Chapter 1: Introduction

The internet has become an indispensable resource for people around the world. It provides access to a vast amount of information, including news articles, blog posts, research papers, videos, and more. However, the exponential increase in web and video content has also posed a number of challenges for users. It is becoming increasingly difficult to find time to consume all of the content that is available, and it can be difficult to identify the most relevant and important content.

Automated web and video summarization tool can help to address these challenges by providing users with concise and informative summaries of web pages and videos. These tools use natural language processing (NLP) techniques to extract the most important information from web pages and videos and then generate a summary that is tailored to the user's needs. Automated web and video summarization tool can save users time in a number of ways. First, they eliminate the need for users to read or watch entire web pages or videos in order to get the information they need. Second, they help users to quickly identify the most important information from web pages and videos. This can be particularly helpful for students, researchers, and professionals who need to consume large amounts of information on a regular basis.

Automated web and video summarization tool can also help users to address the challenge of exponential increase in web and video content. By providing users with summaries of web pages and videos, these tools can help users to find the information they need quickly and efficiently. Additionally, automated web and video summarization tools can help users to stay informed about current events and trends by providing them with summaries of news articles and other timely content. Overall, automated web and video summarization tools are a valuable tool for users who need to consume large amounts of information quickly and efficiently. These tools are particularly useful in addressing the challenge of exponential increase in web and video content.

1.1 Motivation

The motivation for developing an automated web and video summarization tool is to address the challenge of exponential increase in web and video content on the internet. This vast amount of content can be overwhelming for users, and it can be difficult to find the time to consume all of the content that is available. Additionally, it can be difficult to identify the most relevant and important content from the vast amount of content that is available.

An automated web and video summarization tool can help to address these challenges by providing users with concise and informative summaries of web pages and videos. This can save users time and help them to quickly identify the most important information from the vast amount of content that is available.

1.2 Objectives

The objectives to develop the Automated Web & Video summarization tool are:

- To implement advanced Natural Language Processing (NLP) techniques to automatically generate concise summaries from web content & video transcripts.
- To designing an extension that allows easy and on-place input of web & videos and retrieval of summarized content.
- To incorporate automated translation capabilities to facilitate summarization of web content & video transcripts in different languages.
- To introduce a read aloud tool for users who prefer listening over reading.

Chapter 2: Literature Survey

Sr. No.	Title of paper	Author	Year of publication	Proposed work	Gap
1.	"YouTube Transcript Summarizer Using Flask and NLP." (JPSP)	P. Vijaya Kumari, M. Chenna Keshava, C. Narendra, P. Akanksha, K. Sravani.	April 2022	Author employed an interface with Flask-based backend server powers a YouTube transcript summarization system with user-friendly features like translation, speech synthesis, downloads, and email sharing.	This paper proposed a system in which user has to switch the tab and paste the YouTube video link on website. However, this extra work can be avoided by embedding this technology in browser-based extension.
2.	"Text Summarization using NLP", (IJTRET)	Chetana Varagantham, J. Srinija Reddy, Uday Yelleni, Madhumitha Kotha, P. Venkateswara Rao	August 2022	Author presents a framework for Extractive Text Summarization. The proposed framework depends on summarizing the text using K-means clustering algorithm where clusters based upon sentences score.	In this paper, author proposed system which creates extractive summarization by providing text location. But abstractive summarization provides more insights on information.
3.	"AI-based Video Summarization using FFmpeg and NLP." (IJISRT)	Hansaraj Wankhede, R Bharathi Kumar, Sushant Kawade, Ashish Ramtekkar, Rachana Chawke	April 2023	The author proposed an AI-based video summarization platform which creates the summaries of the provided videos by using FFmpeg and NLP techniques.	In this paper, author proposed a system which provide summary of video which is given as input. However, giving video as input requires more time and fast internet. This can be resolve by generating summary of online uploaded videos.

Sr. No.	Title of paper	Author	Year of publication	Proposed work	Gap
4.	"A Review on Text Summarization Techniques", (JSR)	Pradeepika Verma, Anshul Verma	July 2020	Author reviewed various text summarization techniques by discussing their benefits, limitations and challenges concluding that further research is required to develop more effective technique.	Author has discussed several text summarization techniques but with their benefits, these techniques also have some challenges. So, further research is required.
5.	"Video Summarization using NLP", (IRJET)	Sanjana R, Sai Gagana V, Vedhavathi K R, Kiran K N	August 2021	Author proposed a system that summarizes video and creates the new summary in video format by reducing it to users provided duration. To achieve this, author used Latent Semantic Analysis algorithm and various python libraries like moviePy.	Author proposed a system which downloads the YouTube video by providing its link and alters it to create summarized video. But this process requires lots of time and constant internet connection.
6.	"Survey on Abstractive Transcript Summarization of YouTube Videos", (IJARSCT)	S. Tharun, R. Kranthi Kumar, P. Sai Sravanth, G. Srujan Reddy, B. Akshay	April 2023	The author introduces extractive and abstractive methods for automatic text summarization. Also, various structure-based approaches for abstractive summarization and abstractive summarization models like Pegasus and Seq2seq.	Author has discussed about the abstractive summarization of YouTube videos using their transcripts. But some YouTube videos have their transcripts lock. So, they can't be summarized using this approach. Further research is required.

Sr. No.	Title of paper	Author	Year of publication	Proposed work	Gap
7.	**"**Review of Text Summarization Techniques of Documents", (IJCRT)	Shubham U. Pawar, Om S. Behare, Sumit D. Umap, Akshay K. Adhav, Bhushan B. Pawar, Ram S. Thakare, Prof. Harshada M. Raghuvanshi	March 2023	The author presents a system that creates extractive summary of the text using python NLTK library and pretrained deep learning AI model Bidirectional Encoder Representations from Transformers which was released by Google AI language researchers.	Author proposed system which creates extractive summarization of provided text document. But as previously discussed abstractive summarization is better approach.
8.	**"**An Analysis of Text Summarization Approaches using Natural Language Processing", (IJIRID)	Kavita Namdeo Jadhav	February 2023	The author has discussed the various text summarization approaches. He has given a quick overview of text pre-processing, used to clean data to do effective summarization. Then it summarizes the many types of text summarizing approaches, categorizing them according to input, output, content, and purpose.	Author has discussed about various approaches for text summarization using NLP. But further research is required to select the technique that best supports our needs and performs well.
9.	**"**Text Summarization using NLP**",** (JETIR)	Chetana Varagantham, J. Srinija Reddy, Uday Yelleni, Madhumitha Kotha, Dr P. Venkateswara Rao	May 2022	The author has proposed a framework to automate summarization of text documents. It uses extractive summarization approach using clustering method for summarization.	In this paper, author proposed system which creates extractive summarization by providing text location. But abstractive summarization provides more insights on information.

Sr. No.	Title of paper	Author	Year of publication	Proposed work	Gap
10.	"YouTube Transcript Summarizer", (IJCRT)	Gousiya Begum, N. Musrat Sultana, Dharma Ashritha	June 2022	The author focuses on building a chrome extension that is a small and easy to use tool for users who watch YouTube videos on browser. There's no need to change the tab because summary of transcript can be generated in place with popup window.	Author proposed an extension which summarizes the YouTube videos using their transcripts. But same problem arises here for locked transcripts. Further research is required to solve this issue.
11.	"YouTube Transcript Summarizer", (IJSR)	Sarthak Jain, Jahnavi Jain, Gurminder Kaur, Dr. Yatu Rani	February 2023	The author proposed a system that automatically generates a summary of the content in a YouTube video by analyzing their transcript. The proposed work on this project would involve creating a system that can accurately and efficiently extract the main points and key information from the transcript of a YouTube video.	Author proposed a system which creates summary of YouTube video by using its transcript. So, same problem arises here for locked transcripts. Further research is required to solve this issue.
12.	"YouTube Transcript Summarizer", (IJPREMS)	Tryphena Brighty, Pooja V, Jaya Varsini V, Vishnu Priya N	May 2023	The author presents a video transcript summarization tool impowered by Natural Language Processing techniques. Author has used the HuggingFace Library for the text summarization process that focuses on the Abstractive summarization model.	Author created a chrome extension for abstractive summarization of YouTube video using its transcript. But same problem arises here for locked transcripts. Further research is required to solve this issue.

Chapter 3: Problem Statement

In the modern digital era, the abundance of online web & video content has created a flood of information, making it difficult for users to efficiently extract insights from lengthy videos and web content. Manual extraction is time-consuming and ineffective, prompting a demand for automated solutions. By utilizing Natural Language Processing (NLP), automated web and video summarization tool offers a swift way for users to identify crucial information and patterns without watching the entire video.

Chapter 4: Software Requirement Specifications

4.1 Introduction

4.1.1 Scope of project

The Automated Web & Video Summarization Tool Using NLP is a comprehensive web-based application with the primary objective of simplifying the process of summarizing web content and video scripts. Leveraging a diverse set of Natural Language Processing (NLP) techniques, the tool employs tokenization, lemmatization, part-of-speech tagging, named entity recognition, semantic role labeling, and text summarization to automatically generate concise, easy-to-understand summaries for its users.

A fundamental principle guiding the development of this tool is accessibility. The user interface has been meticulously crafted to be intuitive and user-friendly, catering to individuals with varying levels of technical expertise. It ensures that everyone, regardless of their technological background, can seamlessly navigate and utilize the tool. Users can conveniently submit web articles or video scripts through their web browsers, and in real-time, the tool provides them with the summarized content, eliminating the need for complex and time-consuming manual summarization processes.

Scalability is another crucial aspect of this tool's design. It has been engineered to handle a substantial user base and process a significant volume of data efficiently. Whether it's a single user or a multitude of users simultaneously requesting summaries, the tool can adapt and deliver the required content without compromising on performance.

In addition to accessibility and scalability, the security of user data is a paramount concern. Stringent measures have been implemented to safeguard user information and protect it from any unauthorized access. This ensures that users can confidently utilize the tool, knowing that their data remains confidential and secure.

4.1.2 User Classes and Characteristics

User Classes

- Students
- Journalists
- Business professionals
- Casual internet users

User Characteristics

- **Students:** Students use the internet for research and educational purposes. They often need to read and watch a lot of content, and they may not have time to read or watch everything in its entirety. The tool can help students to save time and to quickly understand the main points of the content they need to consume.

- **Journalists**: Journalists need to quickly and accurately summarize news articles and interviews. The tool can help journalists to save time and to produce high-quality summaries of their content.

- **Business professionals:** Business professionals need to be able to quickly understand the main points of reports, presentations, and other business documents. The tool can help business professionals to save time and to be more productive.

- **Casual internet users:** Casual internet users use the internet for a variety of purposes, such as reading news articles, watching videos, and shopping. The tool can help casual internet users to quickly understand the main points of the content they are interested in.

4.1.3 Operating Environment:

The Automated Web & Video Summarization Tool Using NLP will be a web-based application. This means that it will run on any web browser, regardless of the operating system or device that the user is using. The tool will be hosted on a cloud-based platform, such as Google Cloud Platform or Amazon Web Services. This will ensure that the tool is scalable and can handle a large number of users.

4.1.4 Design and Implementation Constraints

The Automated Web & Video Summarization Tool Using NLP project will have the following design and implementation constraints:

- **Accuracy:** The tool must be able to generate accurate summaries of web content and video scripts. This is challenging because the tool will need to be able to handle a wide variety of content, including different writing styles, topics, and languages.

- **Scalability:** The tool must be scalable to handle a large number of users and a large volume of data. The tool will need to be able to generate summaries quickly and efficiently, even for large and complex pieces of content.

- **Security:** The tool must be secure and protect user data from unauthorized access. The tool will need to use industry-standard security practices to protect user data.

- **Usability:** The tool must be easy to use for users of all technical expertise levels. The user interface should be intuitive and easy to navigate.

4.1.5 Assumptions and Dependencies

Assumptions

- **Internet Connectivity:** It is assumed that end users will have reliable internet connectivity to access the Automated Video Transcript Summarizer through a web interface.
- **NLP Libraries:** The availability of NLP libraries and tools for the chosen programming language is assumed. The system will rely on these libraries for natural language processing capabilities.
- **Security Measures:** It is assumed that users will adhere to standard security practices when using the system, such as protecting login credentials and ensuring secure transmission of data.
- **User Input Quality:** The accuracy of the summarization process relies on the quality and clarity of the input video transcripts. The system assumes that users provide well-formatted and comprehensible transcripts.
- **API Integration:** For external platform integration, it is assumed that third-party platforms will provide APIs that the Automated Video Transcript Summarizer can interact with.

Dependencies

- **NLP Library:** The system is dependent on the availability and proper functioning of the selected NLP library for natural language processing tasks. Any updates or changes to the library may impact system behavior.
- **Web Browser Compatibility:** The system relies on compatibility with modern web browsers (e.g., Chrome, Firefox, Safari). Changes in browser behaviors or updates may affect the user interface.

- **External APIs:** For export functionalities, the system depends on the stability and availability of external APIs provided by third-party platforms. Any changes to these APIs may require corresponding adjustments in the system.

- **Server Infrastructure:** The reliability and scalability of the system depend on the underlying server infrastructure. Regular maintenance and monitoring are necessary to ensure optimal performance.

- **Security Protocols:** The system's security measures depend on the adherence to security protocols and standards. Any changes in security requirements may necessitate updates to the system.

- **Language Models:** If the system incorporates pre-trained language models for NLP tasks, it is dependent on the availability and accuracy of these models. Updates or changes to the language models may affect system performance.

4.2 Functional Requirements:

The following are the functional requirements for the Automated Web & Video Summarization Tool Using NLP project:

- **Content Input:**

  Users should be able to submit web articles and video scripts to the tool. The tool must accept a variety of web content formats, including URLs and plain text input.

- **NLP Techniques:**

  Implement tokenization to break down text into individual words or phrases. Utilize lemmatization to reduce words to their base or root form. Apply part-of-speech tagging to identify the grammatical elements of each word. Employ named entity recognition to identify and classify entities such as names, dates, and locations. Implement semantic role labelling to identify the relationships between words in a sentence. Utilize text summarization techniques to condense the content into shorter, coherent summaries.

- **User Interface:**

  Design an intuitive and user-friendly web interface for easy navigation. Provide clear instructions for users on how to input content and retrieve summaries. Ensure compatibility with various web browsers and screen sizes for accessibility.

- **Language Support:**

  Support multiple languages for both input content and generated summaries to accommodate a diverse user base.

4.3 Non-Functional Requirements:

The following are the non-functional requirements of Automated web and video summarization tool using NLP:

1. **Performance Requirements:**
   - Response Time: The tool should generate summaries within seconds of receiving the input, with a response time of no more than 5 seconds for standard-sized content.
   - Throughput: The tool should be able to process a minimum of 100 requests per minute.
   - Resource Utilization: Efficiently use system resources to ensure optimal performance, including CPU and memory usage.

2. **Safety Requirements:**
   - Data Privacy: User data, including input content and generated summaries, must be kept confidential and comply with data protection regulations.
   - Error Handling: Implement robust error handling to prevent system crashes and provide clear error messages to users.
   - Content Filtering: Ensure that the tool can identify and filter out inappropriate or harmful content to maintain a safe environment for users.

3. **Security Requirements:**
   - Data Security: Employ strong scurity protocols to protect data during transmission and storage.
   - Access Control: Enforce role-based access control to restrict access to sensitive system components and user data.
   - API Security: If an API is provided, ensure that it requires authentication and authorization for access.

4. **Software Quality Attributes:**

- Reliability: The tool should consistently generate accurate and reliable summaries, minimizing errors and inconsistencies.
- Usability: Provide an intuitive and user-friendly interface, making it easy for users with varying technical expertise to interact with the tool.
- Performance Efficiency: Ensure that the tool operates efficiently, using system resources optimally and minimizing response times.

4.4 External Interface Requirements:

- **User Interface:**
  - Front-end software: HTML, CSS, JavaScript
  - Back-end software: Python, Flask

- **Hardware Interfaces:**
  - Windows.
  - A browser that supports CGI, HTML & JavaScript.

- **Software Interfaces:**
  - Operating System: Any operating system that supports browsers.
  - Browser: Any browser that supports extensions.
  - Python: To implement our project, we have chosen python Language.

- **Communication Interfaces:**

This project supports all types of web browsers. We are using simple extensions as an interface to user and summarizing web data that is available on internet.

Chapter 5: Flow Chart

1. Start of Process

The provided flowchart illustrates the process of transforming a text or video into a summarized and translated version. The workflow begins with the user initiating a summarization request. The system then checks the nature of the input content, determining whether it's text or video.

2. Text Summarization Process

For text input, the system directly proceeds to extract a summary using a suitable summarization algorithm. The generated summary is then presented to the user alongside buttons for reading or translating the summary.

3. Video Summarization Process

If the input is a video, the system first converts the video into text using an automatic speech recognition (ASR) tool. The extracted text is then processed using the same summarization algorithm as for text content. The generated summary follows the same presentation flow as for text summaries.

4. Translation Process

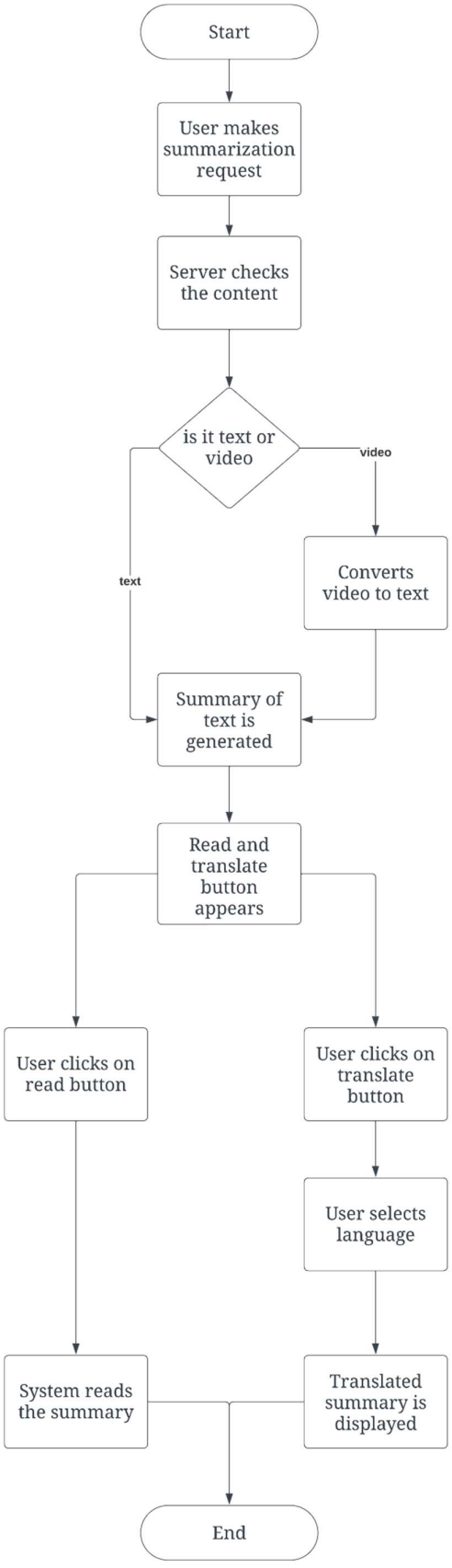
When the user clicks the "Translate" button, the system prompts them to select the desired target language. Once the language is chosen, the summary is translated using a translation model. The translated summary is then displayed to the user.

5. Summary Reading

If the user clicks the "Read" button, the system reads the summary aloud using a text-to-speech engine. This option provides an auditory experience for users who prefer listening to reading.

6. End of Process

The summarization and translation process concludes with the user having access to both the original summary and its translated version. The system remains ready to handle subsequent summarization and translation requests.


Start
User makes summarization request
Server checks the content
is it text or video
video
text
Converts video to text
Summary of text is generated
Read and translate button appears
User clicks on read button
User clicks on translate button
User selects language
System reads the summary
Translated summary is displayed
End

Chapter 6: Project Requirement Specifications

6.1 Front-End Requirements

6.1.1 HTML:

To develop the "Automated Web & Video Summarization Tool Using NLP," HTML (HyperText Markup Language) is crucial. It structures the web-based user interface, defining elements such as input forms, buttons, and content display areas. The HTML document comprises a typical structure with a head section for metadata, a header for branding and navigation, a main content area for user inputs, summary display, and settings. Integrating JavaScript enhances interactivity, and ensuring accessibility, responsiveness, and cross-browser compatibility is essential for a seamless user experience. Semantically sound and valid HTML, along with robust security measures, ensures the tool's reliability and accessibility.

6.1.2 CSS:

CSS (Cascading Style Sheets) is vital for designing the visual appearance of the "Automated Web & Video Summarization Tool Using NLP." It defines the layout, colors, fonts, and styling of HTML elements. CSS rules are applied to various parts of the web interface, ensuring a cohesive and attractive design. Responsive design principles are employed to make the interface adapt to different screen sizes. CSS plays a crucial role in creating an engaging and user-friendly experience, enhancing the tool's usability and aesthetics.

6.1.3 JavaScript:

JavaScript is the backbone of interactivity and dynamic functionality in the "Automated Web & Video Summarization Tool Using NLP." It's used to handle user interactions, such as content submission and real-time summarization, and to manipulate the Document Object Model (DOM). JavaScript enhances the user experience by enabling features like input validation, data processing, and user feedback. It plays a pivotal role in making the tool responsive and user-friendly, creating a seamless and engaging interaction between users and the application.

6.1.4 Manifest.json:

The manifest.json file is essential for creating browser extensions, such as for the "Automated Web & Video Summarization Tool Using NLP." It acts as a configuration file, specifying the extension's name, version, permissions, and other metadata. It defines the extension's structure, including background scripts, content scripts, and pop-up pages. Manifest.json is crucial for browsers like Chrome and Firefox to understand and load the extension correctly, making it an integral part of extension development.

6.2 Back-End Requirements

6.2.1 Python:

Python is a versatile and widely-used programming language employed for backend development in the "Automated Web & Video Summarization Tool Using NLP." With a rich ecosystem of libraries and frameworks, Python is well-suited for tasks like data processing, content summarization, and server-side logic. Its simplicity, readability, and extensive community support make it an ideal choice for web applications. Python frameworks like Flask or Django can efficiently handle server-side operations, enabling robust, scalable, and maintainable backend services.

6.2.2 Flask:

Flask is a lightweight Python web framework used in the backend of the "Automated Web & Video Summarization Tool Using NLP." It's known for its simplicity and flexibility, making it well-suited for building web applications. Flask provides the essential tools for creating APIs, handling HTTP requests, and executing server-side logic. It's a popular choice for projects where a minimalistic yet powerful backend is required. Flask's modular design allows developers to add components as needed, making it efficient and adaptable for web application development.

6.2.3 Hugging Face Transformer:

The Hugging Face Transformers library is a powerful tool used in the backend of the "Automated Web & Video Summarization Tool Using NLP." It provides pre-trained natural language processing models, including transformers like BERT, GPT-3, and others. These models enable the tool to perform advanced NLP tasks such as text summarization, named entity recognition, and semantic role labeling. Leveraging these pre-trained models simplifies NLP development and enhances the accuracy and effectiveness of the tool's language understanding and summarization capabilities.

6.3 API Requirements

6.3.1 Google Text-to-Speech API:

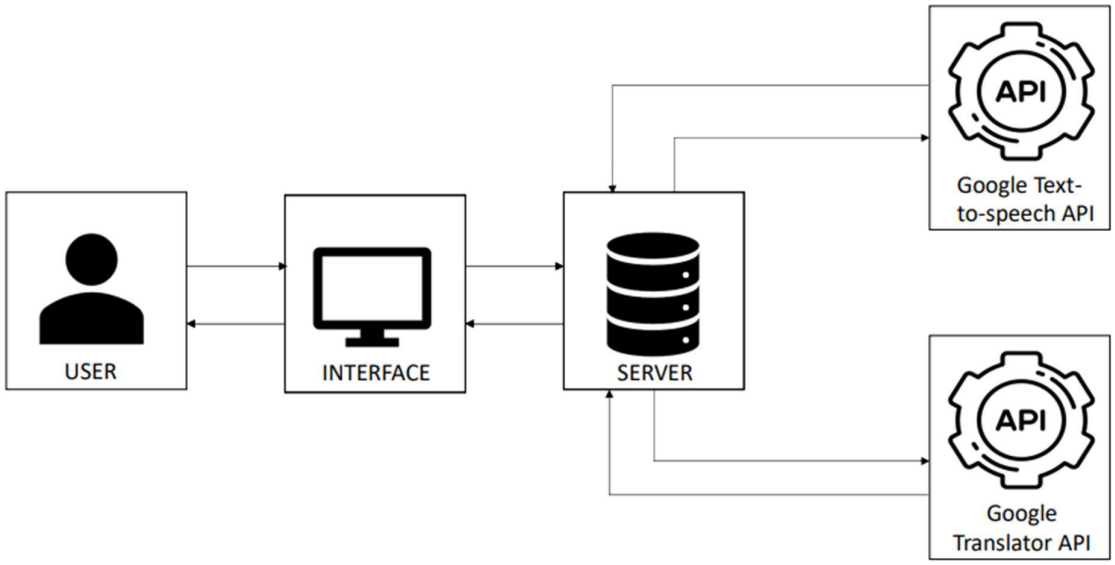
In the context of the "Automated Web & Video Summarization Tool Using NLP," the Google Text-to-Speech API plays a significant role. This API converts summarized text content into natural and coherent speech, enhancing the accessibility and user-friendliness of the tool. By utilizing the Google Text-to-Speech API, the project can offer users the option to listen to summarization results, making the content even more accessible to individuals with visual or reading impairments. This feature enriches the overall user experience, making the tool more inclusive and versatile.

6.3.2 Google Translator API:

The Google Translator API is a valuable component for the "Automated Web & Video Summarization Tool Using NLP." This API facilitates real-time translation of content, allowing users to summarize and consume information in multiple languages. By integrating this API, the project can offer a global audience the ability to access web articles and video scripts in their preferred languages, expanding the tool's reach and making it accessible to non-English-speaking users. This feature enhances the project's versatility and utility, serving a diverse user base.

Chapter 7: Proposed System Architecture

7.1 System Architecture



Above diagram shows the system architecture of project Automated Web and Video Summarization tool using NLP:

1. **User:**
   User is the one who will use the system to generate summaries. User will interact with the system through interface and will ask for summary to the system as per his needs.

2. **Interface:**
   User will interact with the system through the interface. This interface is nothing but an extension embedded in the browser. Through this extension user can ask for summarization of web page or video.

3. **Server:**
   When user asks for the summarization through the interface, the request will be sent to the server. Server will then generate the summary and will display it to the user through the interface.

4. **Google Text-to-speech API:**

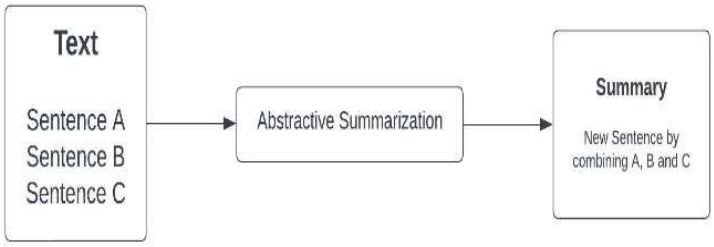
   If user asks the system to read the generated summary, then server will send summary to Google Text-to-speech API to convert it into speech. This speech will be sent back to the user to listen.

5. **Google Translator API:**

   If user asks for the translation of the generated summary in particular language, then the sever will send the generated summary to the Google translator API. Google Translator API will translate the summary in language that user wants.

7.2 Proposed Methodology

Extractive and Abstractive are two types of text summarization. Both ways have their benefits as well as limitations. Abstractive summarization generates new sentence from two or more existing sentences from original text. Figure 1 represent the process of Abstractive summarization. In extractive summarization there is a chance where some sentence can be get skipped if its feature score is less and that results in loss of information while generating summary leading to low summarization quality.



Abstractive Summarization Model.

We propose a real-time chrome extension for giving summary. The objective is to automate the summarization of web and video content available on the internet. The proposed system works on the abstractive summarization-based approach. Abstractive text summarization is a natural language processing (NLP) technique that generates a concise summary of a document or text. The summary represents the main points of the original text.

The system incorporates Hugging Face's Transformers to generate the abstractive summary. This is a library developed by Hugging Face that provides access to a variety of pre-trained transformer models, including language models like GPT-3. It can be used to perform abstractive summarization by fine-tuning a pre-trained language model on a dataset of summaries. For YouTube videos, real-time audio extraction will be used to filter it from the video and then using Speech Recognition Model of huggingsound text gets generated, and depending on the text the user will be provided summary.

7.3 Proposed Algorithm

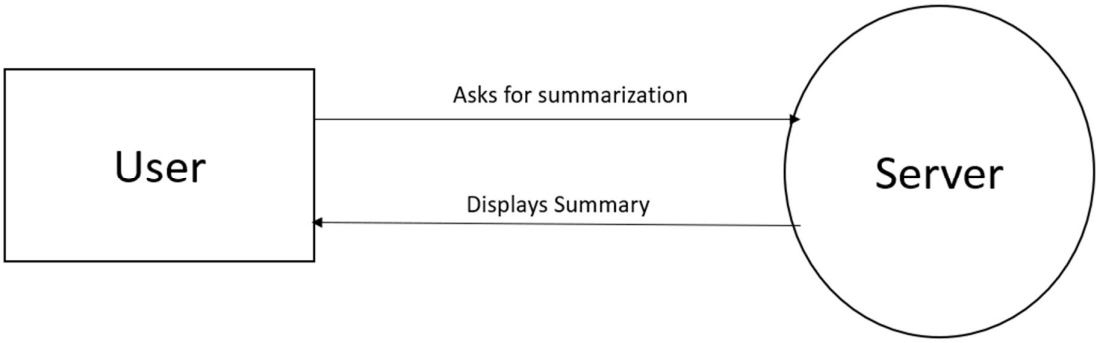
- User clicks on summarize button.
- The link of the page is sent to the server.
- It recognizes if it contains text or video.
- If video:
    - Audio is extracted from the video.
    - This audio is converted into text.
    - Text is sent further to create summary.
- If text:
    - Text is sent further to create summary.
- Summary is generated by using any of the NLP techniques.
- Generated summary is displayed to user.

Chapter 8: High level Design

8.1 Data Flow Diagram (DFD)

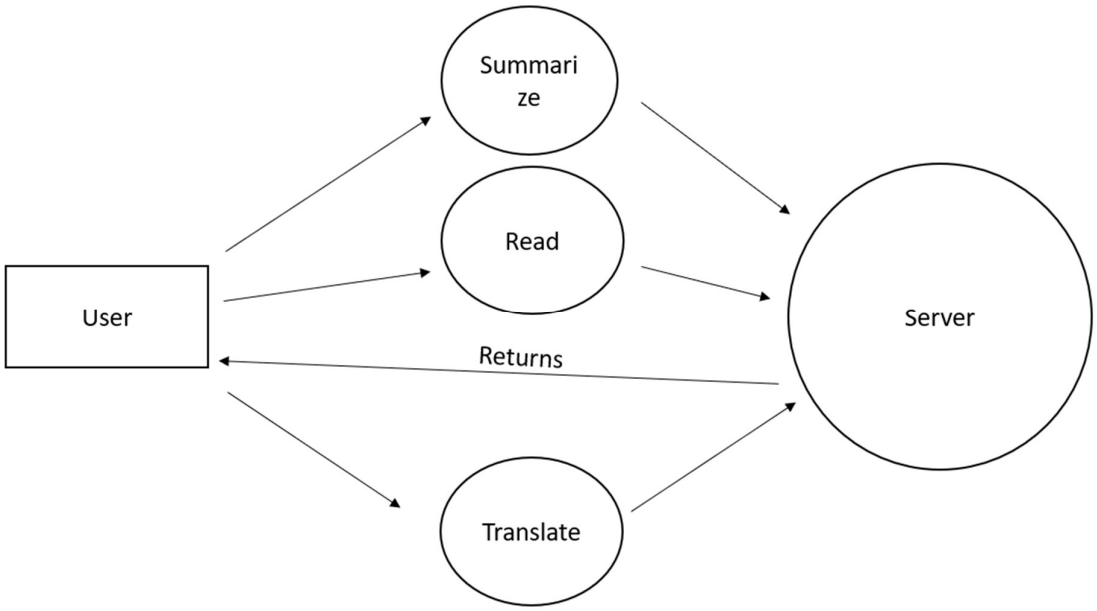
8.1.1 DFD-Level 0:

Level 0 DFD is the highest-level DFD, which provides an overview of the entire system. It shows the major processes, data flows, and data stores in the system, without providing any details about the internal workings of these processes. This diagram shows the overview of the system. The user asks for the summarization to the server and server displays the summary to the user.



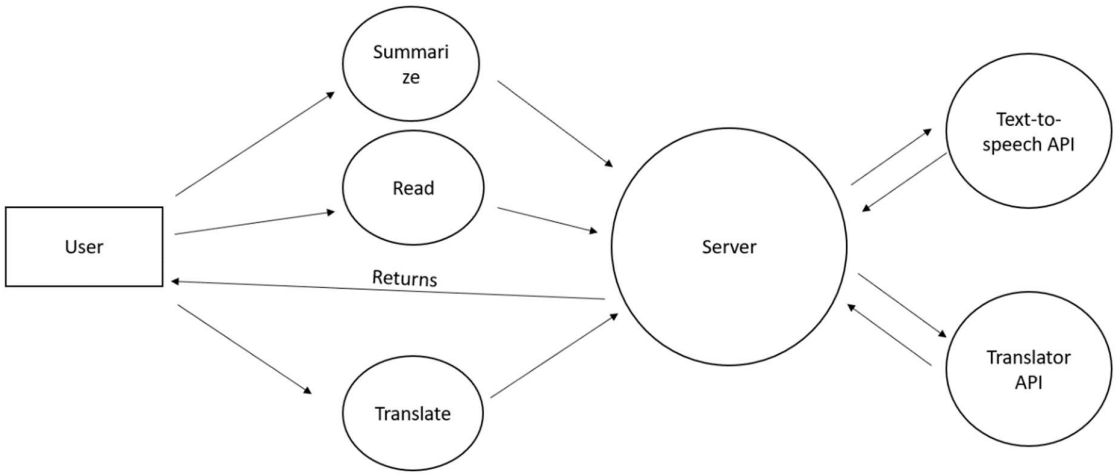
8.1.2 DFD-Level 1:

DFD level 1 provides a more detailed view of the system by breaking down the major processes identified in the level 0 DFD into sub-processes. Each sub-process is depicted as a separate process on the level 1 DFD. The data flows and data stores associated with each sub-process are also shown. This diagram shows the more detailed view of our system. User can ask the server to read, summarize and translate the summary.



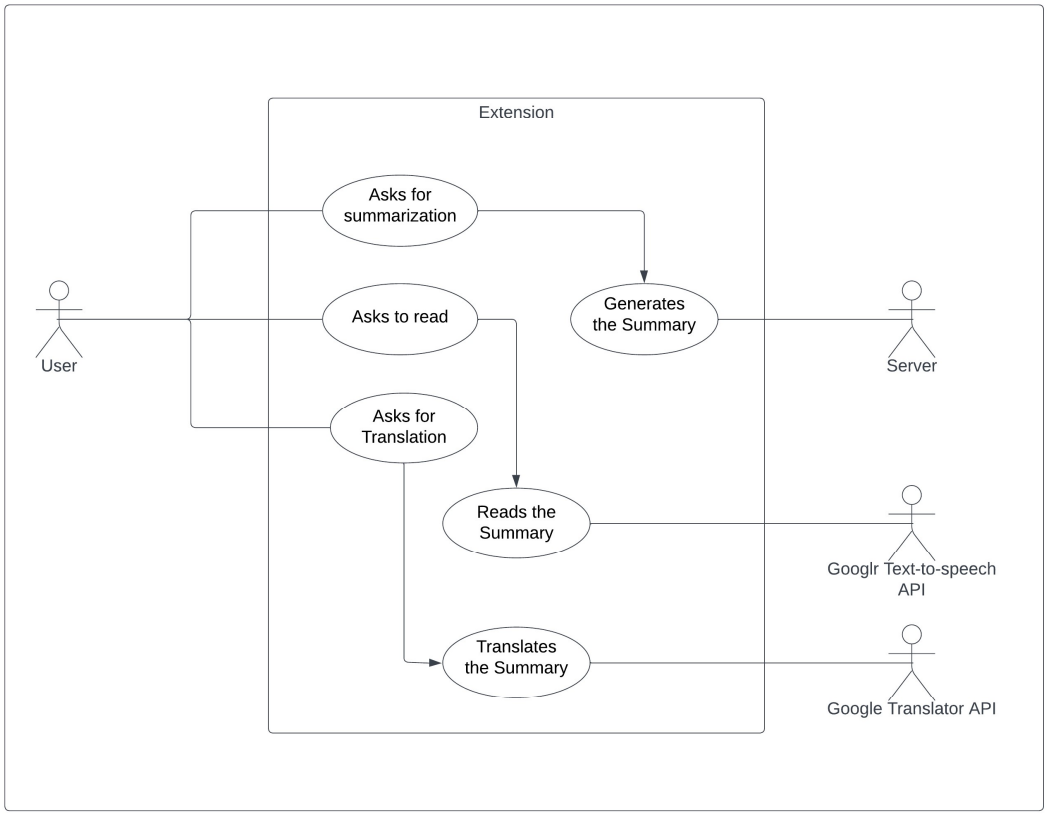
8.1.2 DFD-Level 2:

This level provides an even more detailed view of the system by breaking down the sub-processes identified in the level 1 DFD into further sub-processes. Each sub-process is depicted as a separate process on the level 2 DFD. The data flows and data stores associated with each sub-process are also shown. This diagram shows the more detailed view of our system. The Api integration is also shown in this level.



8.2 Use Case Diagram

A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating use cases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system. This diagram shows the use cases of our system. The user can access the extension and use it to summarize text, ask to read summary and asks for translation of summary. Also, server interact with system to generate summary. Also google text-to-speech API is used to convert summary into speech and google translator API is used to translate the summary.

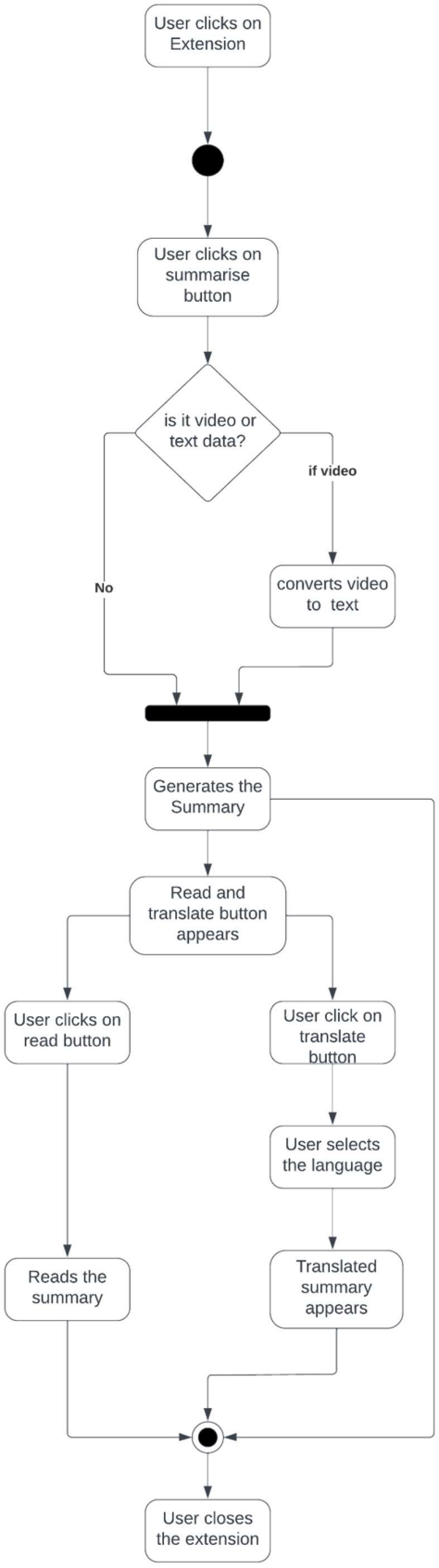


8.3 Activity Diagram

The activity diagram helps in envisioning the workflow from one activity to another. It put emphasis on the condition of flow and the order in which it occurs. The flow can be sequential, branched, or concurrent, and to deal with such kinds of flows, the activity diagram has come up with a fork, join, etc. This workflow of our system. Firstly, user clicks on extension, then clicks on summarize button. The system recognises if it is video or text content. If it is text, the text is directly sent to generate summary. If it is video, then first it is converted to text and then it is sent to generate summary.

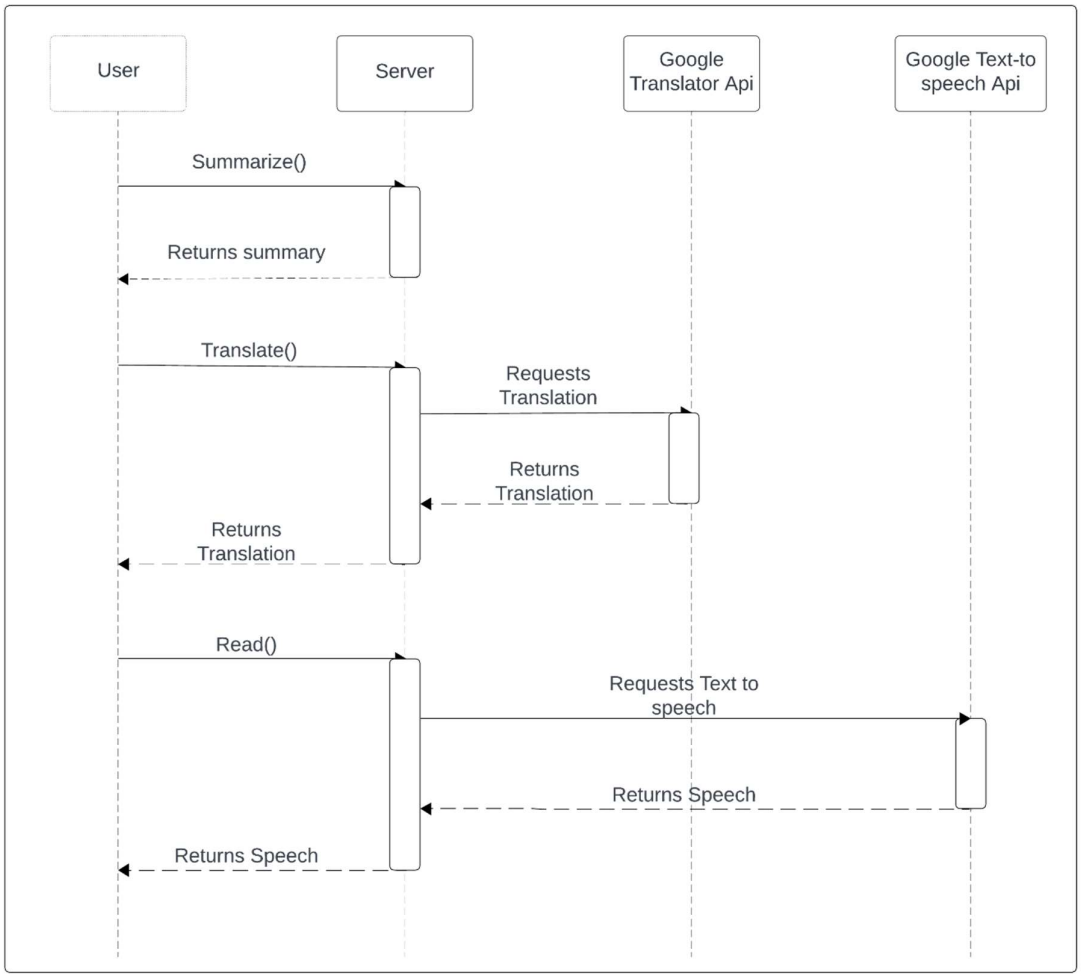
To initiate the video summarization process, the user launches the extension and clicks the "Summarize" button. The system then determines whether the input is video or text data. If the input is video, the system converts it into text format. Once the video is converted into text, the system proceeds to generate a concise summary of the video content. Upon completion of the summary generation, the system displays the "Read" and "Translate" buttons for further processing.

The user can choose to either read the summary aloud by clicking the "Read" button or translate it into a different language using the "Translate" button. If the user selects "Read," the summary is read aloud for their convenience. For translation, the user selects the desired target language and the translated summary appears on the screen. Once the user has reviewed the summary, they can close the extension to conclude the process.


User clicks on Extension
User clicks on summarise button
is it video or text data?
if video
No
converts video to text
Generates the Summary
Read and translate button appears
User clicks on read button
User click on translate button
User selects the language
Reads the summary
Translated summary appears
User closes the extension

8.4 Sequence Diagram

This sequence diagram illustrates the step-by-step interactions between the User, the Summarizer, and user can ask for summarization, reading summary and translation. It shows how messages are passed between server, user and APIs in a chronological order, providing a clear visual representation of the workflow.



Chapter 9: Project Plan

9.1 Purpose

The purpose of the "Automated Web & Video Summarization Tool Using NLP" project is to develop a cutting-edge web-based application that leverages Natural Language Processing (NLP) techniques to streamline the process of summarizing web content and video scripts. This project aims to bridge the gap between the ever-expanding volume of online information and users' capacity to digest it efficiently. By offering an accessible and user-friendly tool, the project seeks to empower individuals with varying levels of technical expertise, providing them with succinct, easy-to-understand summaries of web articles and video content.

Furthermore, the project emphasizes performance, safety, security, and software quality attributes, ensuring that the tool generates accurate and reliable summaries, maintains data privacy, and operates efficiently. By delivering on these objectives, the project intends to enhance the accessibility and usability of online content, making it more convenient and user-friendly for a diverse audience while upholding data security and compliance with relevant regulations

9.2 Domain Area of project

The domain area of the "Automated Web & Video Summarization Tool Using NLP" project spans several fields, primarily focusing on:

1. **Natural Language Processing (NLP):** This project operates at the intersection of linguistics and computer science, using NLP techniques to process and understand human language. It involves text analysis, semantic understanding, and summarization, which are key components of the NLP domain.
2. **Information Retrieval:** The project falls within the domain of information retrieval, as it aims to enhance the way users' access and comprehend web content and video scripts. It involves techniques for efficiently extracting relevant information from a vast pool of data.
3. **Web Technologies:** The project is closely related to web technologies, including web development, content extraction, and web-based user interfaces, as it involves summarizing web articles and delivering results through web browsers.

9.3 Feasibility Study

A feasibility study for the "Automated Web & Video Summarization Tool Using NLP" project assesses the practicality and viability of the project before moving forward with its development. Here are key aspects of the feasibility study:

1. **Technical Feasibility:**

- **Hardware and Software:** The necessary hardware and software, including servers, web development tools, and NLP libraries, are readily available and compatible with the project's requirements.
- **Integration:** The integration of external services or APIs for NLP and content analysis is feasible, offering opportunities to enhance functionality.

2. **Economic Feasibility:**

- **Cost Estimation:** The estimated budget for the project, which includes development, infrastructure, and ongoing operational costs, is within an acceptable range.

3. **Operational Feasibility:**

- **User Adoption:** Initial market research indicates a high level of interest and demand for automated web and video summarization services, suggesting a strong potential for user adoption.
- **Regulatory Compliance:** The project has considered regulatory compliance, including data protection and privacy regulations, ensuring that it can be operated within legal and ethical boundaries.

4. **Schedule Feasibility:**

- **Project Timeline:** A detailed project timeline has been developed, which accommodates development, testing, and deployment phases. Potential bottlenecks or delays have been identified, with contingency plans in place.
- **Milestones:** Key project milestones and objectives have been defined and are achievable within allocated timeframes.

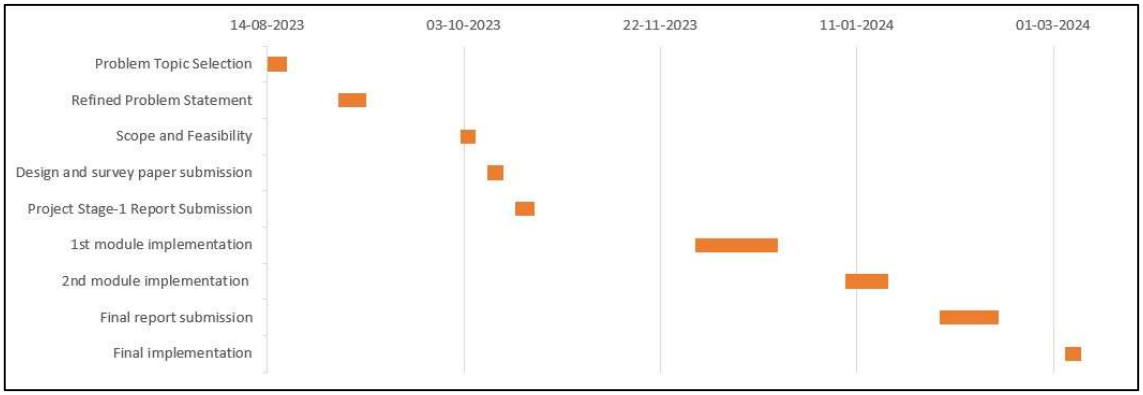
9.4 Project Milestones

Milestone	Due Date
Complete initial requirements gathering	August 2023
Design the system architecture	September 2023
Develop the core NLP model	December 2023
Develop the web and video summarization interfaces	December 2023
Conduct alpha testing	January 2024
Conduct beta testing	February 2024
Representing final product	March 2024

9.5 Project Schedule

Schedule		Project Activity
August 2023	3rd week	Problem Topic Selection
September 2023	1st and 2nd week	Refined Problem Statement
October 2023	1st week	Scope and Feasibility
November 2023	2nd week	Design and Survey Paper Submission
	1th week	Project Stage-1 Report Submission
December 2023	1st to 3rd week	1st module presentation
January 2024	2nd to 3rd week	2nd module presentation
February 2024	1st to 3rd week	Final report Submission
March 2024	1st week	Final presentation

9.6 Project Timeline



9.7 Risk Management

9.7.1 Project Risks

1. **Technical Risks:**

   - **NLP Complexity:**
     Risk: Implementing complex NLP techniques may lead to development delays.
   - **Scalability Issues:**
     Risk: Performance bottlenecks may occur when handling a large number of users or extensive data.
   - **Data Security:**
     Risk: Potential data breaches or privacy violations could harm the project's reputation.

2. **Schedule Risks:**

   - **Development Delays:**
     Risk: Unforeseen technical challenges or issues could lead to project delays.

3. **Technological Risks:**

   - **Dependency on Third-Party Services:**
     Risk: Relying on external NLP libraries or APIs could pose risks if they become unreliable or change their terms.

4. **Quality Assurance Risks:**
    - **Bugs and Inaccuracies:**
      Risk: Quality issues in the summarization process could lead to user dissatisfaction.

9.7.2 Risk Mitigation Strategies

1. **Technical Risks:**
    - **NLP Complexity:**
      Mitigation: Employ experienced NLP experts, conduct thorough research, and consider using pre-trained models and libraries to simplify NLP tasks.
    - **Scalability Issues:**
      Mitigation: Conduct load testing, optimize code and infrastructure for scalability, and plan for resource scaling as needed.
    - **Data Security:**
      Mitigation: Implement robust data encryption, access controls, and regular security audits to protect user data.

2. **Schedule Risks:**
    - **Development Delays:**
      Mitigation: Develop a flexible project timeline, implement agile development methodologies, and be prepared to adapt to changing circumstances.

3. **Technological Risks:**
    - **Dependency on Third-Party Services:**
      Mitigation: Diversify dependencies where possible, monitor the reliability of third-party services, and have backup plans in case of disruptions.

4. **Quality Assurance Risks:**
    - **Bugs and Inaccuracies:**
      Mitigation: Implement rigorous testing procedures, including user testing, and maintain a continuous improvement process to address issues promptly.

Chapter 10: Conclusion and Future Scope

10.1 Conclusion

The "Automated Web & Video Summarization Tool Using NLP" project holds the promise of revolutionizing the way users' access and understand online content. By harnessing Natural Language Processing (NLP) techniques, the tool aims to provide a user-friendly and accessible platform for summarizing web articles and video scripts, making information digestible for individuals with varying technical expertise. By addressing user needs and providing a unique value proposition in a competitive market, this tool aspires to enhance user experiences, facilitate data comprehension, and contribute to the accessibility of online information. Through diligent implementation and continued adaptation, the "Automated Web & Video Summarization Tool Using NLP" project has the potential to make a significant impact on how we interact with and consume digital content.

10.2 Future Scope

The "Automated Web & Video Summarization Tool Using NLP" project holds immense potential for future expansion and enhancement. It can further diversify its impact by extending support for multiple languages and incorporating content from various sources, such as social media, academic journals, and audio content. Offering users, the ability to customize summarization preferences, including summary length and style, can personalize the experience. The development of mobile applications for iOS and Android platforms would increase accessibility. Additionally, creating a well-documented API for integration with other applications and services is a key avenue for future growth. Real-time summarization for live events, news, or stock market updates is another promising direction. Establishing feedback loops for users to contribute insights could lead to continuous improvement through machine learning. Continuous integration of advanced NLP techniques will enhance the quality of summaries, while a focus on accessibility will ensure inclusivity. The tool's potential as an enterprise solution, as well as monetization strategies like premium features or subscription models, can sustain development. Collaboration with educational platforms for content summarization and cross-platform compatibility will also be essential. The future scope for this project is expansive, promising to keep it at the forefront of content summarization technology and a valuable resource for users across diverse domains.

Chapter 12: References

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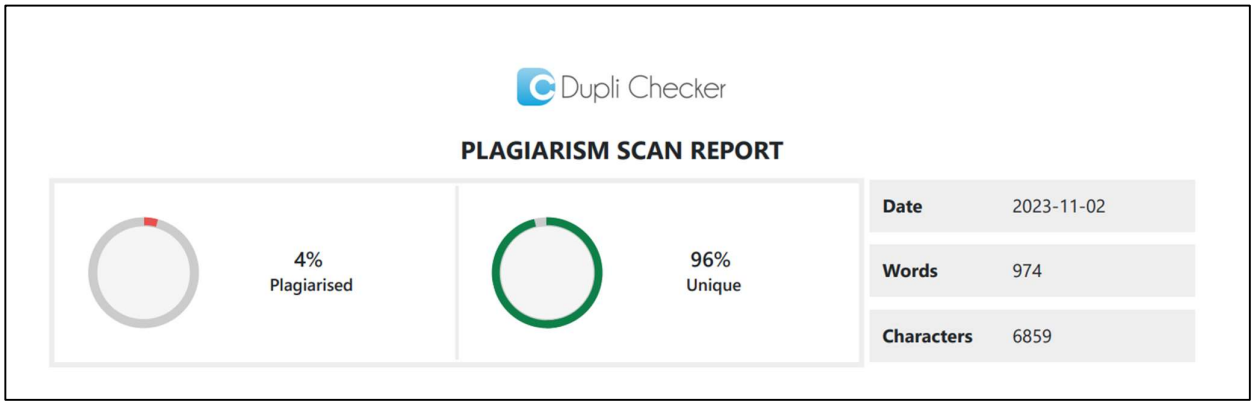
Appendices

12.1 Plagiarism Report



12.2 Base Paper (S)

Author: Kavita Namdeo Jadhav.

Name: "An Analysis of Text Summarization Approaches using Natural Language Processing".

Journal: International Journal of Ingenious Research, Invention and Development.

Issue: Volume 1, Issue 2, February 2023.