Steam Reviews Sentiment and Emotion Analysis Report

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Abstract

This project involves a program for analyzing online game reviews on Steam using Natural Language Processing (NLP) techniques. By using tools like TextBlob and NRCLex, the program processes and visualizes user reviews for sentiment and emotional content, with the goal of enabling a comprehensive understanding of user feedback for developers, businesses, and users themselves. Visual tools such as matplotlib and seaborn are used to display emotional trends and sentiment scores to further refine and visualize complex and copious review data. This visualization also allows for a quick scan of data and its interpretation to pick out certain parameters of outliers without the need for actually analyzing individual reviews one by one. This approach simplifies the review analysis process, making it more accessible to those without the manpower or resources for undertaking the task of a complete analysis of comments.

1 Introduction

Online reviews increasingly and significantly influence consumer behavior, and this is especially so in the gaming industry, where many users are tech-savvy and vocal enough to often review products online. Because of the importance of online reviews, the ability to efficiently parse and understand these reviews is critical. The sheer volume of reviews available online presents a challenge for individuals attempting to manually analyze them.

Using NLP approaches of game reviews is not an entirely novel concept. For instance, in *A Study on Video Game Review Summarization*, George Panagiotopoulos and Antonios Liapis make use of an aspect-oriented approach to analyzing game reviews to determine the most frequent terms of focus. However, our needs are slightly different in that we are concerned with the emotional and sentimental reaction in reviews, less so the gameplay areas of focus.

This paper presents a different solution: a program designed to simplify the process of parsing reviews by employing Natural Language Processing (NLP) techniques. The project aims to provide an automated means of analyzing reviews, making the insights more easily scanned efficiently for information.

1.1 The Problem

Reviews are constantly being posted online, and with the sheer volume available, it becomes impossible for your average individual to effectively parse reviews.

1.2 The Solution

The program attempts to make parsing reviews easier by using various NLP techniques and libraries to process, analyze, and visualize sentiments and emotions in reviews.

1.3 The Goal

This project aims to provide a means of analyzing reviews in large quantities while still retaining meaningful and/or useful data. By utilizing NLP approaches, we can provide users a more in-depth look at a game and its reviews in an easy to digest format.

2 NLP Tools Utilized

This program makes use of several tools made available for use with Python:

NLTK (Natural Language Toolkit) One of the most popular NLP toolkits in Python.

TextBlob A library for processing textual data, used in this project for sentiment analysis.

NRCLex An NLP tool that identifies the emotions expressed in a text.

3 The Process

Data Loading Customer reviews are collected from a JSON format, preparing them for analysis.

Review Preprocessing Each review undergoes preprocessing, where it's converted to lowercase and tokenized for further analysis.

Sentiment Analysis Using TextBlob, each review is analyzed to determine its sentiment, ranking it as positive, negative, or neutral.

Emotion Analysis Separate to sentiment analysis, NRCLex is used to determine the emotional tones present in the reviews, such as joy, sadness, or anger.

Visualization Preparation The processed data is then organized into a format suitable for visualization using Seaborn and matplotlib.

Data Visualization: Finally, the program uses matplotlib and seaborn to create visual representations of the analysis, such as bar plots and heatmaps, helping illustrate the emotional trends in the reviews

4 Acquiring The Data and Processing It

Data is pulled using Steam API functionality. By requesting Steam's DB, we can retrieve jsons of user reviews.

To get usable information for our NLP processes, the json is interpreted by the program and the relevant fields for this project are then stored for preprocessing. While preprocessed the same, sentiment and emotional content are processed separately by TextBlob and NRCLex respectively.

4.1 Preprocessing Steps And Purpose

Tokenization: Breaking down the text into individual words or tokens. Required for breaking reviews into units for analyzing.

Lemmatization: Converting words to their base or dictionary form. The allows for normalization of similar terms as well

5 Sentiment Analysis

TextBlob is a library with multiple functions. However, we are using in in this program mainly for its sentiment analysis capabilities.

TextBlob analyzes the text to provide an overall sentiment. This provides a much quicker way of grasping customer sentiment across a plethora of reviews, which helps understand customer satisfaction and areas that may be problematic.

TextBlob analyzes the text to provide an overall sentiment on a scale, with -1 being very negative and 1 being very positive, while 0 is neutral.

For example, if given a sample review like "I love this game, it's amazing!," TextBlob will recognize positive words such as 'love' and 'amazing' and give them a high positive score, much higher than, say, 'satisfied.' This score is then added to our data analysis segment for evaluation and visualization.

This is useful for our purposes because sentiment analysis lets us identify and quantify the positivity or negativity levels overall in a review based on language used. This quantification then allows us to visualize the resulting data in a way that is useful and able to be parsed quickly by providing a broader interpretation of the initial text. This results in complementary insights with our emotional analysis.

6 Emotional Analysis

NRCLex is used to analyze emotions in the review, which then identifies the dominant emotional tone of each review (for example, joy, sadness, or anger). This provides a quicker understanding of the emotional responses and attitudes of customers by parsing many reviews.

For example, in a theoretical sample review: "I hate this game. It's boring and full of glitches." NRCLex is able to run emotion analysis on this, and as a result the program can pick out emotions. Here, the program finds 'anger' and 'disgust'. Then, the 'level of intensity of the emotion is also quantified, and the info is stored in our data analysis segment of the code.

This is useful for our purposes because emotional analysis lets us identify and quantify levels of emotions in a numerical way. This quantification then allows us to visualize the resulting data in a way that is useful and able to be parsed quickly.

7 Analysis Result Analysis Illustrative Examples

When we run a review through out program, we end up with a score for sentiment and the strength of emotions. Some simplified examples of what the results might look like and how they are used include:

"I love this game, it's amazing!": High sentiment score and strong 'joy' emotion.

This analysis would reveal to the user that a review was very positive toward the subject, and seemed to feel joy strongly based on the textual analysis. This could be helpful for professionals as

it provides a clear cut example of something that seems to be going well and viewed positively in the reviews.

"The game is okay, but has some bugs": Moderate sentiment score with mixed emotions.

This analysis would reveal to the user that a review was overall neutral toward the subject, and seemed to feel a multitude of emotions. This review may be of particular note to a user because it is not biased toward negativity or positivity and covers many emotions. For professionals, this could be valuable information as it represents a balanced perspective, potentially reflecting a more thoughtful and comprehensive review of the game. Such a review might help to pinpoint specific aspects of the game, providing developers with nuanced feedback.

"I hate this game. It's boring and full of glitches.": Low sentiment score with negative emotions.

This analysis would reveal to the user that a review was overall negative toward the subject, and seemed to feel negative emotions most strongly. For professionals, this would indicate the review might highlight areas in need of improvement. Being able to identify reviews such as this would help developers to identify and prioritize issues in need of improvement, thus improving the overall user experience.

8 Visualization

Visualization is one of the major aspects of this program's approach to providing information to the user. By making use of effective visualizations, the program can convey concepts such as emotions and positivity/negativity for a multitude of online reviews. This allows for quicker parsing of the large quantity of reviews, while also providing a useful visual means of interpreting the emotions and sentiment of the reviews in their totality and/or individually.

While there are several ways that the data could be presented and manipulated for comparison, this program's initial scope covered two major visualization approaches: Sentiment and Emotion Bar Plots and Emotion Intensity Heatmaps.

8.1 Sentiment and Emotion Bar Plot

This visualization displays the sentiments scores and intensity for each review, helping in understanding the emotional response in text reviews.

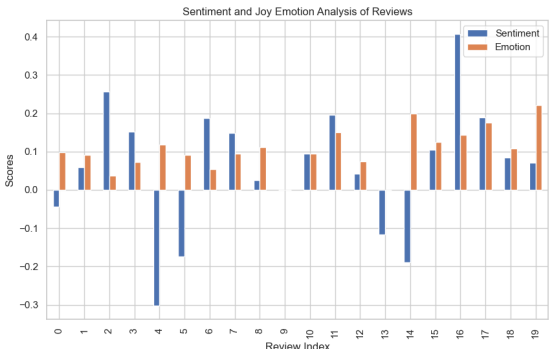

Figure 1: Emotion Bar Plot Example

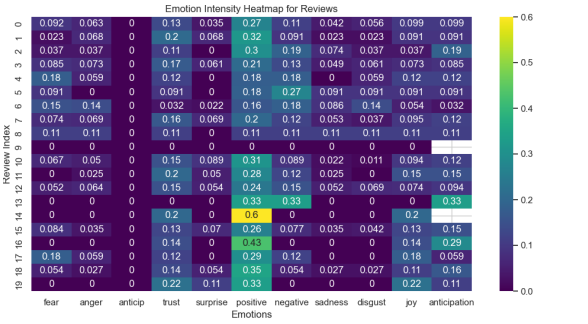

Figure 2: Emotion Intensity Heatmap Example

See figure 1 for example.

8.2 Emotion Intensity Heatmap

This visualization attempts to illustrate the range and intensity of different emotions across the provided reviews. This offers insight into the diverse emotions and intensity of emotion in customer reviews. See figure 2 for example.

9 Implications and Applicability

While the focus of this project is game reviews, specifically from Steam, the approach and processes have implications far beyond the gaming industry and hobby.

9.1 Other Industries

The program's approach to mass analysis of game reviews can be altered for similar applications in other industries. Books, movies, restaurants, and hotels often rely on customer reviews and their interpretation for their business decisions, and in turn many customers rely on them when choosing what institutions to patronize. The ability to parse large volumes of user-generated content can be adapted to understand customer sentiments and product reactions quickly and easily across multiple domains. For businesses and market analysts not involved

in gaming, this program, with minor alterations and access to data, could be used to apply similar techniques for gathering useful insight consumer feedback, in turn helping them to tailor products and services more effectively to their target audience's needs and preferences, particular those of an emotional variety.

9.2 Personal Use

While many platforms offer some means of viewing reviews and refining the results, such as Steam's ability to sort by recommended and not recommended and by date, the challenge of actually reading and choosing which reviews to heed is still a challenge. Individuals, such as individual game players or parents, who aim to discern the quality and aspects of games beyond basic ratings could make use of this NLP-based analysis to get a more comprehensive overview of the gaming community's opinions and experiences with the product before purchasing and/or play. The program enables users to extract and comprehend the prevailing sentiments and emotional tones from a multitude of reviews, aiding in making informed decisions using one's own personal preferences or other such criteria.

10 Future Work and Improvements

Future work could involve integrating more sophisticated NLP models and considering additional factors like user profiles and gameplay statistics for a more comprehensive analysis. Further refinement in gauging sentiment and emotional analysis accuracy would help further filter for reviews that are outliers (either for highlighting or exclusion, depending on purpose), or perhaps even generating new models for further analysis, which would help in identifying analysis accuracy.

In addition, finding an utilizing a method to further link emotions to particular product aspects would be helpful in analysis. For example in the paper "Aspect-Oriented Opinion Mining from User Reviews in Croatian", Glavas et al use "aspect-oriented opinion mining [which] aims to identify product aspects (features of products) about which opinion has been expressed in the text" (Glavas 18). By applying a similar approach to the data, we could pinpoint what aspect of the game may have provoked a certain emotional reaction in the resulting review text.

There are also additional vectors, so to speak, that would help add depth to this analysis. For instance, papers such as "Automatically Assessing Review Helpfulness" use an approach that allows for the assessment of review helpfulness. By assigning helpfulness scores we could help users filter out more impactful reviews or ones that may have the most illumination into a certain feeling, such as a high helpfulness, high fear, high positivity review on a horror game.

11 Conclusion

The main takeaway of this process proved to be just how useful visualization can be for humans interacting with massive amounts of data. NLP programs can help provide that information on a large scale effectively. The ability to quantify not just the overall sentiment of text, but also the specific emotions like joy, fear, or anger, provides a more in depth understanding of customer feedback that is useful for data representation and further interpretation, while visualizations of the extracted data allows for quickly identifying patterns and trends in the data, making it easier to interpret complex emotional data from text at a glance. Thus, NLP processes can be a powerful tool for businesses and users alike.

12 Citations

Goran Glavaš, Damir Korenčić, and Jan Šnajder. 2013. "Aspect-Oriented Opinion Mining from User Reviews in Croatian." *In Proceedings of the 4th Biennial International Workshop on Balto-Slavic Natural Language Processing,* pages 18–23, Sofia, Bulgaria. Association for Computational Linguistics.

George Panagiotopoulos, George Giannakopoulos, and Antonios Liapis. 2019. "A Study on Game Review Summarization." *In Proceedings of the Workshop MultiLing 2019: Summarization Across Languages, Genres and Sources,* pages 35–43, Varna, Bulgaria. INCOMA Ltd.

Soo-Min Kim, Patrick Pantel, Tim Chklovski, and Marco Pennacchiotti. 2006. "Automatically Assessing Review Helpfulness." I*n Proceedings of the 2006 Conference on Empirical Methods in Natural Language Processing*, pages 423–430, Sydney, Australia. Association for Computational Linguistics.