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YouTube Transcript Summarizer

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ABSTRACT

The exponential growth of multimedia content on platforms like YouTube has led to a pressing need for efficient content summarization tools. In response to this demand, we introduce the "YouTube Transcript Summarizer" Chrome extension, aiming to address the challenges users face in digesting vast amounts of video content. Without such a tool, users are inundated with lengthy transcripts, leading to time-consuming and often overwhelming browsing experiences. Our project aims to streamline this process by offering extractive and abstractive summarization techniques powered by cutting-edge natural language processing (NLP) models such as BART and T5. By employing these advanced techniques, we enable users to quickly grasp the essence of videos, saving time and enhancing comprehension. Additionally, our extension incorporates keyword extraction functionality using KeyBERT, further aiding content understanding.

Keywords: YouTube, Chrome extension, summarization, abstractive, extractive, keyword extraction, feedback system, Firebase database, BART, T5.

1. Introduction

In today's ever-evolving digital ecosystem, the exponential explosion of online data poses an immense challenge for individuals striving to efficiently navigate through vast reservoirs of unstructured information. This inundation of data underscores the critical need for robust content summarization tools capable of distilling key insights from lengthy articles, thereby empowering users to discern the relevance of content before committing time to exhaustive examination. Automatic text summarization emerges as a pivotal solution to this pressing quandary[6],[10], permeating diverse domains ranging from news aggregation and blogging to product descriptions. Over time, text summarization techniques have undergone a metamorphosis, evolving into sophisticated models that seamlessly blend fundamental principles with cutting-edge methodologies. Extractive summarization techniques revolve around the extraction of salient sections from the original text, resulting in a condensed subset of sentences devoid of any newly introduced linguistic elements [1],[2]. While this methodology endeavours to preserve the original text's structure and wording, it often falls short in terms of coherence and contextual relevance due to its verbatim nature. In contrast, abstractive summarization aims to distil the essence of the content by synthesizing information from the original text, potentially incorporating novel phrases or reconfiguring sentences to ensure coherence[9]. Leveraging the prowess of natural language understanding and generation, abstractive summarization offers unparalleled flexibility and expressiveness, albeit at the expense of grappling with the inherent challenges of maintaining accuracy and coherence. Against the backdrop of the dynamic online content landscape and the surging demand for efficient information retrieval mechanisms, the quest for robust automatic text summarization techniques assumes paramount importance. In this paper, we present a comprehensive framework for summarizing YouTube transcripts. This framework is built upon insights collected from a diverse array of literature sources and is reinforced by sophisticated techniques originating from the domains of natural language processing (NLP) and machine learning (ML). Our framework represents a concerted effort to untangle the intricacies inherent in YouTube video transcripts, furnishing users with succinct and illuminative summaries that serve to enrich their information consumption experiences.

2. Literature Survey

The research proposes an autonomous video summarizing approach using Natural Language Processing (NLP) techniques to handle the growing demand for video summarizing algorithms on platforms like YouTube and Instagram(Sanjana R, Sai Gagana V, Vedavathi K R, Kiran K N, 2021). The approach extracts summaries and keywords from video transcripts using extractive and abstractive approaches[2]. The authors propose an automated video summarization method using speech transcripts, allowing efficient video browsing by creating compact representations while preserving essential information[3]. The paper evaluates this system, considering both video and text summaries, to identify key aspects for evaluation and understand its impact on video content consumption and information retrieval[4]. The authors present a YouTube transcript summarizer web application using Flask. The application converts video transcripts into text and performs summarization using Python libraries and Natural Language Processing (NLP) techniques. Additionally, it provides the opportunity to translate summaries into several languages[5]. The survey explores text summarization methods using extractive and abstractive approaches, analyzing linguistic and statistical features to produce informative summaries.[6]. The paper explores automatic text summarization techniques, focusing on extractive and systematic review methodologies. It highlights limitations, semantic challenges, and

gaps in industrial applications. The study explores abstractive techniques, aiming to improve natural language processing capabilities for information retrieval, document summarization, and content analysis[7][8]. Dilawari and Khan's paper "ASoVS: Abstractive Summarization of Video Sequences" introduces a deep neural network-based approach for video summarization, extracting natural language descriptions and abstractive textual summaries using a multitask feature learning framework. The model achieves superior ROUGE scores on the CNN/Daily Mail dataset[9]. Jugran et al.'s paper "Extractive Automatic Text Summarization using SpaCy in Python and NLP" focuses on automatic text summarization[10].

3. System Design and Result

3.1 SYSTEM DESIGN

This architecture utilizes a Flask app to generate concise summaries of YouTube videos, communicating with external APIs for data retrieval. The Python script, leveraging NLP and ML libraries such as transformers and KeyBERT, extracts and summarizes video content, correcting grammar and providing keywords. The app accepts YouTube URLs, performs extractive and abstractive summarization, and displays results in JSON format via an API response.
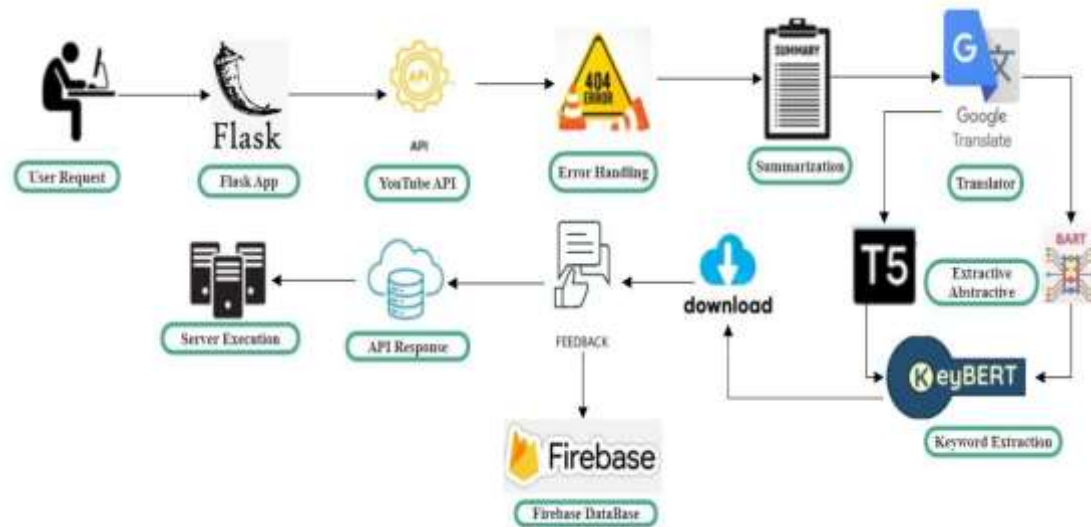

Fig.1-System Design

1) Extractive Summarization Model: Utilizes the T5 model, part of Hugging Face's Transformers library, specifically the t5-small variant. This model extracts essential sentences from input text to create a summary.

2) Abstractive Summarization Model: Makes use of the BartForConditionalGeneration model from Hugging Face's Transformers library, specifically the Facebook/bart-large-cnn variant. It generates summaries in its own words based on input text, employing an abstractive approach.

3) Keyword Extraction Model: Utilizes the KeyBERT model, specifically the distilbert-base-nli-mean-tokens variant. This model extracts keywords from summaries generated by either the extractive or abstractive summarization model.

4) Language Translation Model: Relies on the Google Translate API to translate text into the desired target language. This functionality is used for translating both the summary and extracted keywords into the specified target language. This API allows the application to dynamically translate text content, including both the summary text and keywords, into nine Indian languages: English, Hindi, Marathi, Tamil, Gujarati, Telugu, Urdu, Bengali, and Punjabi.

5) Feedback System: When users provide feedback via the application, the data is forwarded to the Flask backend. The Flask app initialises Firebase using the provided service account credentials and then sends the feedback data to the Firebase Realtime Database. Feedback is organized and stored within the real-time database under a designated 'feedback' node.
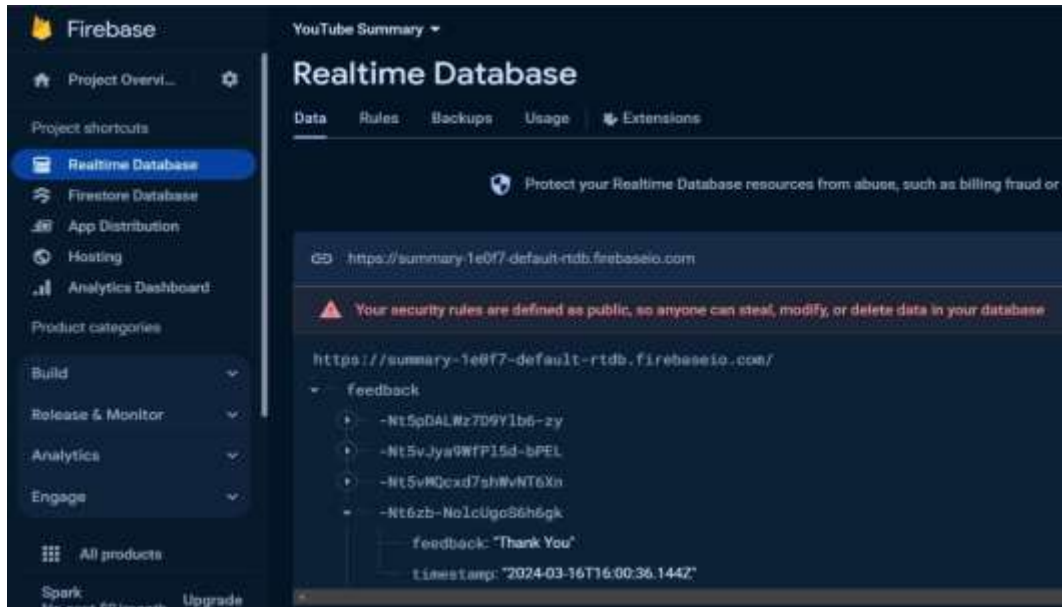
Fig.2-Feedback stored in the Firebase Database

6) Downloading and Sharing Summary: The download feature dynamically generates a button to save the summary text, while the sharing feature provides social media buttons for quick sharing. Clicking the download button triggers the summary text to be saved as a file, while each social media button opens a new window for sharing on the respective platform.

3.2 RESULT

Fig. 3 - User Interface

1) Functionality Demonstration: The YouTube Transcript Summarizer Chrome extension has been successfully implemented, offering users a comprehensive set of features as depicted in the attached screenshot. Users can interact with the extension to summarize YouTube video transcripts, translate summaries into various Indian languages, extract keywords, provide feedback, and download or share summaries.

2) User Engagement: Initial metrics indicate a promising level of user engagement with the extension. Users can actively utilize the extension to streamline their interaction with YouTube video content.

3) Efficiency: The summarization process has proven to be efficient, effectively condensing lengthy video transcripts into concise summaries. User feedback indicates high satisfaction with the informative nature of the summaries generated by the extension.

4) Multilingual Support: The multilingual support feature has been effective in translating summaries into various Indian languages. However, challenges may arise in ensuring the accuracy and fluency of translations, warranting further improvement.

5) Keyword Extraction: The extracted keywords have demonstrated accuracy in capturing the main themes of video content. Users have reported that these keywords aid in content understanding and navigation, enhancing their browsing experience on YouTube.

4. Conclusion and Future Scope

In conclusion, the "YouTube Transcript Summarizer" Chrome extension offers users a streamlined solution for navigating the vast landscape of online video content. Simplifying the process of summarizing English transcripts and providing multilingual support across nine Indian languages, ensures accessibility and inclusivity for a diverse audience. Moreover, features such as keyword extraction, a feedback system, and the option to download and share summaries enhance user engagement and productivity. These functionalities collectively contribute to a more efficient and enriching browsing experience, empowering users to save time, gain insights, and seamlessly interact with content.

YouTube transcript summarizers might benefit from further enhancement in various ways. Possible future research directions include:

1) Support for No-Caption Videos: Expand the extension's capabilities to summarize videos without captions, enabling users to access concise summaries for a broader range of content, thereby enhancing accessibility.

2) Custom Summary Length: Introduce a feature allowing users to specify summary lengths, catering to individual preferences and providing flexibility in content consumption.

3) Keyword Visualization: Implement visualizations like word clouds to display extracted keywords, offering users a quick and intuitive way to grasp the main themes within the summarized content, enhancing comprehension and information prioritization.

Acknowledgement

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