UNIVERSITI TEKNOLOGI MALAYSIA

ABSTRACT

Social media platforms yield data with a heavy emphasis on emotions and user actions, which could be utilized in businesses such as marketing, e-commerce, and social analytics, but deriving insightful information is still on a low scale. The study tends to craft and offer suitable methods and models to tackle the issues that revolve around sentiment analysis and user behavior predictions in the social media context. The research will get to work with text and image data on tweets, such as text and image data. The study uses natural language processing (NLP) and machine learning techniques (ML) to build the framework of multimodal sentiment analysis to enable the integration of text and image information and improve the sentiment analysis accuracy and efficiency. We will measure, by the tested approaches, the effectiveness of modalities of images in sentiment analysis and determine the power of the properties of images with sentimental polarity as a basis of bias in image analysis. The analysis will investigate the reported differences in the emotional expressions of different brands on social media and the reasons for them - for example, features such as the brand image and respective products. This study will enable this through facilitating an avenue for precise sentiment analysis and user behavior prediction in social media, which will equip enterprises, researchers, and policymakers to determine user behavior better and develop marketing strategies that take these behaviors into account.

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ABSTRAK

Platform media sosial menghasilkan data dengan penekanan berat pada emosi dan tindakan pengguna, yang boleh digunakan dalam perniagaan seperti pemasaran, e-dagang dan analisis sosial, tetapi memperoleh maklumat bernas masih pada skala rendah. Kajian ini cenderung untuk mencipta dan menawarkan kaedah dan model yang sesuai untuk menangani isu yang berkisar pada analisis sentimen dan ramalan tingkah laku pengguna dalam konteks media sosial. Penyelidikan akan berfungsi dengan data teks dan imej pada tweet, seperti data teks dan imej. Kajian ini menggunakan pemprosesan bahasa semula jadi (NLP) dan teknik pembelajaran mesin (ML) untuk membina rangka kerja analisis sentimen multimodal untuk membolehkan penyepaduan maklumat teks dan imej serta meningkatkan ketepatan dan kecekapan analisis sentimen. Kami akan mengukur, dengan pendekatan yang diuji, keberkesanan modaliti imej dalam analisis sentimen dan menentukan kuasa sifat imej dengan kekutuban sentimental sebagai asas berat sebelah dalam analisis imej. Analisis akan menyiasat perbezaan yang dilaporkan dalam ekspresi emosi jenama yang berbeza di media sosial dan sebab-sebab mereka - contohnya, ciri seperti imej jenama dan produk masing-masing. Kajian ini akan membolehkan ini melalui memudahkan jalan untuk analisis sentimen yang tepat dan ramalan tingkah laku pengguna dalam media sosial, yang akan melengkapkan perusahaan, penyelidik dan penggubal dasar untuk menentukan tingkah laku pengguna dengan lebih baik dan membangunkan strategi pemasaran yang mengambil kira tingkah laku ini.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Social networks have become an example of an inherent fusion of our daily lives since they can be aligned with our routine easily and change everything about communication, information, and social interactions as we know it. This starts from Facebook to Twitter to Instagram to TikTok - now all have developed as the era of virtual spaces, where individuals talk to their friends and family, as well as sharing both new and old content, giving their thoughts. Hence, a staggering amount of data published by the users and found on the platforms has been created, leading to making it a benefit hub for a wide range of applications.

Certainly, now businesses focus on the idea that social media data is a gold mine for marketing communications, product promotion, and understanding consumer and market trends. The key value comes from how meaning can be extracted out of user behavior and sentiment; however, this is what is the seller that is able to make marketing strategies more segmented, personalized, and connected to the customer. The difficulty in accumulating meaningful analytics from the mountains of big data is a dream that is, to a large extent, not possible. The complexities, with their diversities, that lie therein due to human speech and activities, still remain very difficult to analyze or to interpret to coherent ness in the data that is user-generated. The statement of social media, including sarcasm and irony between friends and family, adds a challenge to the tests beyond what lever will be adequate. The user's behavior, on the other hand, could be explained by the fact that individual tastes, people, and

other atmospheric variables collectively bring about complexity in predicting with certainty.

1.2 Background of the Problem

The massive-processing social media data includes text, pictures, and videos, and it is usually more critical to the video social networks than other sources. Sentiment analysis and pattern recognition are the two vital tasks related to many systems that require behavioral and emotional perceptions of the users. On the other hand, currently, the sentiment analysis methods mainly take into account text information, while the information of other visual altitudes, such as image and video, are ignored and may lead to not comprehensive and imprecise decisions. The integration of multimodal sentiment analysis has been one of the hotspots in the research field, but specifically the challenge the information from different modalities and to break through the heterogeneity or complexity remains the only unsolved problem.

1.3 Statement of the Problem

Disadvantages of single-modality analysis: Most papers on sentiment analysis nowadays focus on text modalities mainly and do not consider the other modalities, like images and videos, leaving the understanding of sentiments lightly and lastly. Challenges of multimodal fusion: Despite the fact that multimodal sentiment analysis has been proven to be research attractive, the way information from different modalities and overcome the heterogeneity and complexity between modalities remains a major problem that is waiting to be solved.

1.4 Research Questions

This study aspires to address the following items:

How to create the more efficient framework of multimodal sentiment analysis by using the multimodal information such as text and images and increasing the speed and accuracy of sentiment analysis?

What role do image modalities play in sentiment analysis? How can I quantify the impact of images on sentiment analysis results?

In the case of social media, do the diverse brands show different emotional expressions on it? Moreover, why do these differences happen?

1.5 Objectives of the Research

In this paper, we will create and validate a multimodal sentiment analysis framework that can effectively integrate text and image information to improve the accuracy and efficiency of sentiment analysis.

Then, the influence of image modality in sentiment analysis is quantified, and the contribution of image features to the judgment of overall emotional polarity is determined through this experimental analysis.

By analyzing the differences in the emotional expression of different brands on social media, and then exploring the reasons behind these differences, such as brand image, product features, etc.

1.6 Scope of the Study

This study will center on the following: Source: Data provided by the users on the Twitter platform, such as text and images. Research Question: The effect of image polarity on the core sentiment of the post and the differences in the emotional sharing of brands on social media. Research Methods: Exploratory data analysis, multimodal sentiment analysis model development, user behavior prediction model development, model evaluation, and feature assessment. Research Objectives: To build and examine a multitask sentiment analysis model, an experiment that will quantify the effectiveness of image modality, scans of brands' attitudes through three different brands as well as their causes.

1.7 Significance of the study

This study has important theoretical and practical significance.

Theoretical implications: This study will tap on the right research in the evolving field of multimodal sentiment analysis and provide a set of new principles for the utilization of image representation.

Practical significance: This study shall bestow the following two enterprises and scientists: Brand image monitoring: By means of emotion appreciation on social media, companies can appreciate user attitude and opinion towards the brand and then modify their marketing strategies at the right time. Product promotion: Business enterprises can, therefore, be able to analyze how different brands are being presented differently on social media as they can hence develop suitable promotion strategies.

User behavior prediction: Businesses can improve the engagement and conversion rates of their users by deploying user behavior prediction models that enable them to forecast what actions the users might take on the platform.

Personalized recommendations: Through this process of categorizing the users' emotions and behaviors, the business will be able to provide the user with a more personalized experience by offering better content to the user.

Public health management: By detecting feelings and behaviors on social sites, the researchers can address the public health issue and revolutionize in a timely way.

Social Science Research: Helping in researches on emotions and behaviors on social sites, the researchers can now study social phenomena and explore about their genesis, however, mad.