Emotion Recognition through Voice Analysis using Deep Learning Techniques

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Agenda

Introduction:
Develop an emotion recognition system using voice analysis.

Primary goals:
Enable the system to recognize and classify the moods and emotions conveyed through a person's speech.

Motivation:
The motivation behind the project lies in the vast potential applications of emotion recognition systems, which can significantly improve human-computer interactions and user experiences across a range of domains. We can ensure that our deep learning models are trained to recognize emotions accurately across different populations and contexts. This is essential for creating a robust and reliable emotion recognition system.

Introduction

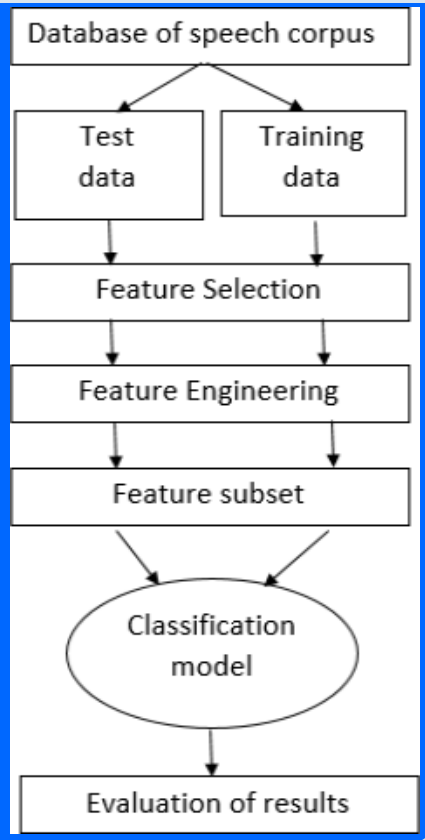
The project aims to develop an advanced emotion detection system using deep learning techniques to enhance applications such as voice-based IoT applications. The system aims to accurately identify and classify emotions conveyed through human speech, and it involves collecting and analysing emotional speech data, extracting relevant features, and applying deep learning methods to build a robust and accurate emotion detection model. The system intends to provide improved performance and capabilities, transforming the way voice-based intelligent systems interact with users and understand their emotions.

Purpose of the Project:

- The purpose of this project is to utilize deep learning techniques for emotion recognition in human speech.
- This will enhance the performance and user experience of voice-based applications, including healthcare services such as mental health monitoring and remote communication with medical professionals.
- By accurately detecting and classifying emotions in a person's speech, this system can help healthcare providers better understand the emotional state of their patients, allowing for more personalized and empathetic care.
- Furthermore, the project aims to demonstrate the potential of machine learning tools such as in the field of medicine, encouraging the adoption of such technologies for improved diagnostics, patient care, and overall healthcare outcomes.

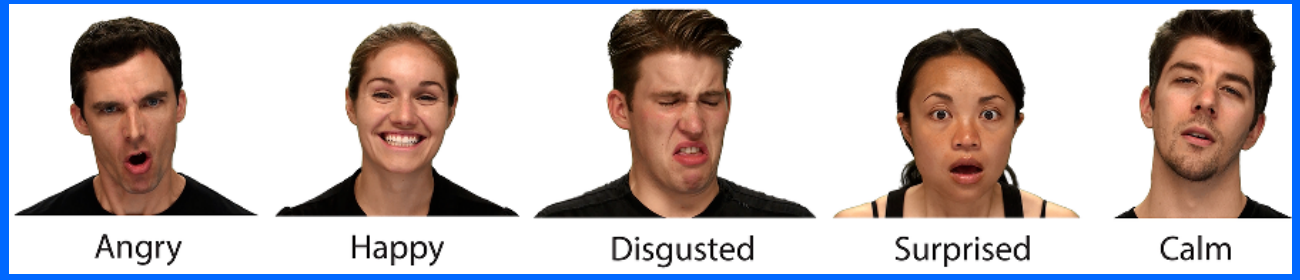
Methodology

- Data Collection
- Feature Engineering
- Model Development
- Model Evaluation



Data Collection and Analysis

- RAVDESS dataset
- Preprocessing and feature extraction
- Deep learning techniques: CNNs and RNNs



Model Training and Evaluation

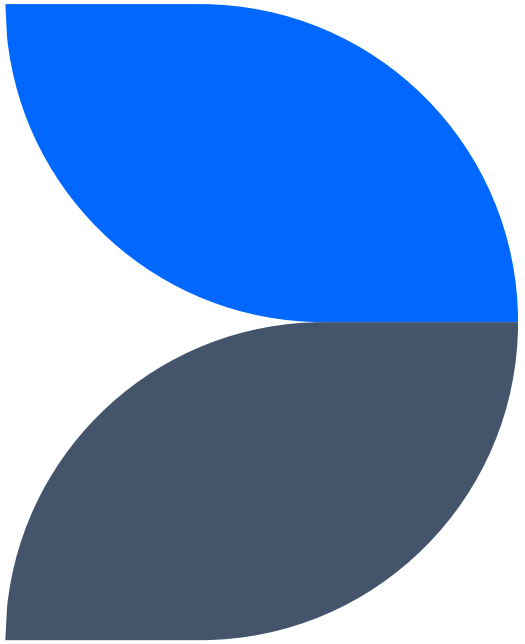
- 8 different models tested
- CNN + LSTM model selected
- Confusion matrices, precision, recall, and F1-score

Model Analysis

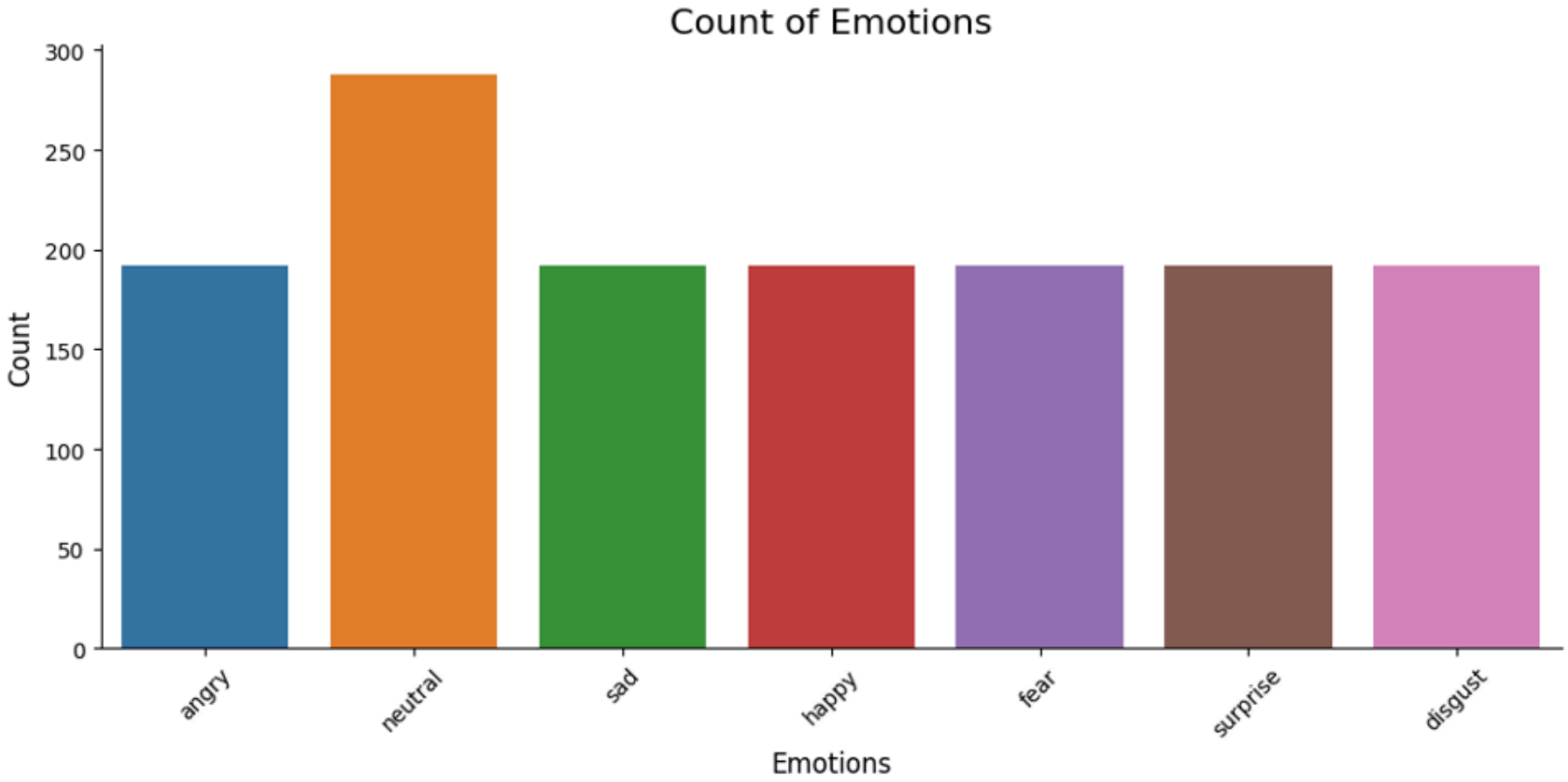
- The analysis of the data revealed patterns and features that are associated with different emotions in human speech.
- By training the deep learning model on this data, it was able to identify these patterns and effectively classify speech samples based on the emotions they convey.
- The results demonstrated that the proposed system can accurately detect emotions from speech signals and frequencies

Primary goal

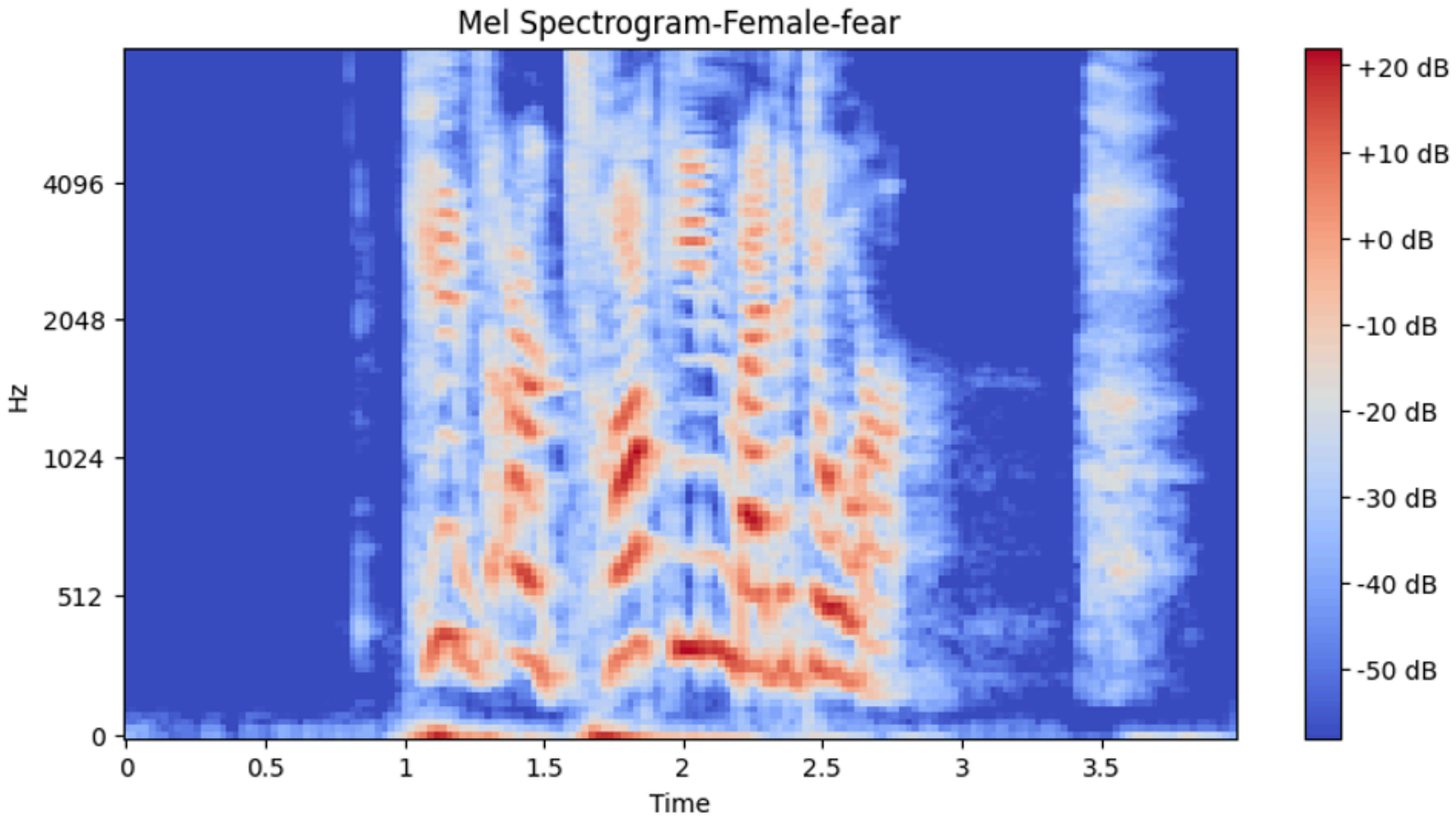
Classify the moods and emotions conveyed through a person's speech.



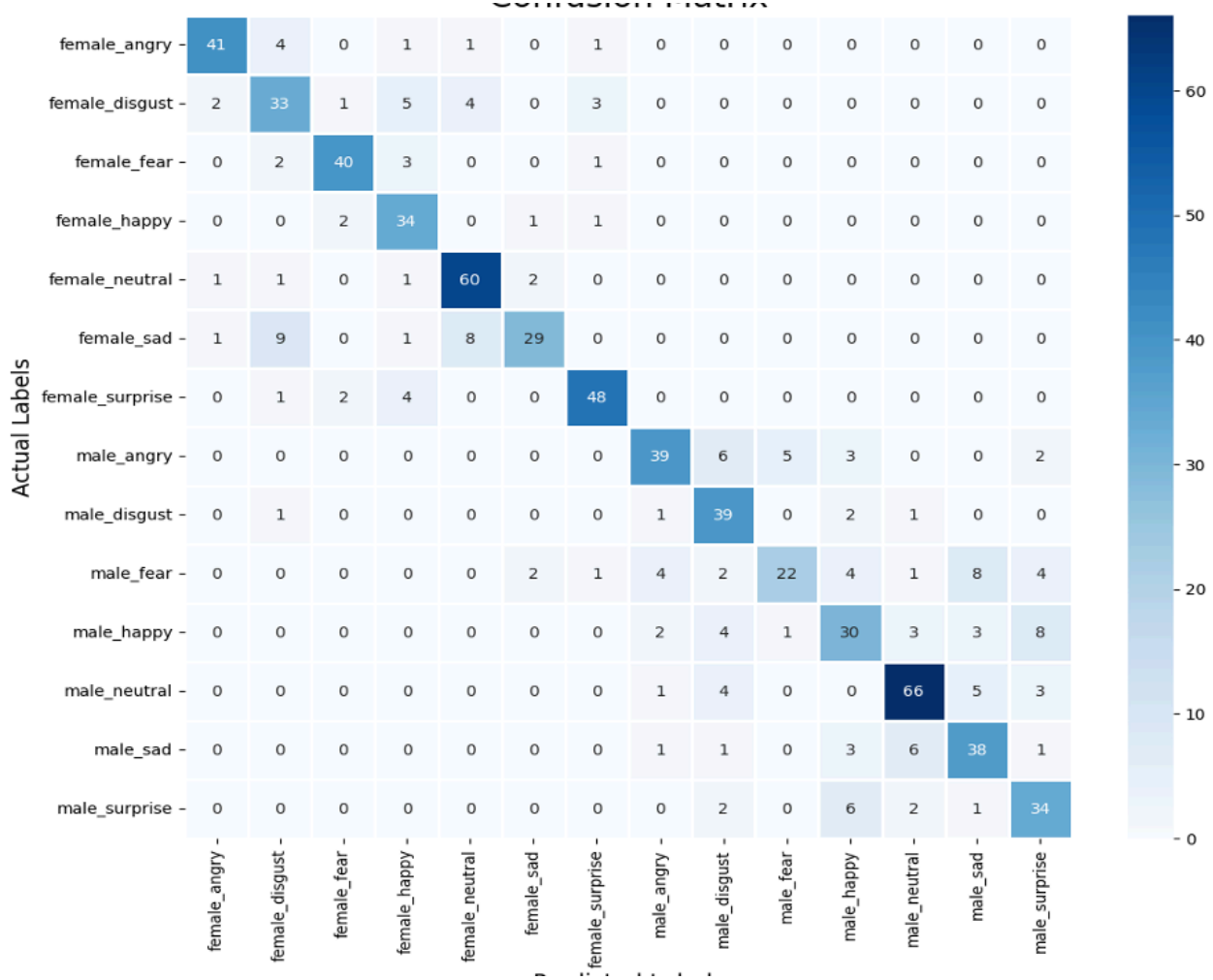
Count of Emotions



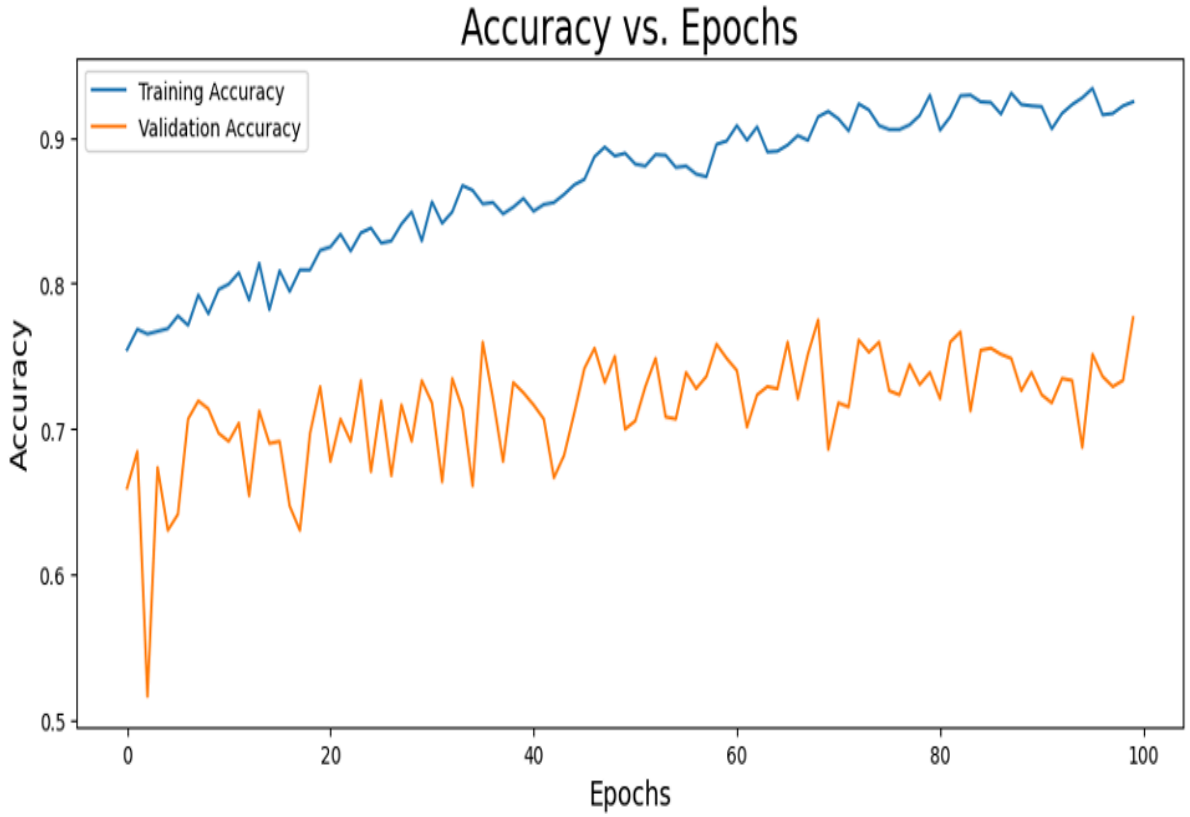
Mel Sectrogram-Female-fear



Confusion Matrix



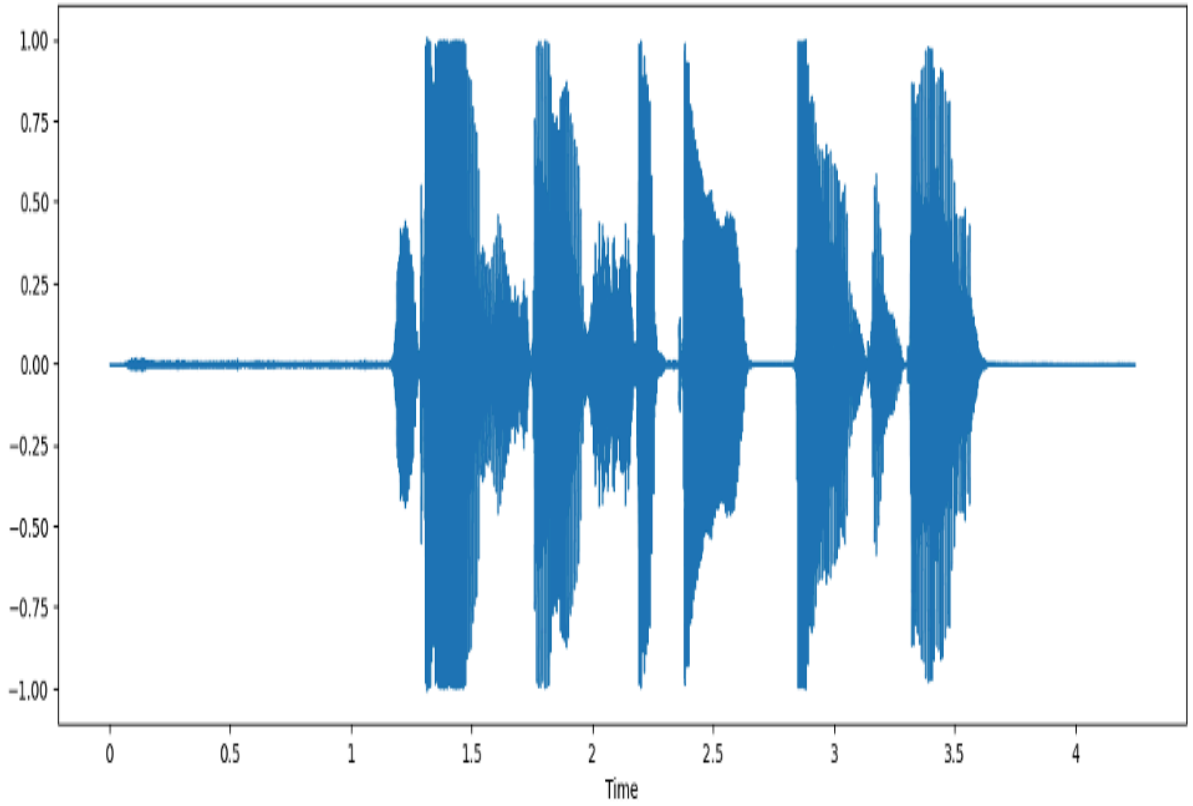
Accuracy vs. Epochs



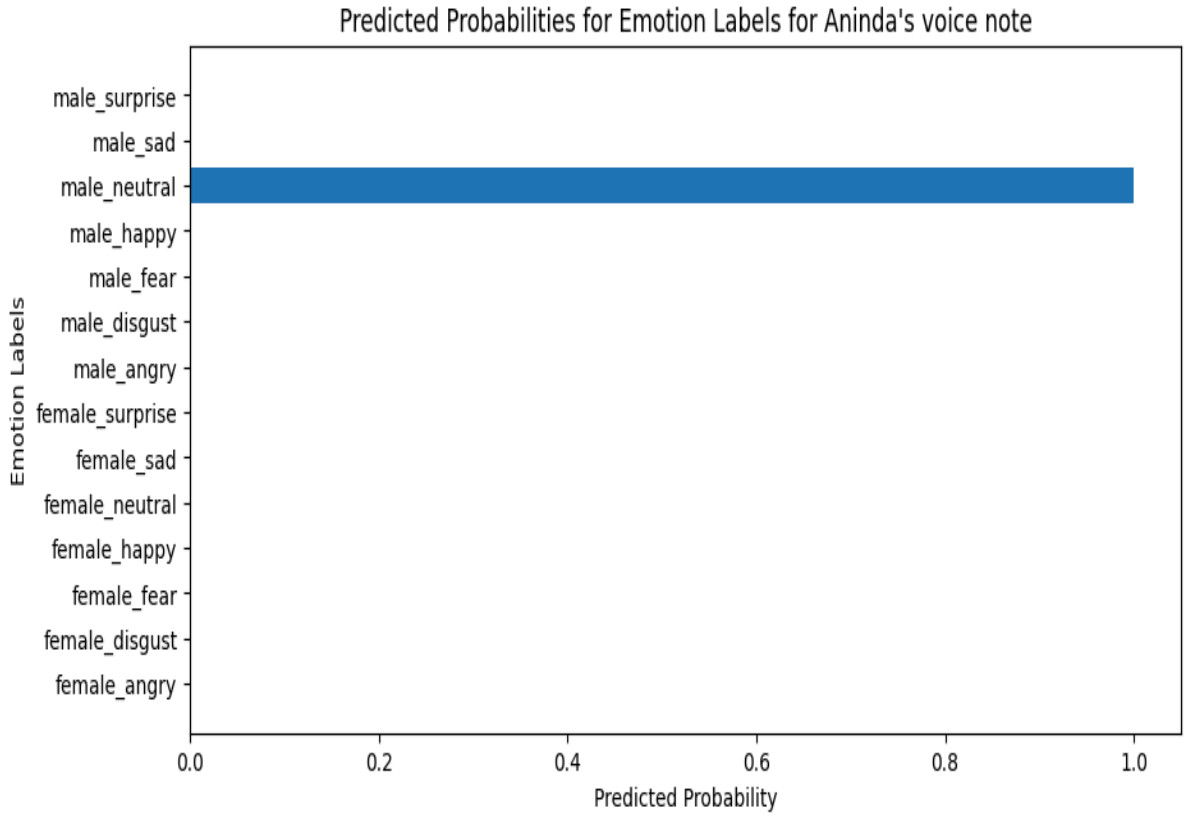
_Precision, recall, f1-score, support

	precision	recall	f1-score	support
female_angry	0.91	0.85	0.88	48
female_disgust	0.65	0.69	0.67	48
female_fear	0.89	0.87	0.88	46
female_happy	0.69	0.89	0.78	38
female_neutral	0.82	0.92	0.87	65
female_sad	0.85	0.60	0.71	48
female_surprise	0.87	0.87	0.87	55
male_angry	0.81	0.71	0.76	55
male_disgust	0.67	0.89	0.76	44
male_fear	0.79	0.46	0.58	48
male_happy	0.62	0.59	0.61	51
male_neutral	0.84	0.84	0.84	79
male_sad	0.69	0.76	0.72	50
male_surprise	0.65	0.76	0.70	45
accuracy			0.77	720
macro avg	0.77	0.76	0.76	720
weighted avg	0.78	0.77	0.76	720

_Librosa Waveplot for Aninda's voice



Predicted Probabilities of Uploaded Voice



Conclusion

- Successful development of a speech emotion detection system
- Potential applications in various fields
- Future work: advanced machine learning techniques, expanded dataset

Thank you