PROJECT PROPOSAL

INTRODUCTION

In the proposed project, we aim to develop a system that utilizes a combination of natural language processing, speech processing, and machine learning techniques to analyze emotions in live conversations. The system will be able to process real-time audio data, extract relevant features, and classify the speaker's emotional state based on those features. By providing instantaneous feedback, the system has the potential to be used in therapeutic settings, customer service departments, research laboratories, and in interactions between humans and computers that are more personalized.

MOTIVATION

In today's world, mental health concerns are on the rise, so we need tools to help detect, intervene, and support them early. This can be addressed with real-time emotion analysis, which provides immediate feedback to the individual or their caregiver. Business owners can improve customer service by understanding customer emotions in real time, and they'll be able to make better product recommendations. Additionally, emotion analysis can supplement and enhance traditional observation methods in therapeutic and research settings, offering therapists and researchers unparalleled insights into human emotional dynamics.

BACKGROUND

Emotions affect not just what we say, but also how we make decisions, remember things, and form relationships. Psychology, therapists, and human observers have traditionally been tasked with understanding and interpreting emotions. There's a growing interest in building computational models for recognizing and interpreting human emotions, especially in live conversations, thanks to advanced Natural Language Processing (NLP) and machine learning techniques.

GOALS

The aim of this project is to develop a comprehensive system that is capable of real-time emotion analysis during live conversation, enhancing human-computer interaction, aiding therapeutic interventions, and providing valuable insight into the various aspects of a variety of industries including customer service and research.

OBJECTIVES

- Emotion Detection: Create a model that can accurately detect emotions from live audio.
- Real-time Processing: Make sure audio data is processed and analyzed in real-time, so you can get instant feedback.
- User Interface: Create an intuitive user interface for business and therapists to see real-time emotion analysis results.
- Validation and testing: Make sure the system is accurate, reliable, and usable in real-world situations.

R&D TASKS

- **Data Collection & Preprocessing**

  - Make a collection of audio samples with emotional labels.
  - Make sure the data is consistent and noise-free by preprocessing it.

- **Feature Extraction**
  - Extract emotional features from audio data based on linguistic and acoustic features.

- **Model Development & Training**

  - Find a machine learning algorithm that works for emotion classification.
  - Preprocessed data and extracted features are used to train the selected models.

- **Real-time Implementation**

  - Develop a system that can process and input audio data in real-time.
  - Make this architecture work with the trained emotion analysis model.

- **User Interface Design**

  - Design and develop an interactive interface to display real-time emotion analysis.
  - Make sure the interface is easy to use and adaptable to different applications.

- **Testing & Validation**

o   Evaluate the accuracy and responsiveness of the system with real users.

o   Improve performance by collecting feedback and iterating on the system design.

PROPOSED TIMELINE

Weekly / Biweekly	Tasks	Expected Task Milestone/Outcomes
08/21 – 08/25	Data Collection & Preprocessing: Begin collecting and preprocessing suitable datasets for emotion analysis.	Identified primary data sources and initiated the data collection process.
08/28 – 09/01	Data Collection & Preprocessing: Complete data gathering and start the preprocessing steps.	Completed data collection and initiated preprocessing.
09/04 – 09/08	Feature Extraction: Begin extracting relevant acoustic and linguistic features from the data.	Developed a pipeline for the extraction of features.
09/11 – 09/22	Preliminary Model Development: Research and set up the initial architecture for machine learning models.	Initial model architecture established and ready for training.
09/25 – 09/29	Model Training: Begin training the machine learning models using preprocessed data and extracted features.	Training of primary models initiated.
10/02 – 10/06	Model Evaluation: Evaluate the performance of trained models on a validation set.	Initial model evaluations completed
10/09 – 10/13	• Real-time Implementation: Start developing the system for real-time audio data input and processing. • Mid-term report submission	Preliminary real-time processing system set up.

10/16 – 10/20	User Interface Design: Begin designing the interactive interface for the system.	Basic design outline for the user interface established.
10/23 – 10/27	Model Refinement: Based on initial evaluations, refine and retrain models.	Refined models trained and ready for integration.
10/30 – 11/10	System Integration: Integrate the trained model with the real-time processing setup and user interface.	Integrated system with real-time emotion detection capabilities
11/13 – 11/17	Testing: Conduct initial testing of the system with pilot users.	Feedback from initial pilot tests collected.
11/20 – 11/24	System Iteration: Based on feedback, make necessary adjustments to the system.	System improvements implemented based on pilot feedback.
11/27 – 12/01	Final Testing: Conduct final tests and evaluations of the system.	System validated and ready for broader deployment.
11/04 – 11/12	- Documentation & Wrap-up: Finalize documentation, deploy the system for broader user access, and wrap up the project. - Final Repot Submission	System fully documented and deployed. Project completion.