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# VIRTUAL MEET SUMMARIZER

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*Abstract—* Effective communication within project teams is crucial for project success. Team meetings play a significant role in fostering collaboration and sharing information among team members. However, as projects grow in complexity and teams become increasingly diverse and distributed, the need for efficient meeting summarization becomes evident. This project aims to develop a comprehensive system for summarizing virtual meetings using natural language processing and machine learning techniques. Our project aims to extract concise summaries from lengthy online virtual meetings, while also providing a comprehensive display of each participant's spoken contributions during the session. By facilitating the review and reference of crucial information, this project seeks to enhance team productivity, decision-making, and knowledge retention, contributing to improved project outcomes. This abstract outlines the importance of the Project Virtual Meet Summarizer initiative and highlights its potential benefits in fostering effective collaboration and communication within project teams.

*IndexTerms -* **Natural language processing, Diarization, Audio Transcription.**

## I. INTRODUCTION

A meeting summary or recap is a document or a transcript that accounts for key talking points, decision, and action items that were discussed during the meeting. The goal of a meeting summary is to gather all pertinent information from the meeting and make it available after the meeting-to-meeting attendees as well as those who could not attend. Summarizing virtual meetings is a fundamental practice that enhances communication, accountability, and documentation within organizations. It addresses the challenges of information overload, ensures that crucial details are not lost, and supports decision-making and collaboration among team members and stakeholders.

We all have been part of those lengthy, information packed team meetings that leave us with pages of notes, action items and the feeling that we might have missed something crucial. Team meetings can be time-consuming, and employees often have packed schedules. Summarizing meetings can help save time by allowing team members to quickly grasp the key takeaways and action items without going through the entire meeting transcript or recording. Meeting summaries can enhance communication within the team by ensuring that everyone is on the same page. This is especially important when team members are distributed across distinct locations and time zones. The main motivation of the meeting summary is to gather all relevant and essential information from the meeting and make it available after the meeting-to-meeting attendees as well as who could not attend the meeting.

Team meetings often involve complex discussion, multiple speakers, and diverse topic summaries distil this information into clear and concise points, making it easier for participants to understand what was discussed. Meeting summaries documents action items, responsibilities, and deadlines. This helps team members and stakeholders stay accountable for their commitments and ensure that tasks are completed on time

## II. LITERATURE SURVEY

In this paper Vishnuprasad, Paul Martin, Salman Nazeer, Prof. Vydehi. K proposed an architecture for the Meeting Summarizer utilising NLP which involves taking a transcript document as input and conducting various operations to generate a summary document. Specifically designed for Microsoft Teams transcripts, the architecture begins by removing timestamps and associating each sentence with its corresponding speaker. The text is then split into individual sentences for further processing [1].

In this paper Jay Sharma, Harsh Hardel, Chirag Sahuji, and Rajesh Prasad proposed 'Automatic Text Summarization' where it will produce the summary of a document on its own. In this, a text is given to the computer and the computer using algorithms produces a summary of the text as output. In this paper, they have discussed their attempt to prepare an extraction- based automatic text summarizer

in which paragraphs of documents are split into sentences and then these sentences are ranked based on some features of summarization where higher rank sentences are found to be important which is used to generate the summary [2].

In this paper Anika Babu, Indhu P, Revathy Surendran, Dr Surekha Mariam Varghese uses techniques for transcription of conference includes speech to text conversion, text summarization for extracting relevant sentences, including wikilink for further references. Google Cloud speech-to-text enables developers to convert audio to text by applying powerful neural network models in an easy-to-use API. It can process real-time streaming audio using Google's machine learning technology. It can accurately transcribe proper nouns. Summarization results are presented by text. This paper presents an automatic text summarization where the most appropriate sentences, words or phrases are automatically extracted from text to produce a summary [3].

In this paper Shubham Jadhav, Ruturaj Mane, Rutuja Chaudhari, Vishal Chatre, Asmita Manna proposed a comprehensive survey on available approaches and methods of ATS is presented to help the researchers understand the drawbacks of the existing systems and find future research directions. The survey presents different aspects of ATS like approaches, methods, datasets, techniques, and evaluation criteria [4].

In this paper Sara Tarannum, Piyush Sonar, Aashi Agrawal, Krishnai Khairnar described a unique approach for extractive summarization with sentiment analysis for two-level text summarising from online news sources. Important sentences from various news stories pertaining to a topic are extracted first, and individual summaries are prepared. Sentiment analysis is used to go further into the individual summaries for each topic [5].

In this paper Tatsuro Oya, Yashar Mehdad, Giuseppe Carenini, Raymond Ng presented an automatic abstractive summarization system of meeting conversations. This system extends a novel multi-sentence fusion algorithm in order to generate abstract templates. It also leverages the relationship between summaries and their source meeting transcripts to select the best templates for generating abstractive summaries of meetings. Its manual and automatic evaluation results demonstrate the success of our system in achieving higher scores both in readability and informativeness [6].

In this paper N.Lalithamani, K.Alagammai, Kolluru Kamala Sowmya, L.Radhika, Raga Supriya DarisiS, Shanmuga Priya proposed a system which basically executes on the basis of concept called Clustering- Corpus based Semantic Similarity coupled with NTC approach, Ranking- Bi Type Graph model and Score calculation of every sentence. They retrieve the data from Yahoo, after retrieval formatting is required. From the formatted data they extract the important keyword and then clustering of sentences takes place, they Rank the sentences on the basis of their importance. After all these processes they select the sentences which are the most important sentences from that particular data. By this way they generate a summary of large data [7].

Table 1. Research Gap

| Work Cited | Research Paper name | Author name | Input type | Output type | Algorithm | Domain |
|---|---|---|---|---|---|---|
| [1] | "Meeting Summarizer Using Natural Language Processing." | Vishnu Prasad, Paul Martin, Salman Nazeer, and Prof. Vydehi. K. | Text document | A transcript and a summary | TF-IDF (Term Frequency-Inverse Document Frequency), Text Rank, GLOVE Embedding | NLP(Natural Language Processing) |
| [2] | "Automatic Text Summarization." | Sharma Jay, Harsh Hardel, Chirag Sahuji, and Rajesh Prasad. | Wikipedia, links, text box, upload document | Summarised text | Text Rank | NLP(Natural Language Processing) |
| [3] | "TRANSCRIPTION OF CONFERENCE." | Anika Babu, Indhu P, Surendran Revathy, and Dr Surekha M. Varghese. | Single or Multiple Text Document. | Summarised Text in either extractive or abstractive form. | Word frequency analysis, Cue phrases identification, Neural networks, ROUGE evaluation metrics. | NLP(Natural Language Processing), Document Processing. |
| [4] | "A Comparative Study of Automatic Text Summarization Methodologies." | Shubham Jadhav, Ruturaj Mane, Rutuja Chaudhari, Vishal Chatre, and Asmita Manna. | Audio recordings. | Summarised text document. | Google Cloud speech-to-text API, NLTK(Natural Language Toolkit), RAKE(Rapid Automatic Keyword Extraction). | NLP(Natural Language Processing), Speech recognition. |
| [5] | "NLP Based Text Summarization Technique for News Article: Approaches and Challenges." | Sara Tarannum, Piyush Sonar, Aashi Agarwal, and Krishnai Kharinar. | News articles | Summarised Text in either extractive or abstractive form. | Graph based algorithm | NLP(Natural Language Processing), Speech recognition. |

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|---|---|---|---|---|---|---|
| [6] | "A Template-based Abstractive Meeting Summarization: Leveraging Summary and Source Text Relationships." | Tatsuro Oya, Yashar Mehdad, Giuseppe Carenini, and Raymond Ng. | Meeting transcript | Grammatically correct and informative summaries of meetings. | Clustering , Hypernym Labelling, and word graph algorithm | NLP(Natural Language Processing), Speech recognition. |
| [7] | "Summarization using NTC approach based on keyword extraction for discussing forums." | N. Lalithamani, Alagammai K, Kolluru Kamala Sowmya, Radhika L, Raga Supriya Darisi, and Priya Shanmuga. | Data retrieved from Yahoo Answers or any other source. | Coherent summary of the discussion or comments retrieved from the input data. | Keyword Extraction, Clustering, Ranking, Sentence Reordering | NLP(Natural Language Processing), Speech recognition. |

## III.　PROPOSED SYSTEM

In today's era of remote work and virtual collaborations, effective communication in online meetings is paramount. However, the vast amount of information exchanged during these sessions can present challenges, particularly for participants unable to attend in real-time. To address this issue, our project introduces the Virtual Meet Summarizer, an innovative solution designed to streamline the post-meeting experience and enhance collaboration among team members.

The Virtual Meet Summarizer serves a dual purpose: firstly, it offers a comprehensive summary of online meetings, condensing lengthy discussions and key points into digestible insights. Leveraging advanced natural language processing capabilities provided by OpenAI models, our system meticulously analyses meeting transcripts to distil essential information. This feature ensures that even absentees can stay informed and engaged, empowering them to catch up on important discussions without the need to sift through hours of meeting recordings.

Furthermore, our project incorporates cutting-edge audio diarization technology facilitated by AssemblyAI to enhance the meeting summary experience. By accurately identifying and attributing spoken contributions to individual participants, the Virtual Meet Summarizer goes beyond conventional meeting summaries. Each person's remarks are meticulously catalogued and displayed alongside the summary on a dedicated webpage, offering a comprehensive overview of the meeting dynamics and contributions from all attendees. Through the seamless integration of OpenAI's language processing capabilities and AssemblyAI's audio diarization features, the Virtual Meet Summarizer sets a new standard for efficient collaboration in virtual environments. By providing concise summaries and detailed spoken contributions, our project aims to foster enhanced communication, knowledge sharing, and collaboration among team members, ultimately driving productivity and success in remote work settings.
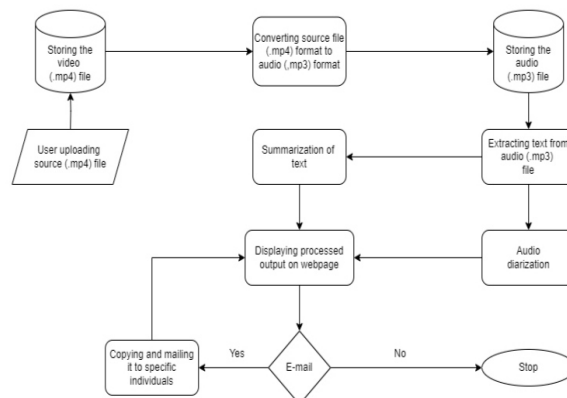
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**Architecture and Framework:**



Fig 1. Architecture of Virtual Meet Summarizer

## IV.   METHODOLOGY

The process unfolds systematically, starting with users uploading source files, typically in MP4 format, which are then stored in the local storage of the system. This initial step lays the foundation for further processing and analysis of the meeting content.

Following the file upload, the application initiates the conversion of the uploaded MP4 file into MP3 audio format. This conversion is facilitated by the Python MoviePy library, which ensures seamless and efficient transformation of the audio content. The transition to MP3 format is essential for optimizing the audio data for subsequent text extraction and analysis stages. Once the conversion is complete, the application extracts textual data from the audio files, effectively transcribing the spoken content into readable text format.

The extracted text data serves as the input for the summarization phase, where the OpenAI model comes into play. Leveraging advanced natural language processing capabilities, the OpenAI model analyses the textual content to generate concise summaries of the meeting proceedings. This summarization process is instrumental in distilling the key points and critical discussions from the voluminous meeting transcripts, enabling users to grasp the essence of the meeting efficiently.

Simultaneously, the application employs audio diarization techniques using the AssemblyAI platform to differentiate and attribute spoken contributions to individual speakers present in the meeting. This diarization process enhances the clarity and organization of the meeting transcript by associating each spoken segment with its respective speaker. By providing clear distinctions between speakers, the diarized audio contributions contribute to a more comprehensive understanding of the meeting dynamics.

Behind the scenes, the project relies on Python as the backend language, harnessing its versatility and efficiency to handle various tasks such as file management, audio processing, and interaction with AI models. On the frontend side, technologies such as React.js, React Fiber, and Three.js are utilized to craft an intuitive and user-friendly interface. These frontend technologies enable seamless user interaction, allowing users to upload files, view summaries, and access diarized audio contributions with ease.

 Following the summarization and diarization of the meeting content, the virtual meet summarizer application offers an additional feature to enhance communication and collaboration among participants. Once the summarized content and diarized audio contributions are displayed on the webpage, users have the option to send this information via email to specific individuals who were unable to attend the virtual meeting. This functionality is seamlessly integrated into the user interface, allowing users to select the recipients and customize the email message before sending. By incorporating this email functionality, the application promotes inclusivity and ensures that absentees are kept informed about the key discussions and outcomes of the meeting.

## V. CONCLUSION

 In conclusion, the development of the Virtual Meeting Summarizer represents a significant advancement in facilitating remote collaboration and communication. By harnessing cutting-edge technologies such as audio transcription and summarization models generated by different models, the project has successfully addressed the challenges associated with managing online virtual meetings. The system's ability to accurately transcribe and summaries meeting content not only saves time but also ensures that critical information is efficiently communicated to all stakeholders. Moreover, the inclusion of audio diarization capabilities enhances the system's utility by enabling users to identify individual speakers, thereby improving accountability and clarity during discussions.

## ACKNOWLEDGEMENT

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