impact of eWOM on Sales

Recently, the media industry has realized that eWOM is a rich source of information for exploring consumer preferences (Liu & Du, 2020). Numerous studies have also found that the impact of eWOM on sales has substantially increased due to the proliferation of eWOM on social media. Specifically, eWOM has been shown to significantly affect sales for products such as books (Chevalier & Mayzlin, 2006), movies (Cheng & Huang, 2019; Dellarocas et al., 2007; Karniouchina, 2011; Liu, 2006), and mobile apps (Liang et al., 2015).

To predict movie box office sales, most previous works attempt to incorporate several different factors into models and assess their significance (Hu et al., 2018; Zimbra et al., 2017). Hu et al. (2018) categorize the research into three streams according to the eWOM factors that affect box office performance. The first stream of research uses movie-related variables such as MPAA (Motion Picture Association of America) rating and genres. The second stream employs volume, a numerical

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