Earnings Call Analyzer

Submitted in partial fulfillment of the requirements of the degree

BACHELOR OF ENGINEERING IN

COMPUTER ENGINEERING

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CERTIFICATE

This is to certify that the Mini Project entitled **" Earnings Call Analyzer"** is a bonafide work of **Tasmiya Khan (30), Purtee Mahajan (39), Ketaki Nalawade (44), Srushti Satish Sambare (54)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **"Bachelor of Engineering"** in **"Computer Engineering" .**

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Mini Project Approval

This Mini Project entitled "Earnings Call Analyzer" by **Tasmiya Khan (30), Purtee Mahajan (39), Ketaki Nalawade (44), Srushti Satish Sambare (54)** is approved for the degree of **Bachelor of Engineering** in **Computer Engineering.**

Examiners

1.....
(Internal Examiner Name & Sign)

2.....
(External Examiner name & Sign)

Date: 21/10/23

Place: Chembur

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Abstract ii

Earnings calls are hosted by management of public companies to discuss the company's financial performance with analysts and investors[1]. Earnings calls play a significant role in providing vital information to the stakeholders. This project enhances corporate call analysis by employing transcription, transcript summarization, financial data extraction, and interactive data visualization. By integrating these methods, valuable insights can be drawn from the earning calls, which will in turn, help the investors and other stakeholders in decision making.

Acknowledgement

We are thankful to our college Vivekanand Education Society's Institute of Technology for considering our project and extending help at all stages needed during the work of collecting information regarding the project.It gives us immense pleasure to express our deep sense of gratitude to Professor Mrs. Sujata Khedkar(Project Guide) for her kind help and valuable suggestions, advice for the development of project work and for her guidance and suggestions.

We convey our deep sense of gratitude to all teaching and non-teaching staff for their constant encouragement, support and selfless help throughout the project work . It is a great pleasure to acknowledge the help and suggestion, which we received from the Department of Computer Engineering . We wish to express our profound thanks to all those who helped us in gathering information about the project. In conclusion, the successful implementation and operation of the On road vehicle breakdown assistance are the result of the collective efforts of all those involved, and we express our sincere appreciation and gratitude to each one of them.

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Introduction

1.1 Introduction

Earnings calls play an important role in boosting the investments in the company by conducting economic communication. Earnings conference calls follow the quarterly release of a firm’s earnings, and have increased in popularity in recent years, mainly because of their ease of accessibility through modern communication mediums (e.g., applications like EarningsCast, interactive investor-relation websites)[2][3]. The purpose of these calls is to tell the market about the firm's future strategy and tactics, as well as to comment on the previous quarter's revenue streams and costs[2][3].

Technical and financial analysis of the company along with the fundamental analysis of the economy is to be taken into account while investing in the capital market[4].A variety of factors influence investors' perceptions of various investing options[4].Data visualization and interpretation are becoming increasingly crucial in today's commercial world[5]..Therefore, developing an analyzer for these earning calls has become crucial in order to help the investors to make profitable decisions. It is usually easy for investors to analyze the financial growth of the companies via data visualization and summarized transcripts.

1.2 Motivation

Access to reliable and timely information is essential in the dynamic world of finance and investing. Earnings calls are a goldmine of complete data that investors, analysts, and decision-makers may use to make knowledgeable decisions. These conversations provide access to the inner workings of businesses and a window into their financial situation, business plans, and potential outcomes.

The requirement to effectively collect, analyze, and evaluate the content of earning calls is a problem in this flood of data, though. Earning calls may last for hours and are filled with technical terms, subtle terminology, and inconsistent audio quality. These calls can be difficult and time-consuming to listen to, transcribe, and understand.Also, the transcript generation is only performed in English majorly so transcription in multiple languages was challenging.Integrating transcription , transcript summarization , financial data extraction and data visualization all at one place was another problem which was important to be addressed.

These problems served as our inspiration for starting the "Fincalls - Earnings Call Analyzer" project. We understood how much this process might be streamlined by using cutting-edge technologies. Our goal was to completely transform the way earning calls are assessed by utilizing OpenAI's Whisper, a cutting-edge voice recognition engine. We sought to translate spoken words into exact, searchable, and easily understandable transcripts using Whisper's sophisticated capabilities.

1.3 Problem Statement & Objectives

It has become crucial to analyze business earnings calls because it is challenging to get highly accurate and efficient results all in one location when using traditional methods of earning calls analysis.

Earnings calls last for a long duration. Understanding and remembering all the crucial information becomes a tedious job. This causes information overloading. Some information might be overwhelming especially for an investor who is new to the company or the industry.

It takes a lot of time to study such a large text, even if a transcript of the call is available. It is observed that investors are more devoted and fond of finicky type of investment choice and preferences[4]. This demands that the data visualization must be designed to be as informative as possible. Also, it must be tailored to the specific needs of the investors.

The 'disclosure bias' is another major issue. Some businesses may emphasize just the positive aspects while downplaying the unfavorable information. As a result, investors may struggle to gain a clear image of the company. These changes can be costly to investors, resulting in greater trading fees, missed purchasing opportunities, or overall position losses[1].

During the earnings calls, some analysts often ask questions that would promote their own investment opinions. This may influence the investors and also give biased information regarding the company.

1.4 Organization of Report

Chapter 1: Introduction to the report, the problem statement and our objectives.

Chapter 2: Literature surveys related to our project.

Chapter 3: Architectural Framework, Algorithm and Process Design

related to our project, includes the detailed explanation of our project with the various methodology applied

Lastly, we give the results of the project.

It includes conclusions and future work.

2. Literature Survey

A project report's literature survey is the portion that lists the many studies and analyses that have been done in our area of interest, together with the findings that have previously been published, while taking into consideration the project's varied constraints and scope.

2.1 Survey of Existing System/SRS

Limitation 1 : Most of the Transcript generators only support English language

1) People from various locations who need transcripts in their native languages are hampered by the inadequate support for non-English languages in transcription systems, which poses accessibility, inclusiveness, and accuracy problems.

2) To resolve these problems, encourage cultural sensitivity, adhere to local laws, and reach a larger market of non-English speakers, it is imperative that language support be expanded in transcribing services.

Limitation 2 : Inefficiency in the quality of the result

1) The accuracy of speech recognition systems can be hampered by poor audio quality or loud backgrounds, which can result in inaccurate or partial transcriptions of spoken information in videos.

2) It can be difficult to produce meaningful and coherent video summaries that capture the spirit and intent of the content when the audio quality is poor because context might be lost.

2.2 Limitations of Existing system or Research gap

Title of Paper	Year	Methodology used	Merits	Limitations
[6] Volatility Forecasting via Text Audio Fusion with Graph Convolutional Networks for Earnings Calls	**2020**	1. The system combines verbal and vocal cues from earnings call transcripts and audio recordings, respectively, with financial cues from a set of financial indicators. 2. The individual components are combined into a joint optimization framework using a graph convolutional network to model the interdependence between stocks and fuse the verbal, vocal, and financial features in a semi-supervised multi-task risk forecasting formulation.	1. Combines verbal, vocal, and financial features to predict stock volatility 2. It accounts for stock interdependence via graph convolutions and uses a semi-supervised multi-task learning formulation	1.Limited to S&P 500 companies 2.Designed specifically for predicting stock volatility, and may not be applicable to other financial prediction tasks.
[7]A Pattern Recognition approach to automated XBRl extraction	**2012**	Using example-based Pattern Recognition methods and combining years of developing both EDGAR filings and natural language processing software.	1. Simplified and Automated Process 2. Improved Accuracy	1. The accuracy of the system may be affected by the quality of the input data 2. The system require customization or fine-tuning to work effectively for different types of financial documents or in different contexts
[8]Transfor mer-based	(2022)	In this paper, the authors present their	1. Effective handling of long financial	The system's performance may be

Models for Long Document Summarisation in Financial Domain		experiments and systems in the financial narrative summarisation shared task, using the Longformer-Encoder-Decoder (LED) model to handle long financial reports.	reports 2. Staged fine-tuning for improved generalization.	limited by the current state of transformer-based models and natural language processing techniques
[9] Automating the Extraction of Financial Data – KTH Bachelor Thesis Report	**2022**	Basic method: A model could read a quarterly report using OCR techniques and then analyze it using NLP techniques . Input format: The input of the system are links, in other words hrefs tags to self hosted PDF hrefs tags, sent from an API	The system worked perfectly. The reason why the system is quick at extracting financial data is because most, if not all reports, use the same financial terms when presenting financial key figures. Words like EBITDA, PE-RATIO, Free cash flow, Price-to-book, Debt-to-Equity, Working Capital, Return on Equity and Price earning are used in most of the reports regardless of company size, company's geographical location or other factors.	1. The reports must be in English or Swedish as the key figures to be searched are modified to these languages. 2. This system is reliant on system 1's (collection of financial reports) output. Hence, it can't work individually.
[10] Survey Paper On Youtube Transcript Summarizer	**2023**	1.The five major processes of the module are transcript creation from video, which includes video to audio and audio to text, text to text summarization, connecting to the backend, and creating a chrome extension.	1.Clear approach: The article gives a clear and comprehensive approach that explains the design and operation of the YouTube transcript summarizer. 2.User-Friendly Chrome Extension: The development of a user-friendly Chrome extension is a major benefit as it makes the solution available to a	1.Most of the existing YouTube transcript summarizers only support English language videos. There is a need to develop summarizers that can support multiple languages. 2.The system is only available as a Chrome extension, so it cannot be used by users of

		2.A real-time chrome extension for giving summary of YouTube videos. 3.Real-time audio extraction will be used to filter it from the video and then using Speech Recognition Model of hugging sound text gets generated, and depending on the text the user will be provided summary using NLP library called SpaCy which is designed to build systems for information extraction.	large audience. 3.Efficiency and Time-Saving: The report emphasizes how the summarizing tool may help users save precious time and resources. Users may rapidly understand a video's essential points without watching the full thing by offering summaries of the information.	other browsers. 3.The system may not be able to summarize videos that are very noisy or have poor audio quality.
[11] Financial Knowledge Graph Based Financial Report Query System	**2021**	This paper presents a solution to the challenges faced in extracting useful information from complex and lengthy financial reports. With the help of this system, financial queries can be resolved in an automated and intelligent manner, leading to faster and more accurate investment decisions.	The Financial Knowledge Graph Based Financial Report Query System provides efficient and smooth access to desired information related to investment in different banks or for a particular bank.	Limited research has been done in this domain.

Table 2.2.1. Literature survey

2.3 Mini Project Contribution

Developing an earnings call analyzer with transcription, text conversion, summarization, data extraction, and data visualization capabilities offers a compelling solution for investors and financial analysts. It addresses the challenges of accessibility, time efficiency, and data extraction by providing easily digestible information from earnings calls. This tool can significantly enhance the ability to make well-informed investment decisions by quickly identifying key financial terms and statistics, allowing for easy comparison of various companies, and presenting the extracted data in a visual format, ultimately aiding users in studying the economic growth and financial health of companies.

3. Proposed System

3.1 Introduction

The proposed system - ‘Fincalls - Earnings Calls Analyzer’ acts as an effective solution for the economic development of the company as well as provide an ease of analysis to the investors.

Fig.1 Logo

This proposed system will help in maintaining a sense of transparency between the company and the investors. The real status of the company, whether positive or negative, will reach the audience instead of some biased data. Such a transparent company gains the position of reliability, and thus, becomes trust-worthy for the investors. This plays a vital role in improving the business relations of the company. Good relations are often responsible for great growth. Along with the stakeholders and the investors, the company itself can use it for gaining better insights about their performance and identifying the areas of improvement. The company can also look for the financial health of the competitors in order to stay ahead in the competition.

3.2 Architectural Framework / Conceptual Design

1. Transcript Generation

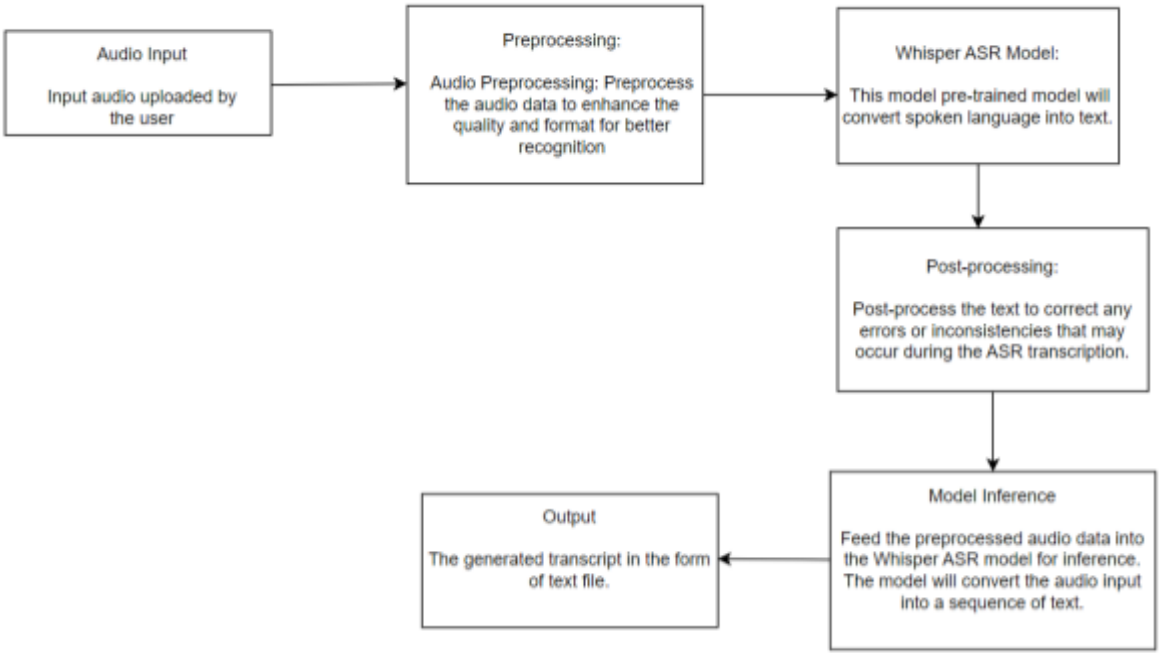


Fig. 2 Transcript Generation

The audio file taken as input will be preprocessed first. After preprocessing, it is sent to the whisper ASR model. Whisper ASR model is a pre-trained model that will convert the audio into text. It generates a text file in our desired language. The textual file generated will be further sent to the next module. Also,as the transcript is generated in various formats, it's easier for the next modules to take the data for further processes.

2. Financial Data Extraction

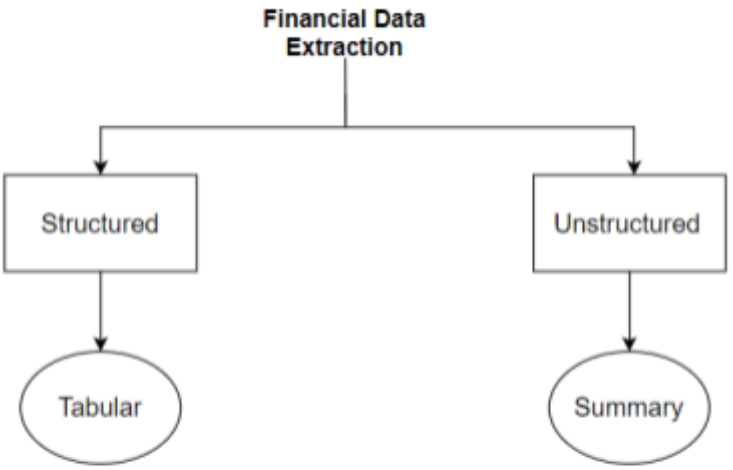


Fig. 3 Financial Data Extraction

The financial data extraction module is divided into two parts - Structured and Unstructured. The Structured financial data extraction depicts the extracted data in a tabular format where important keywords are assigned values from the transcript. Thus, the user will get an overview of the call at a glance. While, the Unstructured Financial data Extraction includes the summary of the transcript. The summarization which will be done here will be Extractive.

a. Unstructured Financial Data Extraction

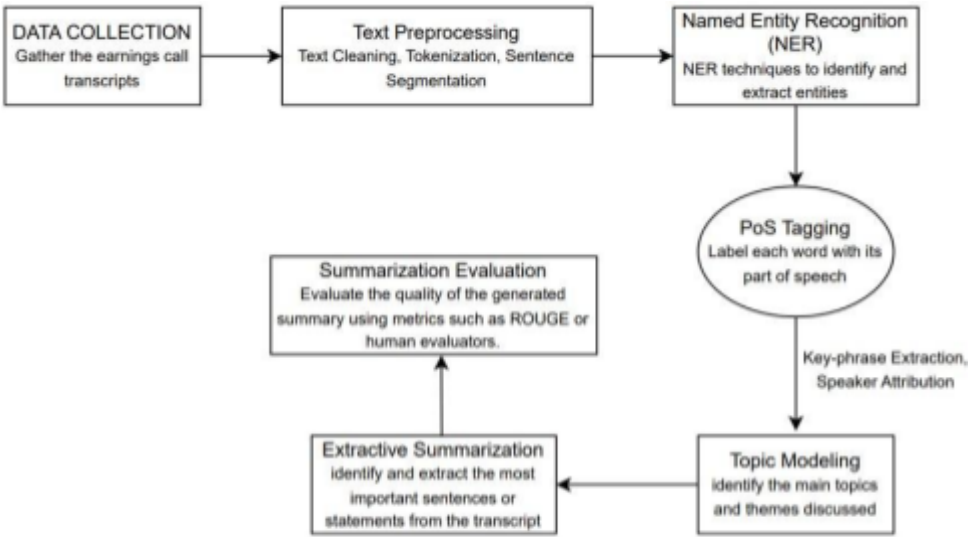


Fig. 4 Transcript Summarization

1. Data Collection
   The input of this module comes from the first module i.e. the transcript generation module. As the transcript generation module outputs the transcript files in various formats, a desired format can be easily chosen.
2. Text Preprocessing
   a. Text Cleaning
      Text cleaning involves the removal of any noise or irrelevant and non-textual elements like the timestamps, speaker identifiers, formatting, special characters, HTML tags.
   b. Tokenization
      Here, the text is broken into individual words or tokens. This is a fundamental step to prepare the text for further analysis.
   c. Sentence Segmentation
      This step consists of breaking the text into sentences to facilitate sentence-level analysis.
3. Named Entity Recognition
   Named Entity Recognition (NER) is used to identify and extract the various entities from the text. Here, the entities include the company names, financial figures, financial keywords, dates, names of the people involved in the call, etc. With the help of NER, recognition and tagging of these entities can be done.
4. PoS Tagging
   Here, each word is labeled with respect to its part of speech which includes noun, verb, adjective, etc. Hence, emphasis on understanding the grammatical structure of the text is given to extract meaningful information and establish a relationship between words.

5. Key-phrase Extraction and Speaker Attribution:
   Key-phrase extraction involves identifying and extracting important phrases or terms that represent the core concepts in the transcript. This will be done using TF-IDF.
6. Topic Modeling:
   In this step, the significant theme of the transcript will be understood which will help in the organization of the summary. Techniques such as Latent Dirichlet Allocation (LDA) or Non-Negative Matrix Factorization (NMF) can be used.
7. Extractive Summarization
   Extractive summarization involves the extraction of the most relevant sentences from the transcript. This is achieved by using algorithms that can rank the relevance of a sentence in relation to the overall content. Here, the important statements will consist of the financial results, strategic decisions, and key takeaways.
8. Summarization Evaluation
   Here, the generated summary and its quality will be evaluated using ROUGE (Recall-Oriented Understudy for Gisting Evaluation). The evaluation will be done based on the similarity between the generated summary and the reference summaries.

b. Structured Financial Data Extraction

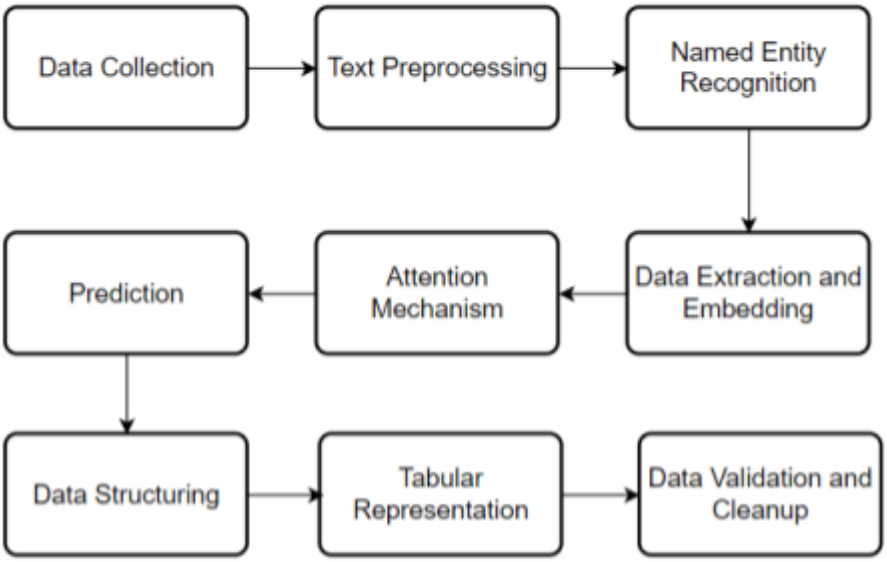


Fig. 5 Structured Financial Data Extraction

For the structured financial data extraction, the first three steps (Data Collection, Text Preprocessing, Named Entity Recognition) would be the same as that for the unstructured financial data extracted.

1. Data Extraction and Embedding
   Relevant financial data will be extracted based on the entities identified during the named entity recognition. This can be done either by using regular expressions or rule-based approach. Numerical entities will be converted into numerical values.
2. Attention mechanism
   Attention mechanism is used so that attention is given to different parts of the text. Hence, more weight will be given to financial terms and indicators.
3. Prediction
   To automate the recognition of the financial terms, a machine learning model

(classifier) will be trained to to predict financial terms in the text based on the embeddings and context. A labeled data (positive and negative) will be used.

4. Data structuring
   Here, the extracted data will be extracted in a structured format like dictionaries, a list of dictionaries or data frames to store the data.
5. Tabular Representation
   Creating DataFrame with columns for different financial entities using Pandas.
6. Data Validation and Cleanup
   The consistency and accuracy of the extracted data is checked. Missing values, data type conversion and any other anomalies are handled.

3. Interactive Data Visualization

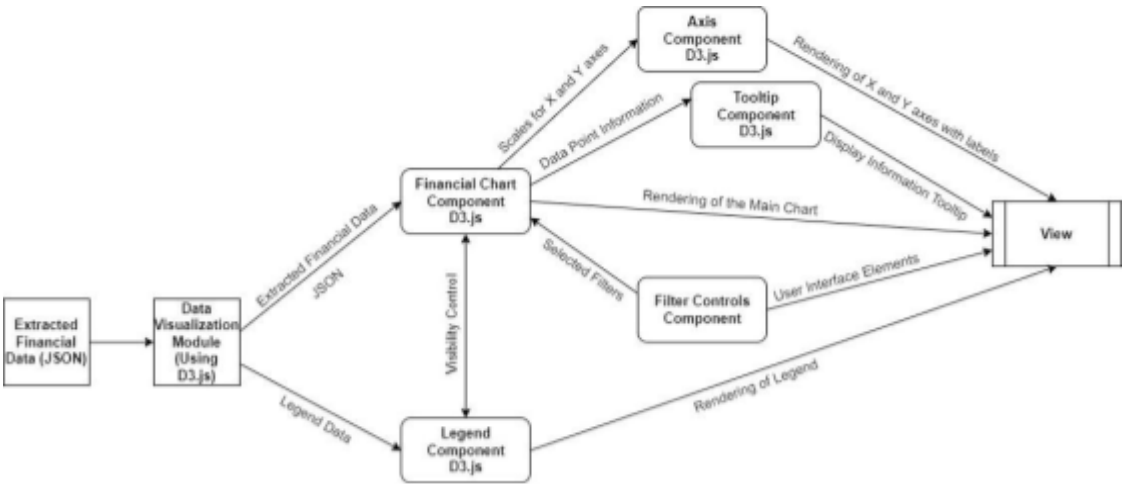


Fig. 6 Interactive Data Visualization

The extracted data will be passed on to the data visualization module of D3.js and further visualization will be made.

The architectural framework and conceptual design for an Earnings Call Analyzer System should be structured to provide a robust, scalable, and user-friendly solution. Following are the key components and design principles for such a system:

1. User-Friendly Website: The interface should be intuitive, providing easy access to essential features like uploading the audio files, getting the summarized and effectively visualized important financial data from the earnings call.
2. User Authentication: Secure registration and authentication processes are necessary to establish user profiles, and maintain a history of the user's research of different earnings calls of different companies.
3. User Profiles: Users should create profiles with relevant details, such as Email Verification, Phone Verification, Employment Verification certifications.

4. Uploading an earnings call of a company: Users can upload the earning call of a company in the format such as Video or Audio.
5. Transcript Generation: Transcript will be formed from the uploaded earnings call and the transcript could be downloaded as a pdf in the device.
6. Transcript Summarization: Summary of the generated transcript will be produced & that summary can also be downloaded in the device. Transcript summarization is important to get a quick overview of the call.
7. Financial Data Extraction: The financial parameters and relevant phrases will be extracted from the generated transcript. NER(Named Entity Recognition) techniques will be applied to identify and classify financial entities such as money amounts, currencies, dates, company names, and other relevant terms.
8. Interactive Data Visualization: Interactive data visualization will be done from the extracted financial data. It involves presenting data in graphical or pictorial form which makes the information easy to understand. Most visualization designs are to aid decision making and serve as tools that augment cognition.[12]. Data visualization is a key component to business and data analytics, allowing analysts in businesses[13].
9. Saving the analysis: This analysis can be saved and re-visited via the profile.

3.3 Algorithm and Process Design

Transcript Generation from audio files

Tool : Whisper ASR, an automatic speech recognition system developed by OpenAI

Step 1: Audio Input
Input audio file(s) that you want to transcribe.

Step 2: Audio Preprocessing
Preprocess the audio data to enhance the quality and format for better recognition. This may include noise reduction, filtering, and resampling if necessary.

Step 3: Utilize the Whisper ASR model developed by OpenAI
This model is capable of converting spoken language into text.

Step 4: Model Inference
Feed the preprocessed audio data into the Whisper ASR model for inference. The model will convert the audio input into a sequence of text.

Step 5: Post-processing:
Post-process the text to correct any errors or inconsistencies that may occur during the ASR transcription.

Step 6: Saving the transcript
Save the generated transcript file on your local device.

Keywords

1. **Revenue**
   The total income generated from a company's primary operations.
2. **Profit**
   The amount of money a company earns after deducting all costs and expenses, including taxes.
   a. **Gross profit**
      Gross profit = Revenue - COGS
   b. **Operating profit**
   c. **Net profit**
3. **Earnings per Share (EPS)**
   A measure of a company's profitability. It indicates how much profit is attributable to each share of stock.
   EPS = Net income / Number of outstanding shares
4. **Margin**
   Margins reveal the profitability of a company's operations.
   a. **Gross Margin**
      Profit as a percentage of revenue
   b. **Net Margin**
      Profit as a percentage of total revenue
5. **Cost of Goods Sold (COGS)**
   the direct costs associated with producing goods or services sold by the company.
6. **EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization)**
   A measure of a company's operating performance excluding the interest, taxes, and non-cash expenses. It is used to assess the core profitability of the business.
7. **Operating Expenses**
   Costs incurred while running a business. It also includes the COGS. Salaries, rent, utilities, and marketing expenses are also included.
8. **Cash Flow**
   The movement of money, in and out of the company.
   a. **Operating cash flow**
   b. **Investing cash flow**
   c. **Financing cash flow**
9. **Dividend**
   Payments made to the shareholders as a distribution of profits. The amount and frequency of dividends can indicate a company's financial health and shareholder value.
10. **Debt-to-Equity Ratio**
    This ratio measures a company's financial leverage by comparing its total debt to shareholder equity. A high ratio may indicate a higher financial risk.
11. **Return on Investment (ROI)**
    A percentage of the initial investment. It is used to assess the efficiency of capital allocation.
12. **Operating Income**

Operating income is also known as operating profit. It represents the profit generated from a company's core operations before interest and taxes.

13. **Guidance**
    Projections and expectations for future financial performance. It often includes revenue and earnings forecasts.
14. **Share Buybacks**
    Share buybacks involve a company repurchasing its own shares, which can impact earnings per share and shareholder value.
15. **Acquisitions and Mergers**
    Any mention of mergers, acquisitions, or strategic partnerships can be important for understanding a company's growth and expansion plans.

3.4 Methodology Applied

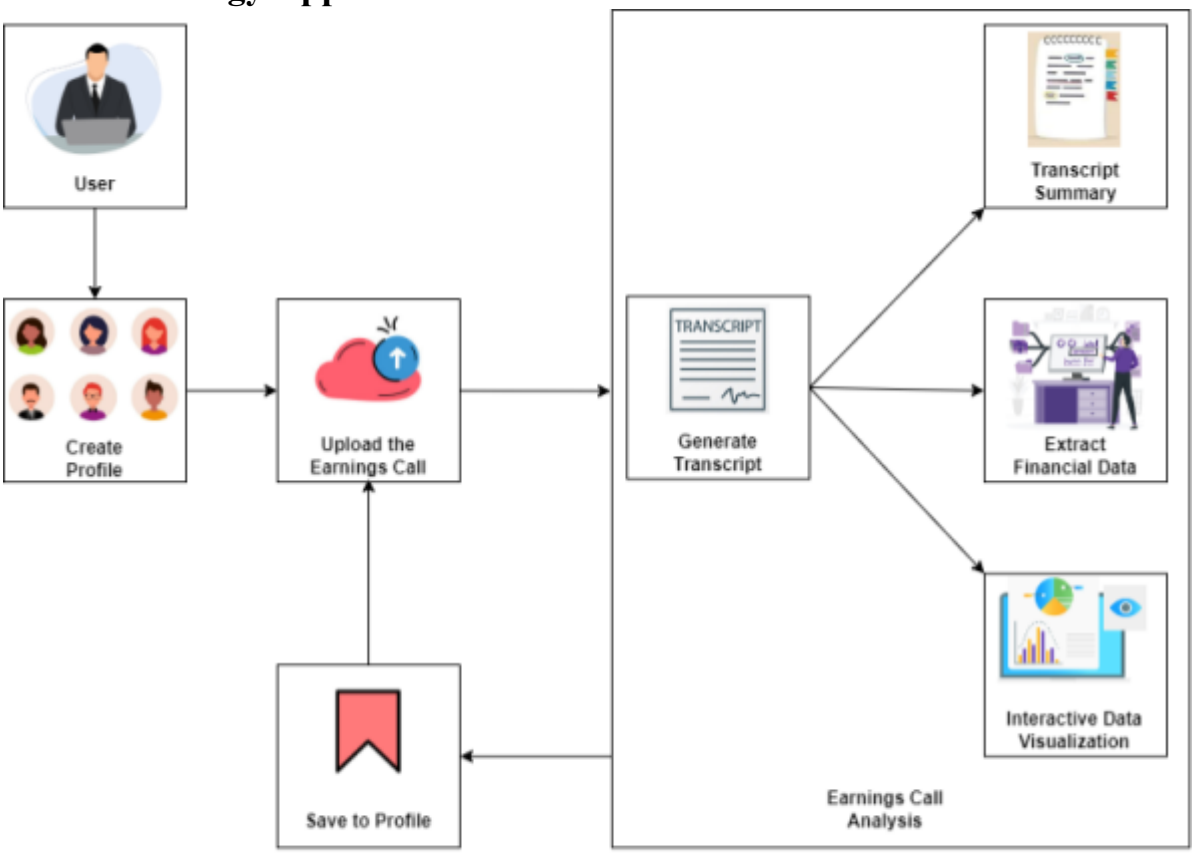


Fig.7 Block Diagram

The Steps for Corporate Earnings Calls Analysis are as follows:

1. **User Profile Creation**
2. **Uploading an earnings call of a company**
    a. User can upload the earning call of a company in the format such as Video or Audio
3. **Transcript Generation**
    a. Generation of a transcript from the uploaded earnings call.
    b. Downloading the transcript as a pdf in the device.
4. **Transcript Summarization**
    a. Generation of transcript summary from the generated transcript.

b. Downloading the transcript summary as a pdf in the device.
c. Transcript summarization is important to get a quick overview of the call.

5. **Financial Data Extraction:**
   a. The financial parameters and relevant phrases will be extracted from the generated transcript.
   b. NER(Named Entity Recognition) techniques will be applied to identify and classify financial entities such as money amounts, currencies, dates, company names, and other relevant terms.

6. **Interactive Data Visualization**
   a. Interactive data visualization will be done from the extracted financial data.
   b. Data visualization involves presenting data in graphical or pictorial form which makes the information easy to understand. Most visualization designs are to aid decision making and serve as tools that augment cognition.[7].
   c. Data visualization is a key component to business and data analytics, allowing analysts in businesses[6].
7. **Saving the analysis**
   a. This analysis can be saved and re-visited via the profile.

3.5 Hardware & Software Specifications

1. **Hardware, Software and tools Requirements**

   1. **Frontend:**
      The frontend will be done using React.js - a JavaScript Frontend Framework which will provide a user interface for our project.

   2. **Transcribing the source earning call:**
      We will use **Whisper** which is an automatic speech recognition (ASR) system to transcribe the uploaded source file. Whisper is a general-purpose speech recognition model. It is trained on a large dataset of diverse audio and is also a multitasking model that can perform multilingual speech recognition, speech translation, and language identification.

   3. **Summarization of transcript:**
      Hugging Face Transformer Library: Transformer is a Python library that provides an API to use many well known architectures. We will use BERT (Bidirectional Encoder Representations from Transformers) for text summarization. This pre-trained model called from the transformer's pipeline

will help us generate a powerful abstract summary from our generated transcript.

4. **Extracting Financial Data:**
   NLP Model and Named Entity Recognition (NER): For the extraction of financial data from our transcripts, we will require NER techniques. The pre-trained model can be used which has NER techniques, but it should be trained specifically for the extraction of financial data. We need to train the model for extracting quantitative measures, keywords related to revenue, earnings per share, revenue generated by the company and a lot more related parameters. This model will identify all the texts that match financial measures and parameters from the generated transcripts.

5. **Data Visualization :**
   D3.js: D3.js is the JavaScript Library that will help us create visual elements. We can create beautiful visualizations based on our requirements. The financial data extracted will be preprocessed and then represented in any kind of visualization, like graphs, word clouds, and charts. This visualization will help the investors identify the patterns and trends in the data. The investor will be able to interact efficiently with the key insights of the call and make proper decisions.

3.6 Experiment and Results for Validation and Verification

When we write commands in anaconda terminal we get the expected results:

1. English audio to english text:

   Command: **whisper "test2.mpeg" --language English --model medium**

```
(text-speech) C:\Users\purte\OneDrive\Desktop\audio>whisper "test2.mpeg" --language English --model medium
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:114: UserWarning: FP16 is not supporte
d on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:05.560]  customer-centric strategy is best validated through client metrics we report, which show
[00:05.560 --> 00:11.760]  a steady increase in the number of clients in every revenue bucket. In Q2, we added two
[00:11.760 --> 00:18.200]  more clients year-on-year in the 100 million plus band, bringing the total to 61. Thirteen
[00:18.200 --> 00:24.440]  more clients in the 50 million plus band, bringing the total to 137. Nine more clients
[00:24.440 --> 00:29.760]  in the 20 million, bringing the total to 292. Twenty-eight more clients in the 10 million
[00:29.760 --> 00:36.320]  plus band, the total to 483. Thirty-eight more clients in the 5 million plus band, bringing
[00:36.320 --> 00:42.200]  the total to 688. And 62 more clients in the 1 million plus band, bringing the total to
[00:42.200 --> 00:49.680]  1,272. I will now request Krithi to speak on the demand drivers during the quarter.
[00:49.680 --> 00:55.320]  Thank you, NGS. Given client caution over the macro overhang, we continue to see the
[00:55.320 --> 01:01.360]  prioritization of spending from discretionary areas to cost optimization. This is driving
[01:01.360 --> 01:06.480]  a significant deal momentum towards large outsourcing fees, vendor consolidation, and
[01:06.480 --> 01:12.360]  operating model transformation. We had a very strong order book in Q2 with a TCB of $11.2
[01:12.360 --> 01:20.720]  billion, our second highest TCB ever, and a book-to-build ratio of 1.6. BFSI TCB continued
[01:20.720 --> 01:27.520]  to be very robust at $3 billion, as also the consumer business order book at $1.4 billion.
```

Fig. 8 English Audio to English Text

test2.mp3 is an audio file and we get the desired transcript. We also get the file test2.mp3 in many different formats:

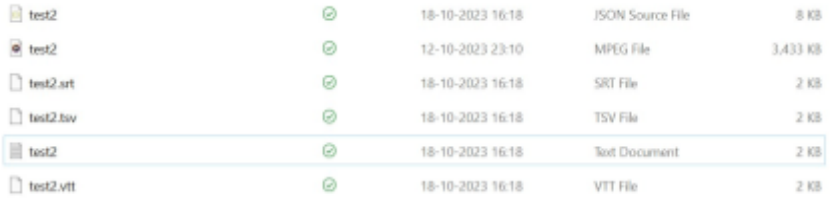


Fig. 9 Transcript File Formats

The transcript is also generated in the pdf format.

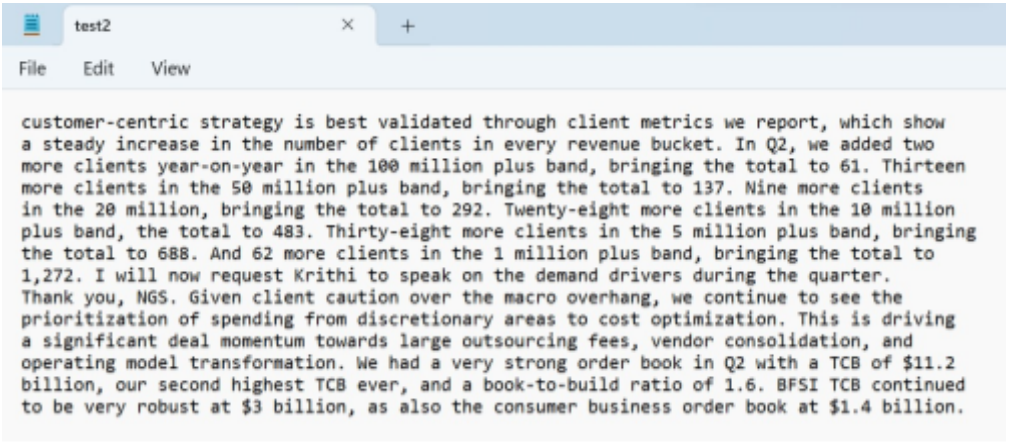


Fig. 10 Transcript Text File

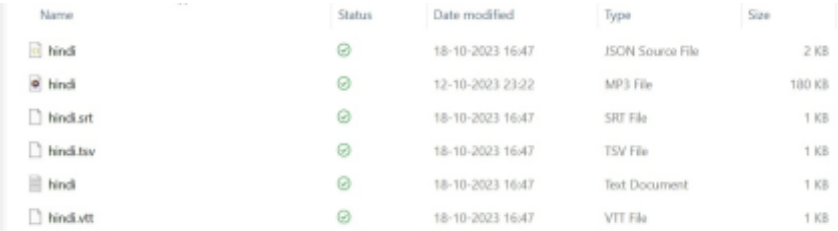
2. Hindi audio file to Hindi text

   Command: **whisper "hindi.mp3" --language Hindi --model medium**

```
(text-speech) C:\Users\purte\OneDrive\Desktop\audio>whisper "hindi.mp3" --language
Hindi --model medium
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:1
14: UserWarning: FP16 is not supported on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:07.600]  हाई मेरा नाम है री है अर मैं आज आप लोगो को पढ़ा उंगा कि अप
ने अई किस धारा से इस्तमाल किया जा सकता है।
```

Fig. 11 Hindi Audio to Hindi Text

Here we generate a transcript of a hindi audio file.



Name	Status	Date modified	Type	Size
hindi	✓	18-10-2023 16:47	JSON Source File	2 KB
hindi	✓	12-10-2023 23:22	MP3 File	180 KB
hindi.srt	✓	18-10-2023 16:47	SRT File	1 KB
hindi.tsv	✓	18-10-2023 16:47	TSV File	1 KB
hindi	✓	18-10-2023 16:47	Text Document	1 KB
hindi.vtt	✓	18-10-2023 16:47	VTT File	1 KB

Fig. 12 Hindi Transcript Files Format

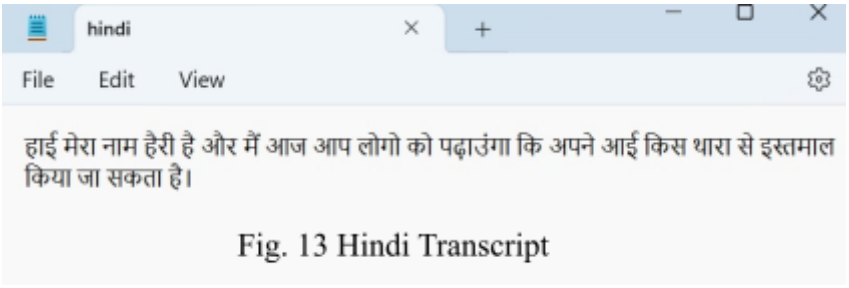


Fig. 13 Hindi Transcript

3. Japanese audio to Japanese text and then japanese audio to english text:

   Commands: **whisper "anime2.wav" --language Japanese**

   whisper "anime2.wav" --language Japanese --task translate

```
(text-speech) C:\Users\purte\OneDrive\Desktop\sample-music>whisper "anime2.wav" --language Japanese
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:114: UserWarning: FP16
is not supported on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:02.000] にゃんぱすー

(text-speech) C:\Users\purte\OneDrive\Desktop\sample-music>whisper "anime2.wav" --language Japanese --tas
k translate
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:114: UserWarning: FP16
is not supported on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:01.500]  Nyampassu!

(text-speech) C:\Users\purte\OneDrive\Desktop\sample-music>whisper "anime1.wav" --language Japanese
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:114: UserWarning: FP16
is not supported on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:03.500] なにやったって 変わったって関係ない
[00:04.500 --> 00:07.000] 君は 倒せ君だよ

(text-speech) C:\Users\purte\OneDrive\Desktop\sample-music>whisper "anime1.wav" --language Japanese --tas
k translate
C:\Users\purte\anaconda3\envs\text-speech\Lib\site-packages\whisper\transcribe.py:114: UserWarning: FP16
is not supported on CPU; using FP32 instead
  warnings.warn("FP16 is not supported on CPU; using FP32 instead")
[00:00.000 --> 00:04.000]  It doesn't matter what you do, or what you do.
[00:04.000 --> 00:07.000]  You're the one I'm looking for.
```

Fig. 14 Japanese audio to Japanese text and then japanese audio to english text

Here we first transcribed two Japanese audio files (in Japanese itself) and then again transcribed the files translated in English. Hence we got transcription from Japanese to English language.

3.7 Result Analysis and Discussion

1) Multilingual Transcription : Transcripts may be created from English to any language and vice versa which effortlessly crosses linguistic borders.

2) Simple to Use: Anyone can easily have an access to the transcribed file

3) Accuracy : It provides great accuracy to the users

4) Fast response time : For any real-time system , time is of essence. Whisper provides a response quickly which enhances the user experience.

5) Generates text file on transcription immediately : Convenience is crucial. When a transcription is finished, whisper creates a text file for the user. No need to manually copy and paste text. Users may access and use the transcribed text right away , which helps them to save time and effort.

3.8 Conclusion and Future work.

Thus we have successfully implemented transcript generation in this semester.

Advantages of using FinCalls – Earnings Calls Analyzer

1. Clarity and Accessibility: It simplifies complex earnings call discussions by converting them into written transcripts, making financial information more accessible to everyone.
2. Efficiency and Accuracy: Automation of transcript generation and data extraction processes improves efficiency and reduces the chances of errors, ensuring that financial insights are precise and reliable.
3. Informed Decision-Making: The system empowers businesses to make informed decisions by presenting financial data through clear and easy-to-understand visualizations, aiding in strategy formulation.
4. Stakeholder Engagement: Improved transparency and concise summaries enhance communication with investors and stakeholders, fostering trust and potentially attracting more support.
5. Competitive Advantage: The ability to quickly analyze and visualize financial data provides a competitive edge, enabling businesses to respond promptly to market changes.

In the next semester we are going to implement the following :

1. Transcript summarization
2. Financial data extraction
3. Data visualization
4. Extracting keywords from the call
5. Future earnings prediction for the investors
6. Sentiment analysis of the call
7. A chatbot for the investors

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