



MINOR PROJECT - II

SummaEase: Speech and Text Summarizing using LLM

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INTRODUCTION

- The abundance of information in today's data-driven world is a major challenge that calls for effective techniques to extract important insights.
- “**SummaEase**”: Abstractive text and speech summarization are important solutions that provide the capacity to summarise large amounts of information into brief but informative summaries.
- The need for automated summarization techniques is growing, whether it is for accessibility, knowledge extraction, or quick decision-making. Accurate, cogent, and contextually relevant summaries are still difficult to produce, though.
- The present introduction delineates the urgent necessity for progress in abstractive summarization, emphasising its significance in various fields for expedient information processing and understanding.

PROBLEM STATEMENT

In a time when there is an abundance of spoken and written information, it is critical for effective understanding and knowledge extraction to condense this information into brief summaries. This need is met by abstractive text and speech summarization, which provides automated ways to condense large amounts of content while maintaining critical meaning. This speeds up information retrieval, consumption, and decision-making in a variety of fields.

- Information Overload: Coping with the overwhelming volume of textual and spoken data.
- Time Efficiency: Enabling rapid access to crucial information amidst time constraints.
- Decision Support: Providing concise insights to aid in decision-making processes.

OUR MOTIVATION

Information Overload Crisis

LLMs empower efficient information consumption by summarizing text and speech, combating the surge of overwhelming content.

Accessibility

Improve accessibility for individuals with visual or reading disabilities by offering summarization for both written and spoken content.

Efficiency

Enhance productivity by enabling users to quickly extract key insights and information from diverse sources.

User Empowerment

Empower users to navigate through vast amounts of information effectively, making informed decisions and enhancing learning opportunities.

1. To develop a system that automatically generates concise summaries of text and speech content

This involves leveraging the power of LLMs to understand the meaning and key points of information, then condensing it into a shorter version that retains the essential details.

2. To improve information accessibility and efficiency for diverse users

This objective addresses the growing challenge of information overload by equipping individuals with a tool to quickly grasp the essence of content, be it for personal use, media consumption, education, or improving accessibility for people with disabilities.

TECHNOLOGY STACK

Development:

- **Backend** - Python
- **Frontend** - HTML, CSS

SDLC Model: Rapid Action Development Model (RAD)

Algorithm: Keyword Extraction, Sentence Scoring, and Lexical Chain Analysis

Database: .csv files operated using file handling

Data Structures: Array, Dataframes and vectors

Technology Used: Natural Language Processing (NLP) and Large Language Model (LLM)

Version Control: Git Bash and GitHub

DATASETS

We have obtained the dataset from the following websites:

1. <https://www.kaggle.com/code/midouazerty/text-summarizer-using-nlp-advanced/input>
2. <https://www.kaggle.com/datasets/kevinbnisch/german-bundestag-speeches-translated-and-summarized>
3. <https://archive.ics.uci.edu/dataset/769/turkish+user+review+dataset>
4. <https://paperswithcode.com/paper/samsum-corpus-a-human-annotated-dialogue-1>

Our data comprises of three .csv files which have 10 columns, it is sized at 669.64 mb with each file sized at 203.54mb, 225.76mb and 240.34mb. After performing Exploratory Data Analysis (EDA), the dataset will be utilised for the text summarization model.

Strengths

- Utilizes state-of-the-art large language models for high-quality summaries.
- Integrates text and speech summarization for a comprehensive solution.
- Offers personalized summaries through fine-tuning on diverse datasets and a user-friendly interface.

Weaknesses

- Reliance on large language models may lead to high computational requirements.
- Challenges in handling domain-specific jargon and context.
- Ensuring the accuracy of speech-to-text transcription for speech input.

Opportunities

- Potential integration with other AI technologies like question-answering systems.
- Room for research and development to enhance summarization algorithms.
- Expansion into new languages and domains for broader impact.

Threats

- Competition from existing summarization tools and services.
- Ethical concerns regarding data privacy and bias in summarization.
- Regulatory challenges related to the use of AI in summarization.

1. **Data Collection:** Gather a diverse dataset of text and speech content relevant to your targeted summarization use case.
2. **Preprocessing:** Clean the data by removing noise, inconsistencies, and formatting issues. Tokenize the text into individual words or sentences.
3. **Feature Engineering:** Represent the preprocessed data using word embeddings that capture semantic relationships between words.
4. **LLM Training:** Select an appropriate LLM model [like GPT or BERT] and fine-tune it on your prepared dataset. Tune hyperparameters for optimal performance.
5. **Summarization Model:** Train a separate model (e.g., extractive or abstractive) to utilize the LLM's understanding and generate summaries based on the input text or speech.
6. **Evaluation:** Assess the generated summaries using quantitative metrics (ROUGE, BLEU) and qualitative analysis to evaluate faithfulness, conciseness, and coherence.

METHODOLOGY

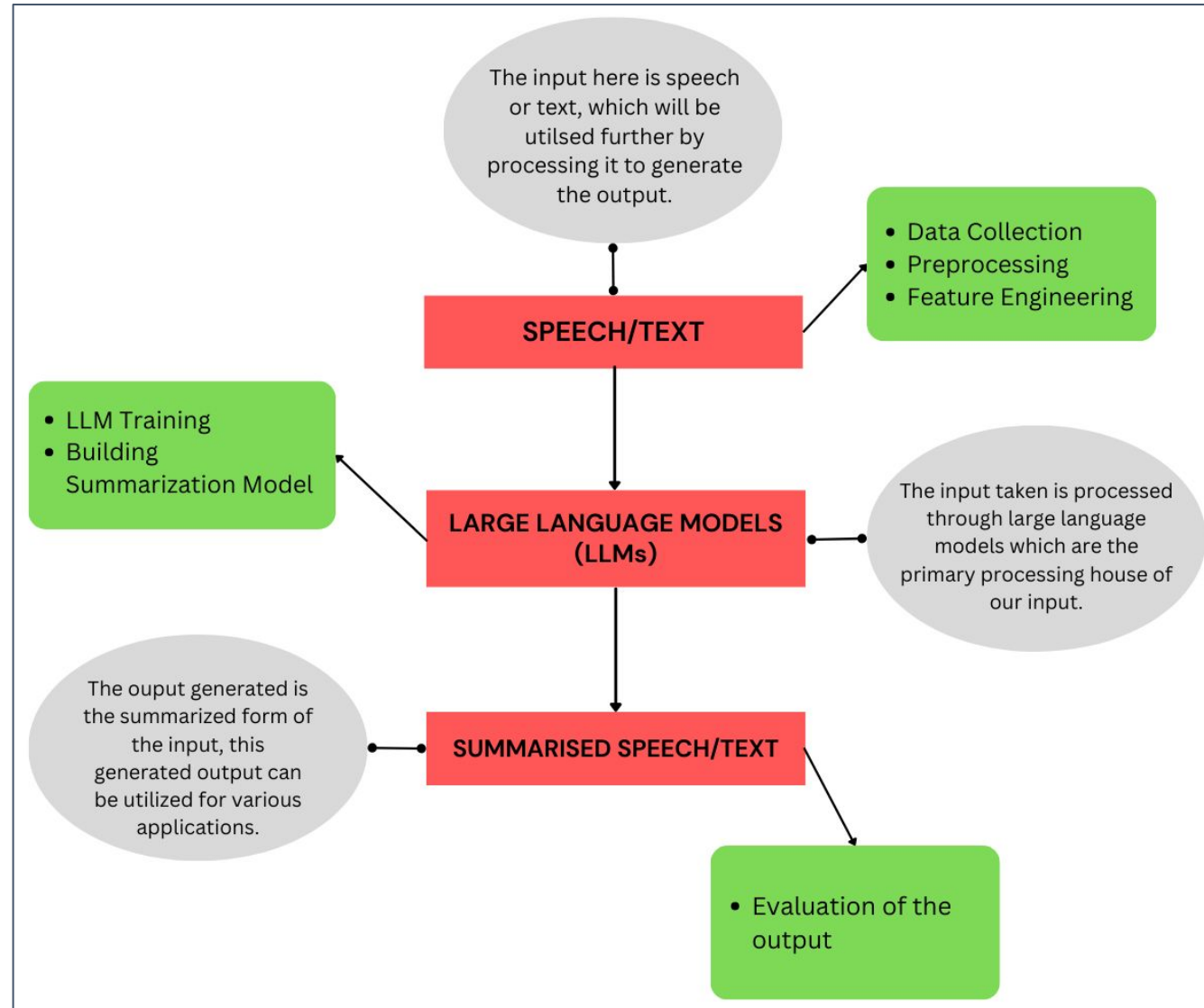


Fig. 1 Architectural Diagram

1. Education and Research:

- Enhancing learning experiences through summarizing textbooks, lectures, and academic papers.
- Facilitating research by summarizing complex information from various sources.

2. Media and Journalism:

- Streamlining content curation by summarizing news articles, press releases, and interviews.
- Supporting journalists and media professionals in quickly digesting and reporting news.

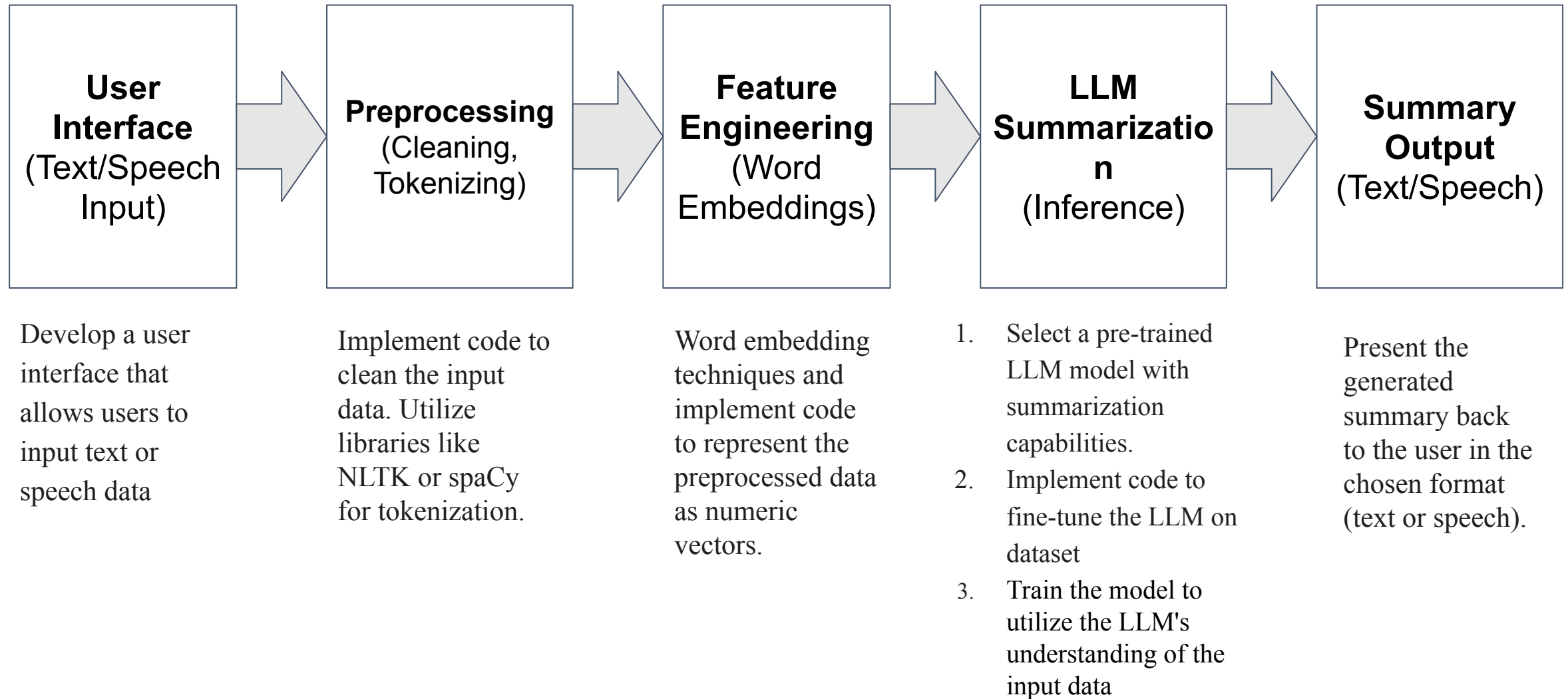
3. Customer Service and Support:

- Assist customer service representatives by summarizing customer feedback, inquiries, and support tickets.
- Improve response times and customer satisfaction by providing quick access to summarized information.

4. Healthcare and Legal Industries:

- Assisting healthcare professionals and researchers in summarizing medical research articles, patient records, and healthcare information.
- Supporting legal professionals in summarizing legal documents, court cases, and legislation for legal research and case preparation.

IMPLEMENTATION



PERT CHART

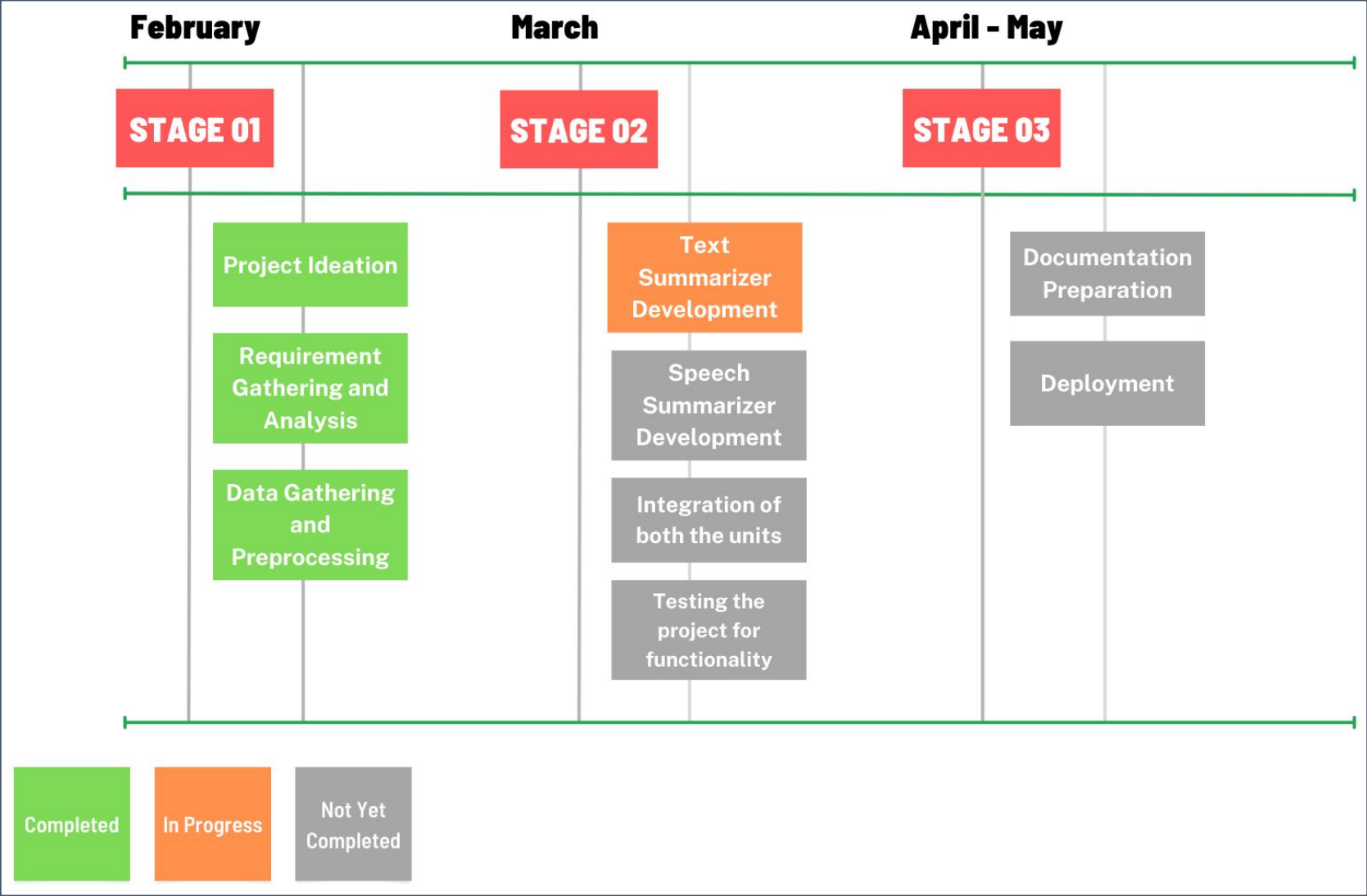


Fig. 2 Program Evaluation Review Technique Chart

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THANK YOU