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Text Summarization Using Natural Language Processing

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Abstract: In this digital era, a vast amount of digital data can be found on the internet for various purposes. However, manually summarizing this data is a challenging task. The internet is filled with chunks of information, making it crucial to find an efficient and accurate solution for extracting the necessary information. Text summarization has become a popular problem to tackle in this modern age. The primary objective of text summarization is to extract concise summaries from large volumes of text in an efficient and accurate manner. Summarizing video information using natural language processing (NLP) involves extracting the key points from the spoken or written content in a video. This process typically includes several steps, such as transcription, text processing, and summarization. By utilizing text summarization, reading time can be significantly reduced. This paper focuses on the implementation of text summarization for image, PDF, video using the Text Rank Algorithm, NLP, OCR, Open AI Key, NLTK. We can generate accurate and contextually meaningful summary.

Keywords - NLP, Text Summarization, Text Rank, OCR, Open AI.

I. Introduction

With the rapid growth of the Internet, accessing vast amounts of information has become increasingly difficult. Reading all the text available nowadays can be quite challenging. Over the past 50 years, a method has been developed to provide quick and accurate summaries as the use of the Internet and digital files has risen. Automatic text summarization condenses lengthy texts into shorter versions that retain the main ideas, themes, and other essential elements. This process involves sending a text to a computer, which then generates a summary. Text summarization is a valuable tool in daily life, simplifying long documents into more digestible and informative formats while preserving the key information. Our project focuses on utilizing machine learning to automatically create abstractive or extractive summaries from given texts.[1]

Our project is focused on creating a unified text summarization system utilizing Natural Language Processing (NLP) techniques to condense valuable information from videos, PDF documents, and images. The goal is to address the issue of information overload and time constraints that users often face when dealing with large amounts of multimedia content. The rise of digital media has led to the widespread use of videos as a means of sharing information, entertainment, and educational content. However, the extensive duration and intricate nature of videos make it hard for users to swiftly extract suitable information. Likewise, PDF documents, video link, any type of text commonly utilized for reports, research papers, and articles, consist of lengthy text that necessitates correct analysis to extract crucial insights.

In today's fast-paced digital world, the volume of video content available online has grown exponentially. From educational tutorials and news broadcasts to entertainment and social media clips, videos are a dominant medium for communication and information sharing. However, sifting through hours of footage to find relevant information can be time-consuming and often impractical. we aim to create concise, informative summaries of

video content that capture the essence of the original material. Our approach focuses on extracting key information and generating natural language descriptions that are both accurate and coherent.

II. OBJECTIVE

- To maintains the original content's integrity and context.
- To Evaluate the quality and effectiveness of the summarization system using relevant metrics.
- To generate accurate and contextual meaningful summery.
- To make the summary easier to read and understand than the original text.
- To quickly understand content without reading or watching everything.
- To identify key information and main points.
- To save time and improve productivity.

III. SYSTEM ARCHITECTURE

Text summarization is a challenging process that entails condensing a text document into a more concise form while preserving its essential information and overall significance. ATS is a rapidly growing field, gaining significant interest. Future advancements aim to provide efficient techniques for summarizing large texts. The study offers a clear, updated overview of text summarization methods, highlighting their effectiveness in managing large datasets. Researchers consider various factors, including the number and size of input documents, for generating summaries.

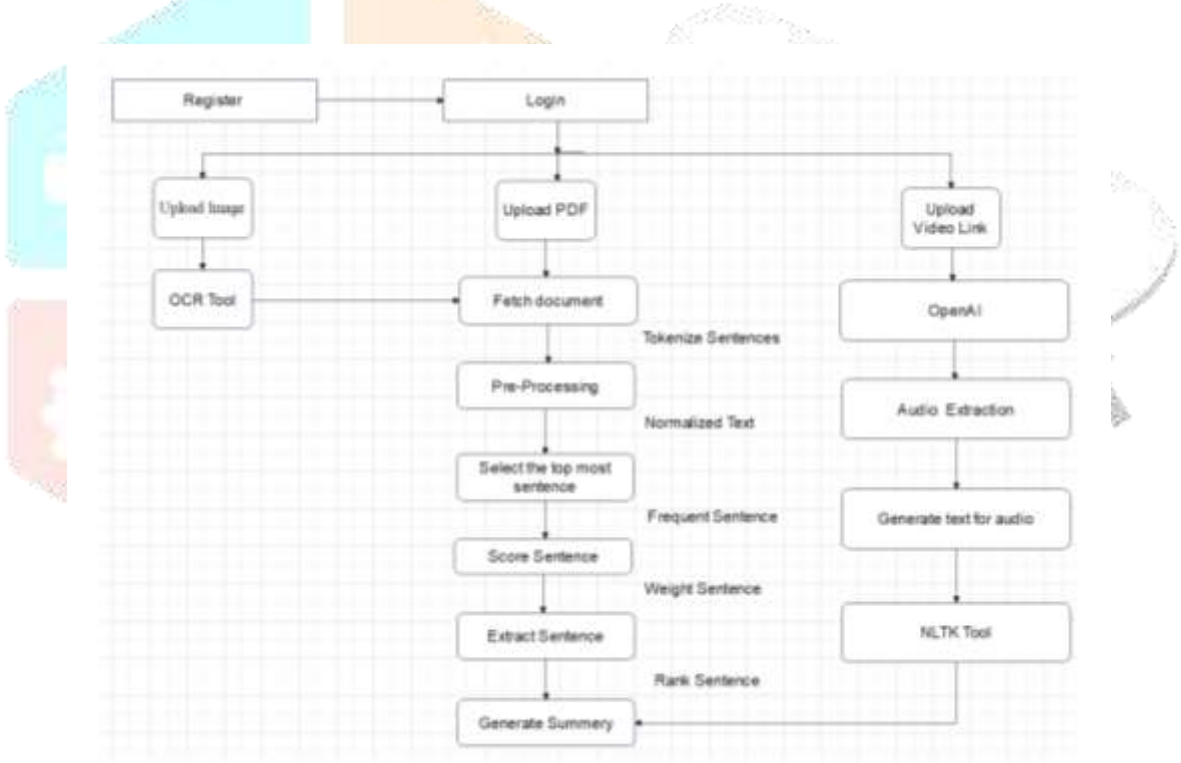


Fig 1 : System Architecture

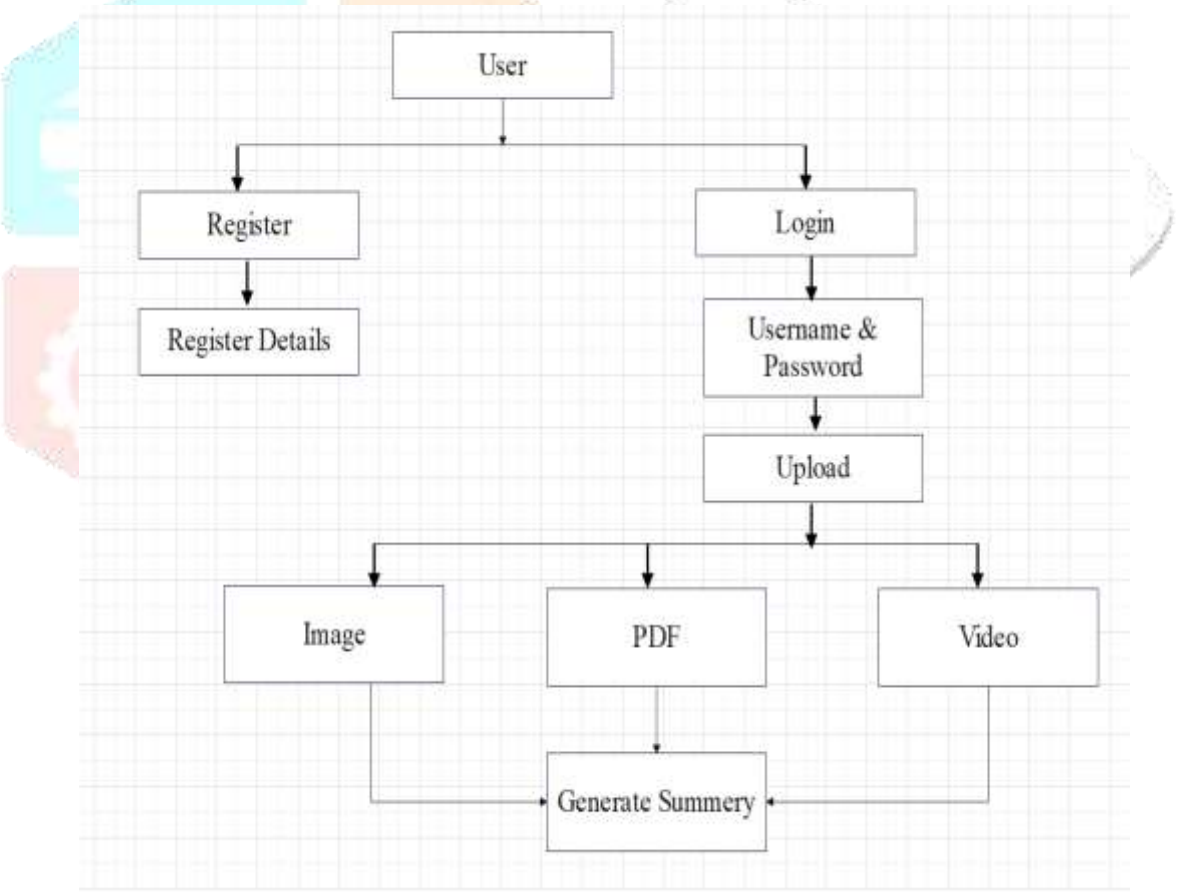
Text summarization of an image using NLP and Pytesseract involves a multi-step process where text is extracted from an image using OCR and then summarized using NLP techniques. Initially, image preprocessing is performed to enhance text quality for better OCR results, which may involve resizing, noise reduction, and contrast adjustment. Pytesseract, a Python library interfacing with Google's Tesseract-OCR Engine, is then utilized for extracting text from the image. The extracted text is further prepared for summarization through preprocessing steps such as tokenization, stop word removal, and normalization. The preprocessed text is then fed into an NLP model for summarization, which can involve extractive techniques (highlighting key sentences) or abstractive techniques (generating a summary in natural language). The NLP model produces a brief and logical summary that captures the essential information. The summarized text can be applied in various ways, such as generating image descriptions, extracting data from scanned documents, or assisting visually impaired individuals in accessing written content. Text summarization through the use of NLP and Slate3k entails the compression of extensive text into concise and logical summaries. Slate3k, a

Python library, interacts with OpenAI's GPT models like Slate, specifically designed for summarization purposes. The initial step involves inputting the text to be summarized, which may consist of articles, documents, or any other textual material. Prior to inputting the text into the summarization model, preprocessing procedures are implemented, such as tokenization, elimination of stop words, and various text normalization techniques. Subsequently, the prepared text is fed into the Slate3k library, which employs the GPT models to produce a summary. Video processing includes the extraction of audio from the video and its conversion into text through speech recognition technologies such as the YouTube Transcript API. The text is then subjected to tokenization and various preprocessing procedures, including the elimination of stop words and punctuation. NLP methods, utilizing models like OpenAI's GPT-3.5, are employed to produce a succinct and logical summary of the text, with the length of the summary tailored to specific requirements. Subsequently, the condensed text is displayed alongside the video or incorporated into the video platform to provide a rapid overview of the content.

I. RESEARCH METHODOLOGY

3.1Data Flow Diagram

DFDs are applicable to various types of systems, including information systems, business processes, and software systems. They aid in visualizing and analyzing data flow, identifying areas of congestion and inefficiency, and effectively conveying system design to others. data flow diagram can be created using



different notations, such as the Gane-Sarson notation and the Yourdon-DeMarco notation, depending on the designer's preferences and conventions.

Fig 2 : Data Flow Diagram

Initially, users can register on the app by entering their full name, email, username, password, and confirming the password. Once registered, users can log in directly using their username and password. Upon logging in, the system presents options to upload an image, PDF, or video link. When the user uploads an image, the system generates a summary of the image. If the user uploads a PDF, the system generates a summary of the PDF. Similarly, when a user uploads a video link, the system generates a summary of the video.

3.2 Use Case Diagram

A use case diagram for a text summarization system using natural language processing illustrates the functional requirements and interactions between the user and the system. The primary actor is the user, who interacts with the system for summarizing images, PDFs, and videos. The user's interactions include uploading documents, selecting summary types, generating summaries, viewing summaries, and downloading summaries. The "Generate Summary" use case depends on the "Upload Document" (image, PDF, or video link) and "Select Summary Type" use cases.

In the proposed system, the user can upload a text document, either an image or a PDF, for summarization. After uploading, the user selects the desired type of summary. The system then generates the summary of the uploaded document. The user can view and download the generated text summary. Similarly, the user can upload a video to the system, which generates a summary of the video. The user can then view and download the video summary. This detailed use case diagram effectively outlines the various interactions and dependencies within the summarization system.

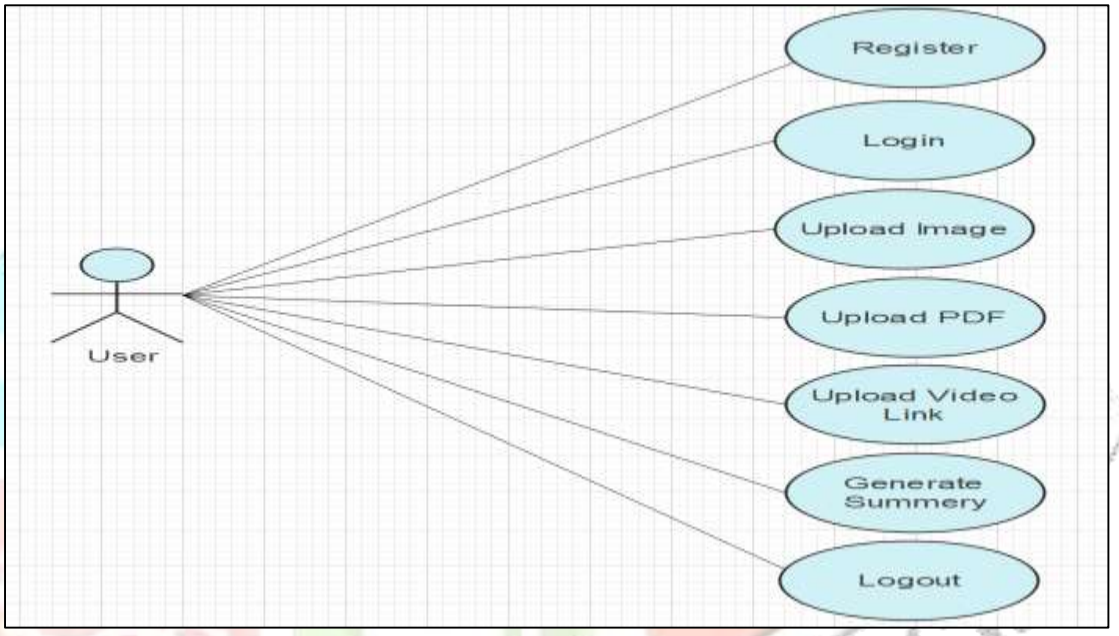


Fig 3: Use Case Diagram

IV. RESULTS AND DISCUSSION

4.1 Register Page

Fig 4: Register page

User will first go to register. In register user will have to enter Full Name, Email, Username, Password, Confirm Password. Click the green "Register" button to submit your information and complete the registration process. If you are already registered, you can click the "login" link at the bottom to go to the login page.

4.2 Login Page

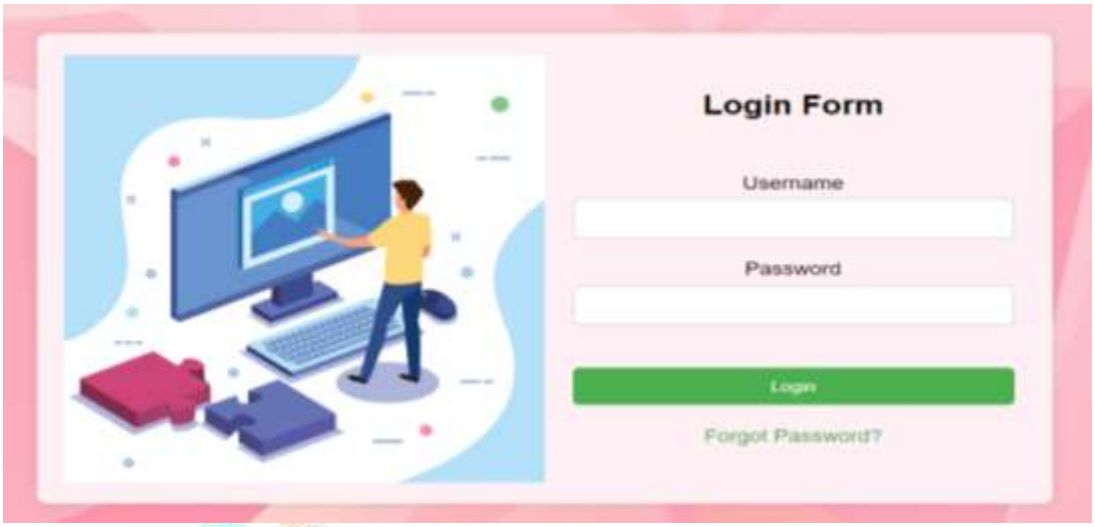


Fig 5: Login Page

After authentication user's profile will get created. Then user can be login this system with username an password. Click the green "Login" button to submit your credentials and access your account.

4.3 Upload Image, Pdf, & Video Link

As the user is logged in the system will show image, pdf, and video link upload option. In upload image option user can upload image. In upload pdf option user can upload pdf. In upload video option user can upload video link.

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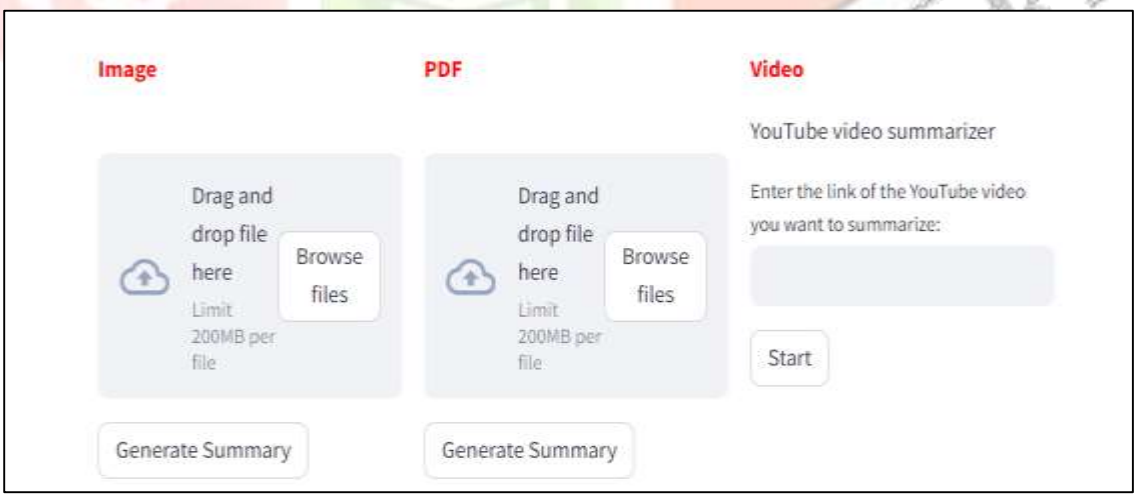

Fig 6 : Upload image, pdf, & video link page

4.4 Generate Summary Page

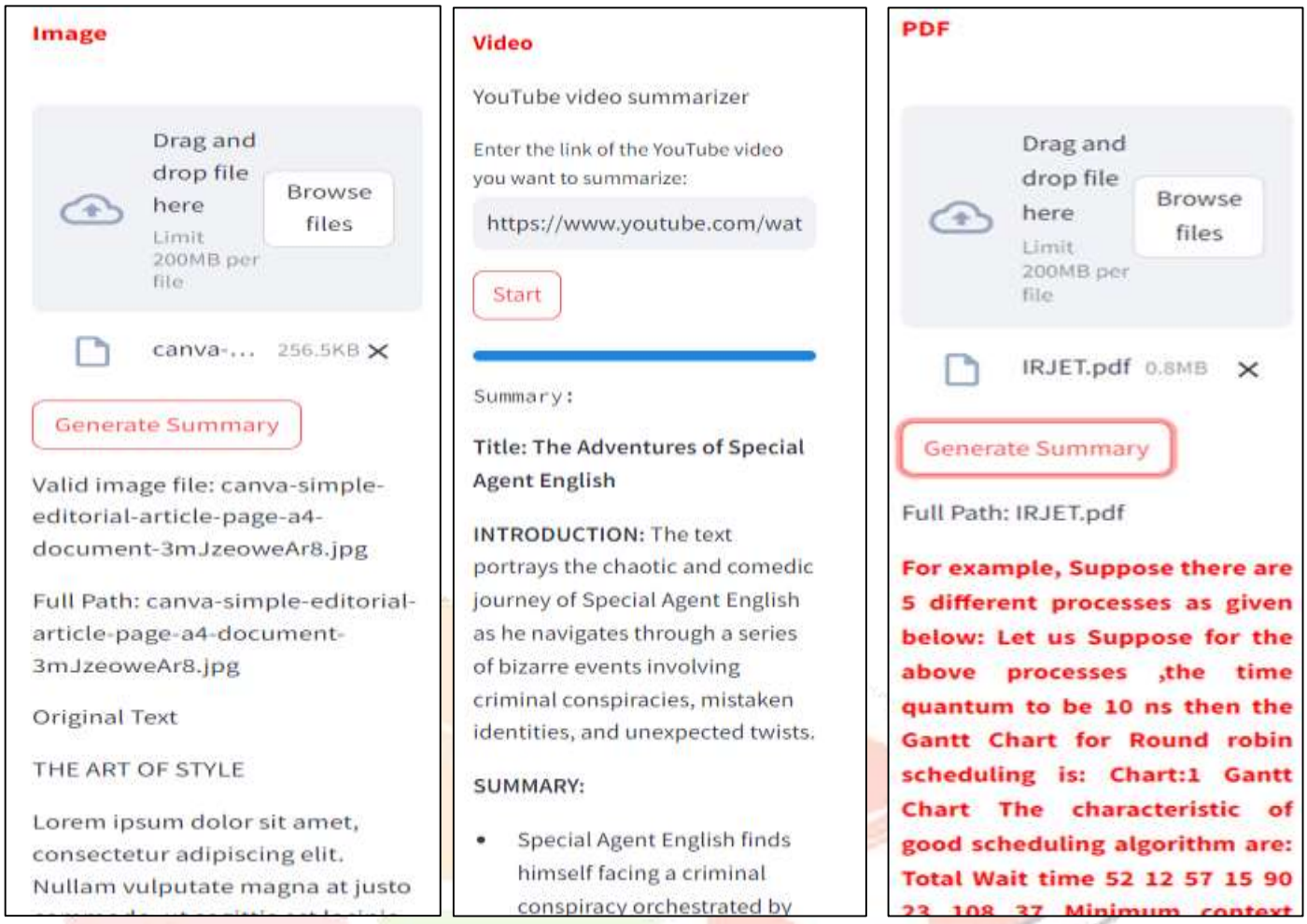

Fig 7 : Generate Summary Page

IV. CONCLUSION

The project of text summarization for video, PDF, and image using NLP offers a comprehensive solution for extracting key information and insights from diverse types of multimedia content. By integrating advanced NLP techniques with multimodal processing, the project aims to address the unique challenges posed by each data type and provide users with efficient, informative, and accessible summaries. Automatic text summarization is the mechanism that provides a summary reducing the size of the original document, but keeping important information in the original document. This system is based on Natural Processing Language algorithm.

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