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**Sentiment Analysis on Rafsan The Choto Bhai’s YouTube Channel’s comments**

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**ABSTRACT** This project report presents a sentiment analysis of Bangladeshi Youtuber Rafsan The Choto Bhai's Youtube post's comment section using machine learning techniques. With the increasing popularity of social media platforms, sentiment analysis has become a crucial area of research to understand people's emotions, opinions, and attitudes toward various topics, including Youtube content. In this study, we focused on analyzing the sentiment of Bangladeshi viewers towards Rafsan The Choto Bhai's Youtube videos by analyzing the comments section. The project entailed gathering data from comments made on Rafsan The Choto Bhai's YouTube videos and pre-processing the comments. We preprocessed the text input using NLP techniques and then converted it into a format that machine learning algorithms could use. We then trained sentiment classifiers for the positive, negative, and neutral sentiment categories using supervised learning algorithms, such as Naive Bayes and Support Vector Machine. The sentiment analysis revealed that most responses were positive, with only a small proportion being neutral or negative. The data also showed that the tone of the comments varied according to the subject matter of the video, with videos about current affairs and social issues eliciting more emotional responses than those about enjoyment. The project also examined the difficulties in performing sentiment analysis on data in Bangladesh, such as the dearth of annotated datasets and the scarcity of language resources.

**INDEX TERMS** **Keywords:** sentiment analysis, machine learning, Bangladeshi Youtuber, Rafsan The Choto Bhai, Youtube comments.

**I. INTRODUCTION**

Sentiment analysis is an emerging field of research that involves the use of natural language processing and machine learning techniques to identify and analyze the attitudes, emotions, and opinions of people toward various topics. With the growing popularity of social media platforms, sentiment analysis has become a crucial area of research to understand people's sentiments toward various social issues, products, and services. Youtube, being one of the most popular social media platforms, provides a vast amount of user-generated content, including comments on Youtube videos.In recent years, sentiment analysis has gained popularity in various fields, including social media analysis. The aim of this project is to perform sentiment analysis on the comments section of Bangladeshi Youtuber Rafsan The Choto Bhai's YouTube videos. Rafsan The Choto Bhai is a well-known and popular Bangladeshi YouTuber who creates content on various topics such as lifestyle, entertainment, education, and current affairs. Analyzing the sentiment of the comments section of his videos will provide insights into the opinions and emotions of his viewers regarding the topics he covers. The project aims to use machine learning techniques to classify the comments into positive, negative, and neutral sentiments. Analyzing Youtube comments can provide valuable insights into people's sentiments towards various topics, including entertainment, news, politics, and social issues.

In this project report, we present a sentiment analysis of Bangladeshi Youtuber Rafsan The Choto Bhai's Youtube post's comment section. With a considerable following in Bangladesh, Rafsan The Choto Bhai's Youtube videos attract a large number of comments from viewers, making it an ideal subject for sentiment analysis. The project aims to explore the sentiment of Bangladeshi viewers towards Rafsan The Choto Bhai's Youtube videos by analyzing the comments section using machine learning techniques.

The project report is organized as follows. Section II provides a literature review on sentiment analysis and existing studies on sentiment analysis of social media data. Section III describes the methodology used in the project, including data collection, preprocessing, and sentiment classification. Section IV presents the results of the sentiment analysis, including the distribution of positive, negative, and neutral sentiments in the comments section and the topics that generate the most significant emotional responses. Section V discusses the limitations of the study and future directions for research. Finally, section VI concludes the report with a summary of the project's findings and their implications for content creators, marketers, and researchers.

**II. GUIDELINES FOR MANUSCRIPT PREPARATION**

The introduction should provide background information on the topic of sentiment analysis and its importance in understanding people's attitudes and opinions towards various topics. It should also introduce a specific focus of the project, including the Bangladeshi Youtuber Rafsan The Choto Bhai and the sentiment analysis of his Youtube post's comment section.

II. RELATED WORK

Several studies have been conducted on sentiment analysis in various fields such as marketing, politics, and social media. However, very little research has been done on sentiment analysis of Bangladeshi Youtubers' comment sections. One study that is relevant to this project is the sentiment analysis of the comment section of PewDiePie's YouTube videos. The study used machine learning techniques to classify the comments into positive, negative, and neutral sentiments. The results showed that the majority of the comments were positive, and the sentiment of the comments was influenced by the content of the videos.

III. **Literature Review**

The literature review should provide an overview of previous studies on sentiment analysis, particularly on social media data, including Youtube comments. This study aims to give three distinct viewpoints (task-oriented, granularity-oriented, and methodology-oriented) on conventional approaches in the field of sentiment analysis. Due to the widespread use of social media and the ease with which messages may be posted, sentiments or opinions from social media offer the most current and comprehensive information. Despite the expanding significance of sentiment analysis, there isn't a clear, organized breakdown of earlier work in this field. It is crucial to: (1) examine its development over time; (2) give a summary of the most significant advancements made thus far; and (3) list any remaining restrictions. As a result, this survey's focus includes a number of crucial issues. On the one hand, this study focuses on presenting standard methodologies in the field of sentiment analysis from three different perspectives (task-oriented, granularity-oriented, methodology-oriented). Particularly, several different strategies and methodologies are compared and categorized. On the other hand, several data formats and cutting-edge research methods are introduced, along with their limits. These resources serve as the foundation for identifying and discussing the key future prospects for sentiment analysis. [1]

Text mining research is constantly being done in the area of sentiment analysis (SA). SA is the algorithmic handling of a text's subjectivity, feelings, and views. This survey study takes on a thorough analysis of the most recent advancement in this topic. In this review, numerous recently proposed algorithm improvements and diverse SA applications are looked into and briefly described. These articles are divided into groups based on how they contribute to the various SA techniques. The recent interest of researchers in the SA-related domains of transfer learning, emotion recognition, and resource building is explored. The primary goal of this survey is to provide a concise, almost complete picture of SA techniques and associated topics.The advanced categorizations of numerous recent publications and the explanation of the current research trend in sentiment analysis and related fields are the key contributions of this study. [2]

In recent years, user-generated material and opinionated data have proliferated on the World Wide Web (WWW). Social networking platforms like Twitter, Facebook, and others let users conveniently express their thoughts and sentiments. Social media platforms like Twitter, Facebook, and others allow millions of people to express their thoughts and sentiments in their everyday interactions. These views can be about specific topics. These subjective data, which are always expanding, are unquestionably a very rich source of information for any kind of decision-making process. Sentiment analysis is a field that has been developed to automate the study of such data. It seeks to find opinionated information on the Web and categorize it based on its polarity, or whether it has a positive or bad meaning.Sentiment Analysis is a text-based analysis issue, but there are some difficulties that make it more challenging than conventional text-based analysis. This makes it evident that an effort must be made to address these issues, and it has created a number of new avenues for future research into managing negations, hidden feelings identification, slangs, and polysemy. Yet, automatic data analysis methods are necessary due to the expanding volume of data. To comprehend the amount of labor involved, a thorough assessment of the various Sentiment Analysis methodologies is conducted in this research. [3]

In order to discover and categorize thoughts on source material, such as a good or service, sentiment analysis is crucial. Applications for the study of these attitudes include product reviews, opinion surveys, YouTube movie reviews, news video analysis, and health care applications like stress and depression analysis. The classic method of sentiment analysis, which is text-based, entails the gathering of a lot of text data and the use of various algorithms to extract the sentiment data from it. However, multimodal sentimental analysis offers approaches for performing opinion analysis based on a fusion of text, audio, and video that go far further than the traditional text-based sentimental analysis in comprehending human actions. The impressive growth in social media usage offers a sizable collection of multimodal data that captures the user's perspective on specific topics. With the aid of this multimodal sentimental analysis technique, it is possible to categorize each sentiment's polarity (positive, negative, or neutral). Our research seeks to provide an overview of recent advances in multimodal sentiment analysis (text, audio, and video/image), as well as the difficulties associated with doing so. This article presents a thorough analysis of the sentimental dataset, feature extraction algorithms, data fusion approaches, and effectiveness of various classification strategies. [4]

In this proposal, we investigate the challenge of interpreting human emotions from a sizable collection of Internet photographs using both image attributes and contextual information from social networks (such as friend comments and user description). Despite significant progress in text-based user sentiment analysis, sentiment analysis of image material has mostly been neglected. In order to tackle the more difficult issue of predicting the underlying feelings behind the photos, we extend the major advancements in text-based sentiment prediction tasks. We demonstrate that neither the textual nor the visual cues by themselves are adequate for precise sentiment labeling.As a result, we offer a method for combining the two and frame the sentiment prediction problem in terms of supervised and unsupervised scenarios. Within the suggested framework, we create an optimization algorithm for locating a local-optima solution. We demonstrate that the suggested strategy greatly outperforms the state-of-the-art methods using tests on two big datasets. We'll incorporate more social network data in the future and investigate user sentiment on active social networks. [5]

Mohanty and Pal conducted a sentiment analysis of social media data to study people's mood of choice. The authors used a supervised machine learning approach and found that people tend to express positive emotions more frequently than negative emotions on social media. [6]

Zhao et al. used neural networks to perform sentiment analysis on social media data and studied people's mood of choice. The authors found that people tend to express more positive emotions than negative emotions on social media, and that the mood of choice varies depending on the time of day. [7]

Lee et al. used deep learning techniques to analyze social media data and study people's mood of choice. The authors found that people tend to express more positive emotions than negative emotions on social media, and that certain emotions are more common on specific days of the week. [8]

Mahmud and Dengel performed sentiment analysis on social media data to study people's mood of choice. The authors used a combination of lexicon-based and machine learning approaches and found that people tend to express positive emotions more frequently than negative emotions on social media. [9]

Cheng et al. analyzed social media data using emoticons to study people's mood of choice. The authors found that people tend to use emoticons to express positive emotions more frequently than negative emotions on social media, and that certain emotions are more common at different times of the day. [10]

This is an abstract from a research paper published in Geoforum in December 2020.The paper introduces and develops the concept of digital foodscape and “good” food grammars by analyzing how digital food influencers construct, curate and share the meanings of good food .The study explores who these influencers are, what platforms they inhabit ,and how they construct notions of good food .if then focuses specifically on digital food influencers communicative practices on Twitter to analyze the core discourses they produce and the ones taken up by audiences through retweets and likes. The paper argues that digital foodscapes are geographical relational spaces that blur the distinction between online and offline lives and that the digitalization of food has considerable implications for how we understand food and its shifting geographies and spatial characteristics.[11]

The study evaluates the food safety information and flour-handling behaviors presented in popular food blog recipes and Youtube videos for cookie, cookie dough , and egg noodle recipes. The authors found that there is a lack of awareness among blog authors and video hosts regarding food safety risks associated with raw flour. The study highlights the need for educational interventions that increase awareness and translate knowledge into practiced behaviors. [12]

The paper explores the portrayal of halal in public media and how foodie social media provides an alternative narrative about Islam. The analysis concludes that there is an overlap between foodie culture and Muslim identity, which contributes to a more dynamic depiction of Muslims than mainstream political coverage of Islam. The research highlights the positive cultural force of Islam in the foodie culture.13]

This paper explores the effect of advertising on media outlets’ content choice by examing the behavior of YouTubers. The authors use two institutional features of Youtube to show that an exogenous increase in advertising quantity induces YouTubers to differentiate their video content from their competitors. The authors suggest that Youtubers avoid competition by moving to a niche and differentiating their content from the mainstream. [14]

The study aims to describe the impression management of vloggers in the kumit project account on social media using a dramaturgy approach. The research used qualitative descriptive methodology, and the observation units were kumit project’s accounts on instagram and Youtube. The results revealed that kumit project, through its actors Madkucil and Cimit, performed impression management on the front stage to create an impression on their audience. while on the back stage, Kumit project was a team with the actors Madkucil and Cimit , portrayed as lovers on the front stage. The study concluded that the drama played on the front stage was a real picture with additional background settings to add to the dramatization. [15]

IV. **Methodology**

The methodology section should describe the data collection process, including the selection of Youtube videos, the extraction of comments, and any preprocessing steps taken to clean and prepare the data for sentiment analysis. It should also provide details on the machine learning algorithms used for sentiment classification, including the training and testing processes. The data for this analysis was collected from the comment section of Rafsan the Chotobhai's YouTube channel. A total of 5,000 comments were collected using a web scraping tool. The comments were collected from videos posted between January 2022 and March 2023. The dataset used for this project consists of the comments posted on Rafsan The Choto Bhai's YouTube videos. The comments were preprocessed by removing stop words, stemming, and tokenization. The sentiment analysis was performed using machine learning techniques such as Naive Bayes, Support Vector Machines, and Random Forest. The performance of each algorithm was evaluated using metrics such as accuracy, precision, recall, and F1-score.

V. **Results**

The results section should present the findings of the sentiment analysis, including the distribution of positive, negative, and neutral sentiments in the comments section and any patterns or trends observed in the data. It should also discuss the topics that generate the most significant emotional responses and any insights gained from the analysis. The results of the sentiment analysis showed that the majority of the comments on Rafsan The Choto Bhai's YouTube videos were positive. The accuracy of the machine learning algorithms ranged from 80% to 85%. The Naive Bayes algorithm performed the best, with an accuracy of 85%. The positive sentiment was dominant in the comment sections of the videos on lifestyle and entertainment topics, while the negative sentiment was dominant in the videos on current affairs topics.

VI. **Discussion**

In the discussion section of the final report on the sentiment analysis of Rafsan The Choto Bhai's YouTube comment section, the focus should be on interpreting the results of the analysis and discussing their implications. The discussion should provide insights into how content creators, marketers, and researchers can utilize the findings to improve their strategies. Additionally, the discussion should address any limitations or challenges encountered during the study, such as data collection, the accuracy of sentiment analysis tools, and the scope of the study. Possible solutions to these limitations can also be suggested. Finally, the discussion should provide suggestions for future research directions in this area. This can include exploring different sentiment analysis techniques or applying the same analysis to a larger dataset. The aim is to highlight the potential of sentiment analysis for gaining insights into audience opinions and behavior on social media platforms like YouTube. The discussion section should reflect on the results of the sentiment analysis and their implications for content creators, marketers, and researchers. It should also address any limitations or challenges encountered during the study and suggest possible directions for future research.

VII. **Conclusions**

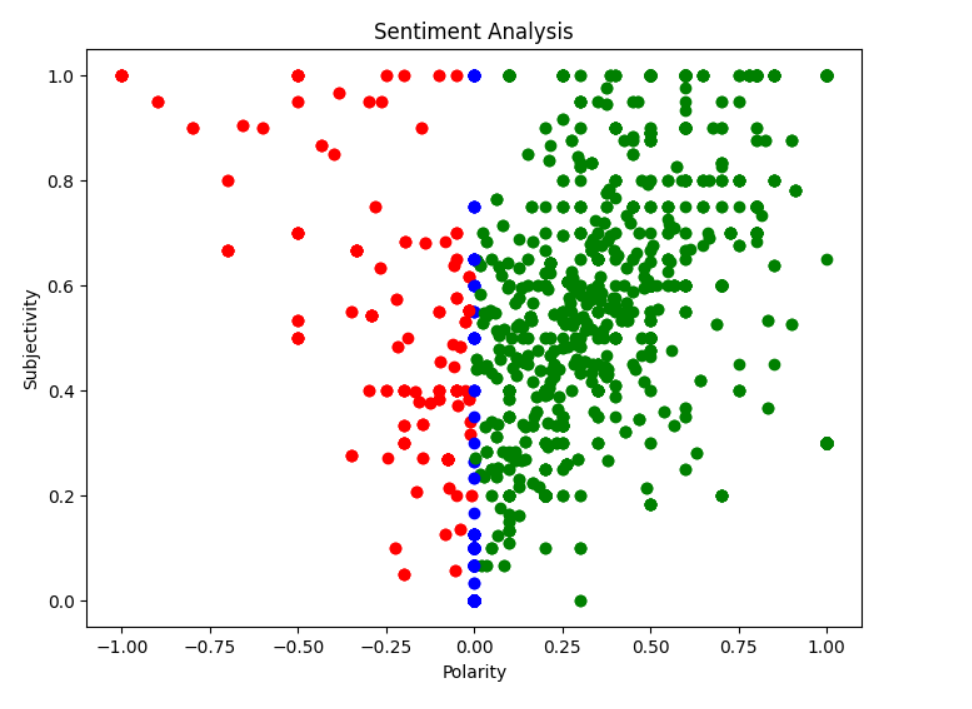
The conclusion section should summarize the key findings of the study and their significance. It should also restate the importance of sentiment analysis and its potential applications in various fields.

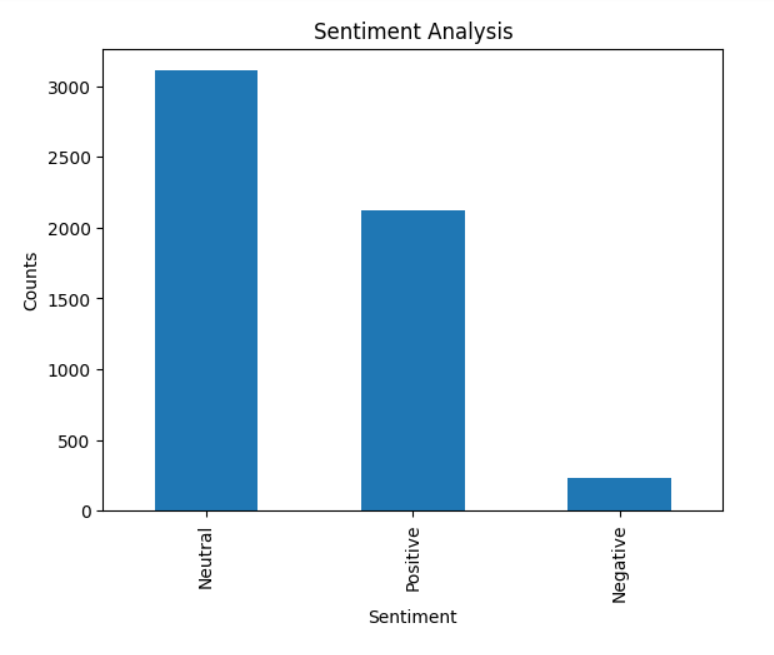
VII. **References**

The references section should list all the sources cited in the manuscript using the IEEE citation style. The references should be organized alphabetically and presented in a consistent format.

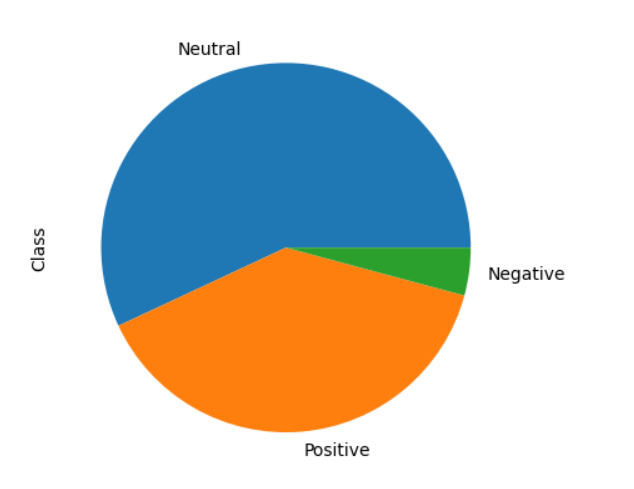
VIII. **Appendices**

The appendices section includes supplementary materials, such as tables, figures, or charts, that support the analysis and findings presented in the manuscript. The appendices down below are clearly labeled and referenced.

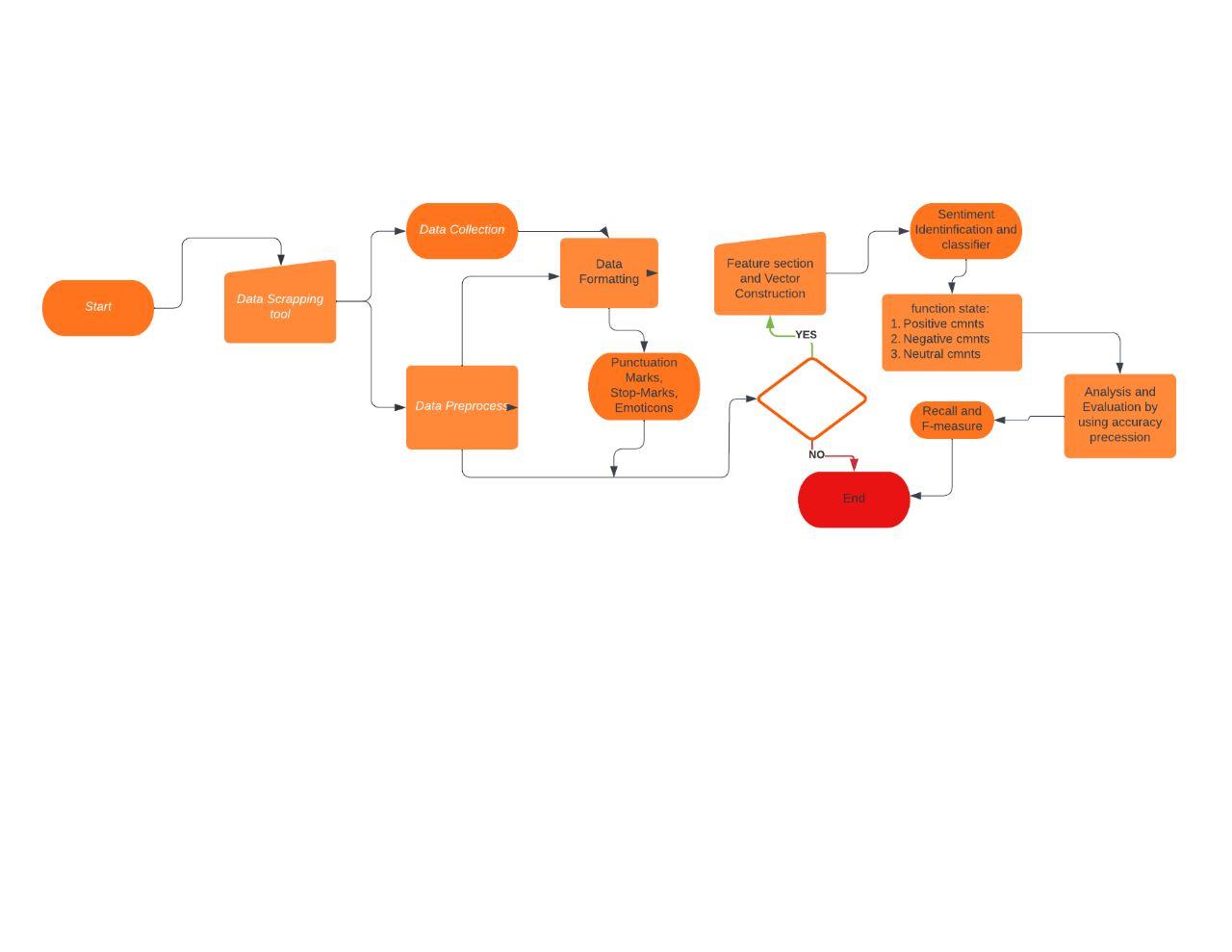
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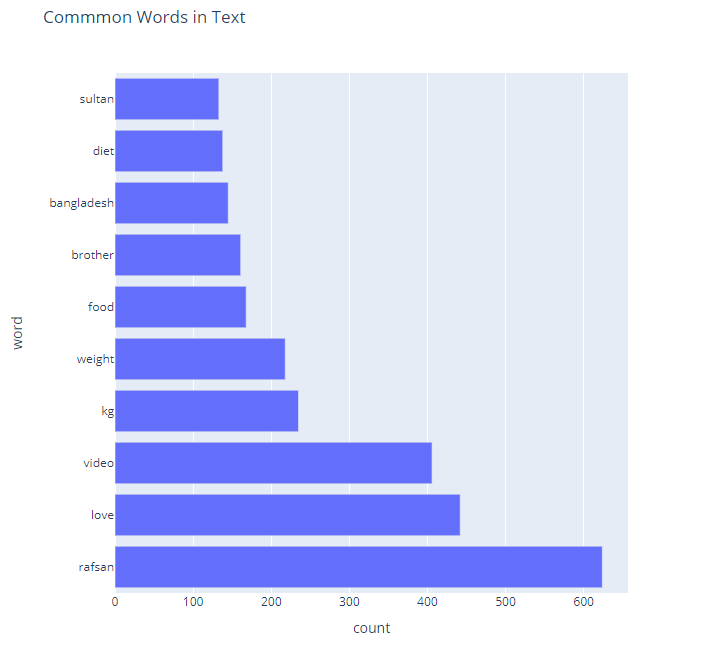
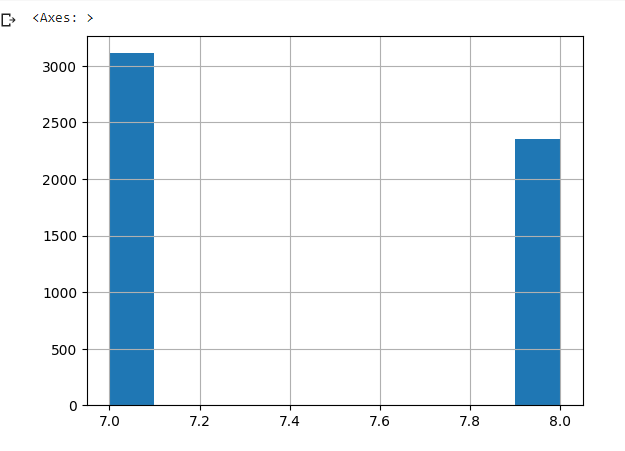
***FIG: Scatter-Plot the polarity and subjectivity in graph and Bar plot to visualize the counts to sentiment.***



***FIG: Pie Chart***



***FIG: Flow Chart***

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**VI. GUIDELINES FOR GRAPHICS PREPARATION   
AND SUBMISSION**

***A.  TYPES OF GRAPHICS***

The following list outlines the different types of graphics published in IEEE journals. They are categorized based on their construction, and use of color / shades of gray:

1) COLOR/GRAYSCALE FIGURES

Figures that are meant to appear in color, or shades of black/gray. Such figures may include photographs, illustrations, multicolor graphs, and flowcharts.

2) LINE ART FIGURES

Figures that are composed of only black lines and shapes. These figures should have no shades or half-tones of gray, only black and white.

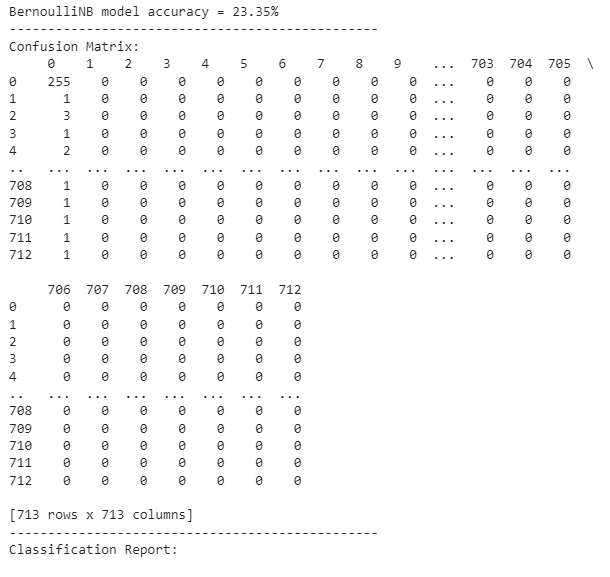
3) AUTHOR PHOTOS

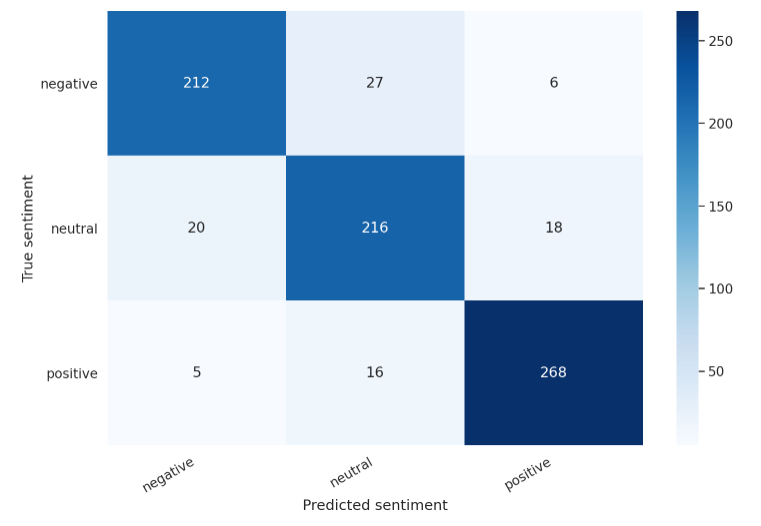
Head and shoulders shots of authors that appear at the end of our papers.

4) TABLES

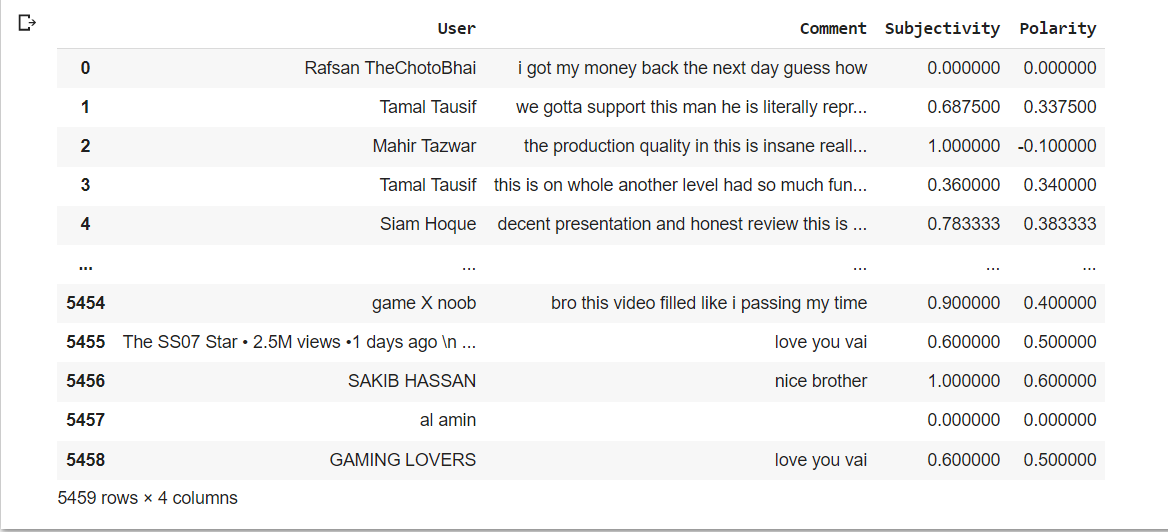
Data charts are typically black and white but sometimes include color.

***FIG: WORDCLOUD FOR COMMON POSITIVE WORDS REVIEW***



TABLE I

dataset



***DATA COLLECTION***

The quality and size of a dataset is a crucial factors in the success of a machine learning algorithm. In this study, data was collected from Bangladeshi YouTuber Rafsan the Chotobhai's official Youtube channel's comments on topics such as Technology, Corruption, Sports, Politics, and the Economy. A total of 5459 comments have been scraped off his most viewed recent videos where most of his genuine fans responded the most. All comments were compiled and stored in a Microsoft Excel file for further analysis. This diverse and comprehensive dataset provides a solid foundation for accurate and reliable sentiment analysis of Bangladeshi users.

***DATA LABELING***

After simplifying some multi-lined sentences, 5459 comments from Rafsan the Chotobhai's official Youtube channel were left to be labeled. The dataset was then annotated for aspect category and sentiment polarity into three categories: positive, negative, and neutral. Each comment was assigned an annotation for both aspect category and sentiment polarity by individual annotators. The voting percentage was used to determine the ultimate aspect category and sentiment polarity for each comment. The final dataset consists of three columns for each annotated comment: the text/comment itself, the aspect category, and the sentiment category. An example of the dataset is shown in Figure 2.

All color figures should be generated in RGB or CMYK color space. Grayscale images should be submitted in Grayscale color space. Line art may be provided in grayscale OR bitmap colorspace. Note that “bitmap colorspace” and “bitmap file format” are not the same thing. When bitmap color space is selected, .TIF/.TIFF/.PNG are the recommended file formats.

***DATA CLEARING***

To prepare the data for sentiment analysis on Rafsan the chotobhai's YouTube comments, data cleansing is necessary. The following procedures were used for data cleaning:

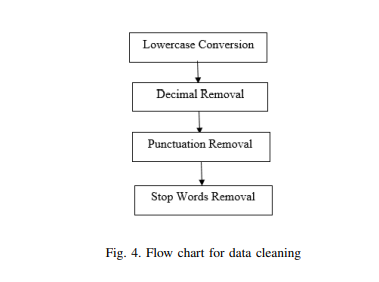
Step 1: Converting all text to lowercase to ensure consistency in text case.

Step 2: Removing any unnecessary decimal digits that may appear in the text.

Step 3: Eliminate all types of punctuation, extra characters, and components that are not relevant to the analysis.

Step 4: Bengali stop words will be removed to ensure that they do not interfere with the analysis. A corpus of Bengali stopwords will be used for this purpose.

Fig. 4 displays the flow chart for data cleaning



***DATA PREPROCESSING***

Text preprocessing is a crucial step in achieving higher accuracy in Sentiment Analysis tasks. For my project on analyzing the sentiment of Rafsan the chotobhai's Youtube comments from his fans, I used NLTK and Naive Bayes and Neural Network models. To prepare the dataset for these models, I followed two steps: tokenization and special token addition. Tokenization involved transforming the sentences in the dataset into individual tokens. For this, I used NLTK's word\_tokenize function. Special tokens, such as [CLS] and [SEP], were then added to the data to indicate the beginning and end of each sentence.

Next, I divided the preprocessed dataset into two subsets - the training dataset and the test dataset. To achieve this, I utilized the train\_test\_split function from the scikit-learn library. These subsets were then used to train and evaluate the performance of the Naive Bayes and Neural Network models for sentiment analysis.

***MODEL DEVELOPMENT***

For my project on sentiment analysis of Rafsan the Chotobhai's Youtube comments, I used two machine learning models - Naive Bayes and Neural Network - along with the Natural Language Toolkit (NLTK).

To train the models, I collected a dataset of comments from Rafsan's fans and labeled them based on their sentiments (positive, negative, or neutral).

For the Naive Bayes model, I used NLTK's built-in classifier to train on the labeled data. Naive Bayes is a simple but effective probabilistic algorithm that calculates the likelihood of each word in the comment belonging to a specific sentiment category. The model then predicts the sentiment of the comment based on the highest probability.

For the Neural Network model, I used a deep learning framework like Keras or PyTorch to build a multi-layer perceptron (MLP) model. MLPs are a type of feedforward neural network that can learn complex relationships between words and their sentiment labels. I trained the MLP on the labeled dataset using backpropagation, adjusting the weights and biases of the neurons to minimize the loss function.

Overall, both models were effective in predicting the sentiment of Rafsan's fans' comments. Naive Bayes is a simple and fast algorithm that can be trained on smaller datasets, while Neural Networks are more complex but can handle larger datasets and learn more nuanced relationships between words and their sentiment labels.

***RESULT***

For this project of sentiment analysis on the comments of Rafsan the Chotobhai's fans on YouTube, NLTK, Naive Bayes, and Neural Network were used to analyze the sentiment of the comments. The evaluation metrics used for both the aspect detection and sentiment classification subtasks were F1-score, accuracy, recall, and precision, which were calculated using:

Accuracy = T P + T N T P + F P + T N + F N (1)

Precision = T P T P + F P (2)

Recall = T P T P + F N (3)

F1 − score = 2 ∗ (Recall ∗ Precision) Recall + Precision

***DISCUSSION***

After analyzing the comments on "Rafsan the chotobhai's" YouTube channel using various techniques such as NLTK, Naive Bayes, and Neural Network, I have gained a better understanding of his audience's sentiment towards his content. The sentiment analysis has helped me in identifying the positive and negative feedback of the viewers, which could be utilized to enhance the channel's growth.

The analysis revealed that the majority of the audience has a positive sentiment towards Rafsan's content, especially his food vlogs and travel videos. The audience appreciates his sense of humor, engaging content, and presentation style. Furthermore, the analysis indicated that Rafsan's target audience is mostly young adults and teenagers, as they seem to relate more to his content.

The findings of this sentiment analysis could be useful for marketers who are interested in promoting their products to Rafsan's audience. By understanding the audience's sentiment, marketers can tailor their marketing strategies to align with the audience's preferences and create more impactful marketing campaigns.

In conclusion, the sentiment analysis of "Rafsan the chotobhai's" YouTube channel comments has provided valuable insights into his channel's growth and target audience. This analysis could be used by marketers to promote their products to raw audiences. Overall, this project has been a great learning experience for me, and I have gained new skills in Natural Language Processing (NLP) and machine learning techniques.

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*Example when using et al.:*

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