



Youtube Video Analyzer Using Llm

Automated Summarization and Sentiment Analysis of Streaming Content

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Abstract: The YouTube Video Analyzer addresses the growing need for efficient analysis of streaming content. This tool utilizes natural language processing (NLP) and machine learning to automatically extract and summarize information from YouTube videos and viewer comments. It integrates sentiment analysis, Google's GenerativeAI Gemini Pro for summarization, and leverages YouTube's official APIs for comprehensive content analysis. This allows users to quickly grasp video content and viewer sentiment, empowering researchers, creators, and enthusiasts to navigate the vast world of streaming content with greater ease. The YouTube Video Analyzer represents a significant step forward for automated content analysis in the online streaming landscape.

Keywords – YouTube Video Analyzer, Content Summarization, Natural Language Processing (NLP), TextBlob, Streamlit, Google GenerativeAI, Sentiment Analysis, Viewer Comments, Machine Learning, Digital Content Analysis, Public Opinion.

I. INTRODUCTION

The rapid growth of multimedia content on platforms like YouTube makes manual analysis difficult. This "YouTube Video Analyzer," tool uses machine learning, natural language processing (NLP), and Google's GenerativeAI to analyze and summarize YouTube videos and user comments.

Central to this tool is Google Generative AI's Gemini Pro model, known for its superior summarization capabilities. It condenses video transcripts and viewer comments into key insights, making it easier to understand the core content of YouTube videos. TextBlob, an NLP tool, analyzes the sentiment of comments, providing a snapshot of public perception and emotional response to the video.

The YouTube Video Analyzer streamlines its process using the YouTube Transcript API to extract video transcripts and the YouTube Data API to gather comments. TextBlob performs sentiment analysis, and Gemini Pro generates concise summaries that capture the essence of both the video and audience feedback.

This paper delves into the design, functionality, and evaluation of the YouTube Video Analyzer, showcasing its effectiveness with case studies. This tool is invaluable for researchers, content creators, and enthusiasts seeking to navigate and understand the vast amount of content on YouTube, representing a significant advancement in automated content analysis.

II. LITERATURE SURVEY

Kannan and Hasan (2016) introduced a graph-based approach for the extractive summarization of YouTube transcripts. By constructing a graph representing the phrases within a transcript, they applied a PageRank-like algorithm to identify significant sentences to include in the summary. This method underscores the utility of graph-based algorithms in extracting essential information from video content on platforms like YouTube.

Ahmad, Ahmed, and Khan (2019) developed a deep learning technique for abstractive summarization of YouTube videos. Using a sequence-to-sequence model with attention mechanisms, their method generates concise summaries that encapsulate the main ideas of the video content. This study demonstrates the effectiveness of deep learning in producing accurate and coherent summaries of video transcripts, emphasizing the potential of neural networks in handling complex summarization tasks.

Inamdar, Kalaskar, and Zade (2023) surveyed various methods for summarizing YouTube transcripts, discussing the challenges in watching lengthy videos and searching for relevant content within them. They stressed the importance of using NLP and machine learning for text summarization, referencing tools such as SpaCy, gensim, PyTube, and Hugging Face. Their work highlights how summarization technology can enhance the user experience by providing quick and easy access to essential information.

Chaflekar et al. (2022) presented a YouTube Transcript Summarizer that combines extractive and abstractive summarization techniques. This tool, integrated into a Chrome extension, aims to increase the efficiency of critical information extraction from YouTube videos. By leveraging both NLP and machine learning, this project offers customizable summaries that help users save time and effort in processing lengthy video content.

Alhujaili and Yafooz (2021) focused on the sentiment analysis of YouTube comments, categorizing them as neutral, negative, or positive using machine learning techniques. This research underscores the importance of sentiment analysis in gauging user attitudes and preferences, providing valuable insights for content creators and platform developers regarding common sentiment patterns in user comments.

Varagantham et al. (2022) reviewed ongoing research on automated text summarization, highlighting the combination of single and multi-document summarization techniques. They explored various strategies, including extractive summarization, which involves identifying and extracting key content, and abstractive summarization, which entails generating summaries in new formats. Their work shows that coherent summaries integrating crucial details from original sources can be achieved using diverse tools and methodologies.

III. METHODOLOGY

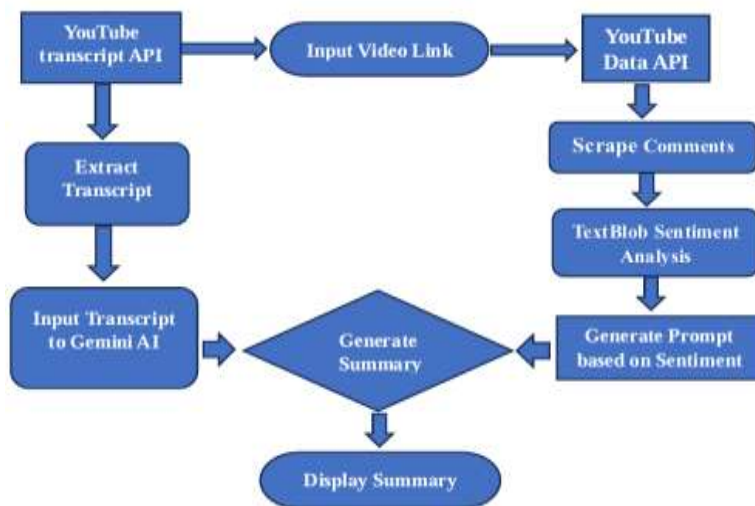


Fig 1 Proposed technique

The methodology involves retrieving the transcript of a YouTube video through the YouTube Transcript API, which is then utilized to generate a prompt for the Gemini Pro model, facilitating the creation of a summary of the video content. Following this, the system employs the YouTube Data API to extract comments from the video, subsequently categorizing them as positive, negative, or neutral using TextBlob. Based on this sentiment analysis, another prompt is formulated for the Gemini Pro model to summarize the comments and capture the overall audience sentiment.

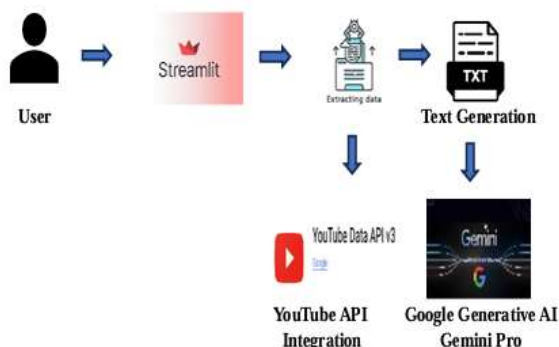


Fig 2 Architectural workflow

A . Input Gathering

The YouTube Video Analyzer software streamlines the process of obtaining user feedback, thereby facilitating user involvement. Users enter the URL of the YouTube video they are looking for to examine using a text input area in the Streamlit interface.

B. Transcript Extraction

The YouTube TranscriptApi library is used by the application to retrieve the transcript from the given YouTube video URL. The first step in this procedure is to parse the video ID from the video's URL, which is necessary to get the transcript for the video. After extracting the video ID, the program uses the YouTube TranscriptApi libraries to obtain the transcript related to that specific video. This library makes it simple and efficient to obtain YouTube video transcripts, which expedites a method of extracting text from videos.

C. Text Preprocessing

After the transcript text is extracted, text preparation is an important step in the YouTube Video Analyzer program. During this procedure, extraneous letters, punctuation, and unique symbols are eliminated from the retrieved text. The program makes sure the text is clear and free of any unnecessary parts that might affect the accuracy of later processing stages by preparing it in this way.

D. Sentiment Analysis with TextBlob

Sentiment analysis is a key component of the YouTube Video Analyzer tool, which makes it possible to gauge how the public feels about a particular YouTube video. The TextBlob library is used in this study to determine the sentiment polarity of each individual remark. Sentiment polarity, which has a value ranging from -1 (negative) to 1 (positive), represents the emotional tone of a statement. To calculate an average sentiment score, the program adds together all of the comments' sentiment polarity ratings. A summary of the general feelings that viewers had about the video is given by this score. A good response is indicated by a positive average sentiment score, whereas a negative score denotes a less favourable reception. A score that is near 0 also shows a neutral opinion.

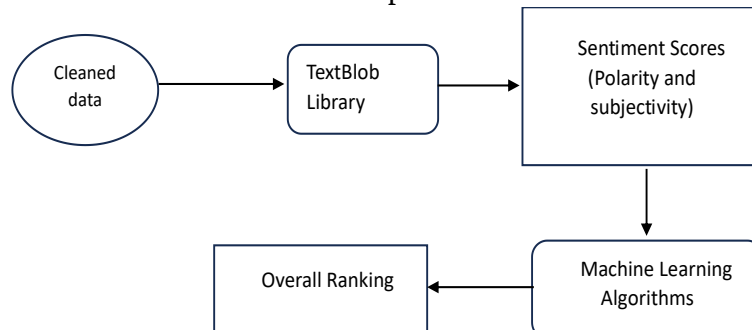


Fig 3 Textblob Sentiment Analysis Workflow

E. Prompt Generation

The YouTube Video Analyzer software creates a prompt that is unique to the Gemini Pro model after analysing the sentiment of user comments. With appropriate titles based User Text Generation YouTube API Google Generative AI Integration Gemini Pro on the most common attitude (positive, negative, or neutral) indicated in the comments, the model is instructed to describe the general public's opinion on the YouTube video. The program makes sure that the produced summary appropriately captures the audience's general sentiment towards the film by coordinating the question provided with the sentiment analysis results. By using a focused approach, the summary becomes more relevant and successful while giving consumers a clear and insightful picture of how the audience feels about the video.

F. Summary Generation

The Gemini Pro variant of Google's GenerativeAI is utilized by the YouTube Video Analyzer tool to produce a synopsis of the YouTube video transcript. Starting with the extracted transcript text and sentiment analysis results, a prompt is generated. The challenge directs the model to condense the video transcript's main ideas into a brief synopsis, enumerating crucial details and points within a predetermined word count.

G. Display output

The streamlit interface presents the automatically created synopsis of the video transcript as well as any further information gleaned from the sentiment analysis. The transcript summary is shown in a prominent manner, making it easy for consumers to rapidly understand the main ideas and information that the video conveys. In order to provide consumers with a clear picture of the emotional tone and reaction of the video material, the interface may also show the audience's general feeling regarding the film.

IV. RESULT

A synopsis of the video transcript and a summary of the comments are the two primary outputs that users of the YouTube Video Analyzer application can access. The YouTube TranscriptApi library is used by the program to extract the video transcript after a user enters the URL of a YouTube video and clicks the "Generate Summary" button. Next, using the transcript that was retrieved, it creates a prompt for the Gemini Pro model, which is then used to create a synopsis of the video content. The user sees this summary in the Streamlit interface.

In a similar vein, selecting the "Analyse Comments" button causes the YouTube Data API to begin extracting comments from the designated video. Next, using the TextBlob library, the application analyses the

comments to determine if they are generally positive, negative, or neutral. This study is used to provide a prompt that asks the Gemini Pro model to summarize the comments and highlight the general sentiment of the audience. The user is also presented with the summaries of the comments created using the Streamlit interface.

Demo Example:

Upon entering the YouTube video URL (<https://www.youtube.com/watch?v=EzTxYQmU8OE>) into the YouTube Video Analyzer application and clicking the "Analyse Comments" button, the following results were obtained:

Positive Opinions - The majority of comments expressed positive opinions towards the video's content.

- Viewers appreciated the concise overview of the 2024 Development Pipeline and found the video helpful and informative.

Negative Opinions - Some viewers questioned the accuracy of certain aspects of the roadmap, particularly the earning potential mentioned in the video.

- Concerns were raised about the rapid pace of technological changes and the need for continuous learning.

Summary of Transcript:

The transcript of the video highlighted key trends in modern web development, including advancements in front end and back-end technologies, the rise of full-stack development, and the adoption of tools like React, Next.js,.

The video also emphasized opportunities for developers, such as earning potentials and becoming proficient in full-stack development. This integrated analysis demonstrates the functionality and effectiveness of the YouTube Video Analyzer application in extracting insights from both video content and audience feedback.

V.CONCLUSION

The YouTube Video Analyzer application shows how to extract, analyse, and summarize textual content from YouTube videos using a combination of libraries and APIs. Via the integration of TextBlob library, YouTube Data API, YouTube TranscriptApi, and Google GenerativeAI, this application offers users insightful data on the tone and substance of YouTube videos and user comments.

The program demonstrates how machine learning and natural language processing methods may be used to analyse and summarize internet video footage. It emphasizes how crucial it is to extract and analyse data efficiently in order to give users clear and insightful analyses of video content and user response.