Speech Emotion Recognition

(SER)

By

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Prepared for UMBC Data Science Master Degree
Data 606 Capstone project
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Introduction

- **What is Speech Emotion Recognition (SER)**
- **Significance of SER**

Overview

The primary objective of this project is to develop a robust Speech Emotion Recognition (SER) model that can accurately identify and classify the emotions conveyed through a speaker's voice.

My aim is to achieve the following key goals:

Accurate Emotion Classification

Cross-domain Applicability

Real-world scenarios & Applications

Methodology

Dataset Preprocessing

- Load Audio files
- Extract labels
- Audio Resampling
- Resize to Fixed length

Data Augmentation

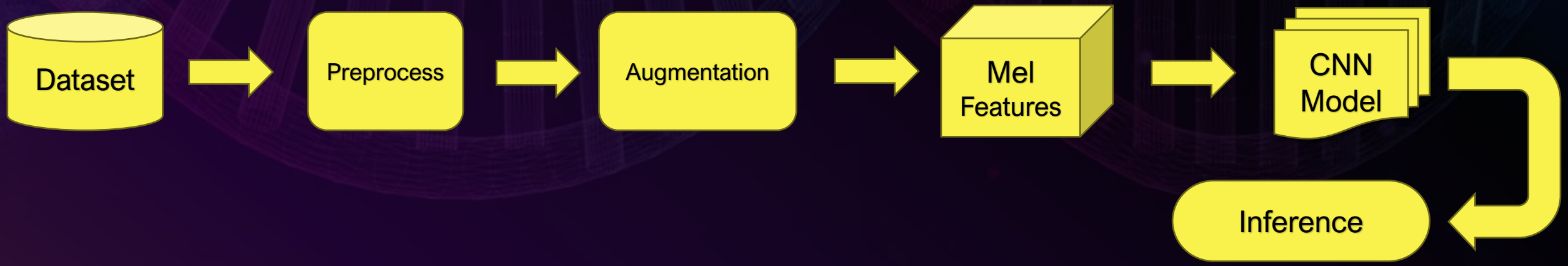
- Noise
- Time shifting
- Pitch shifting
- Time stretch

Feature Extractions

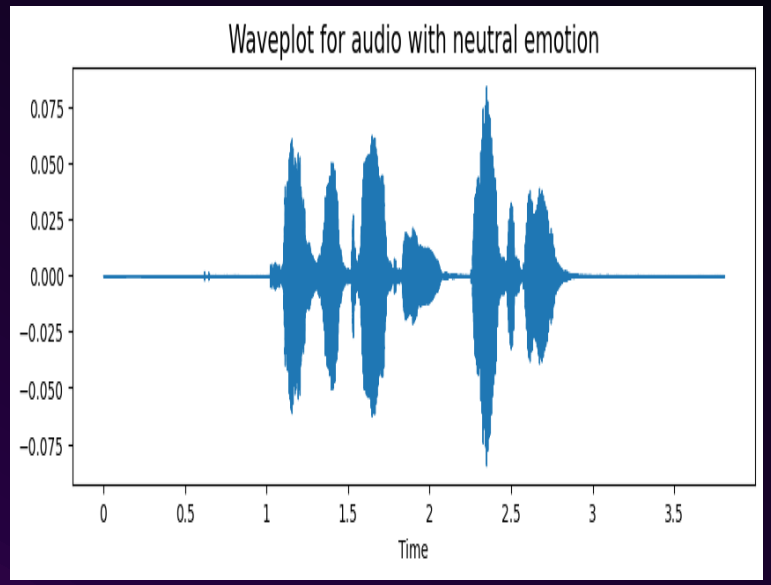
- STFT
- Mel spectrogram
- MFCC

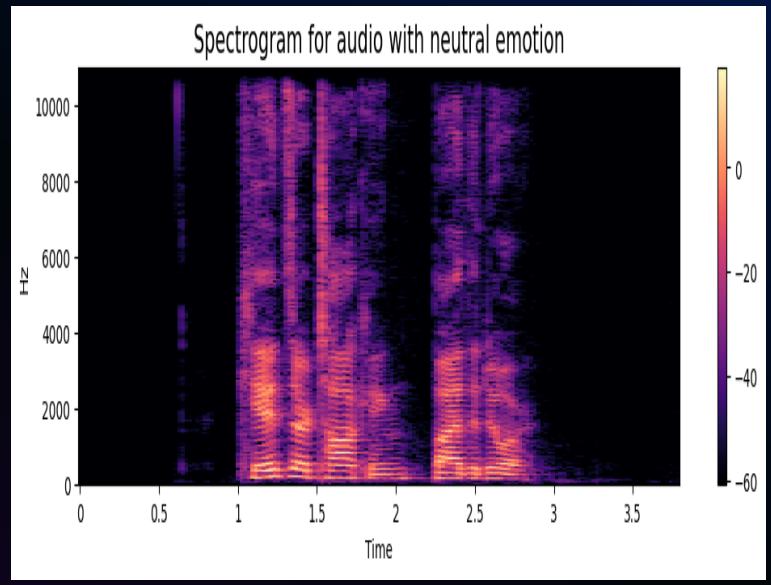
Model Training & Validation

- CNN model

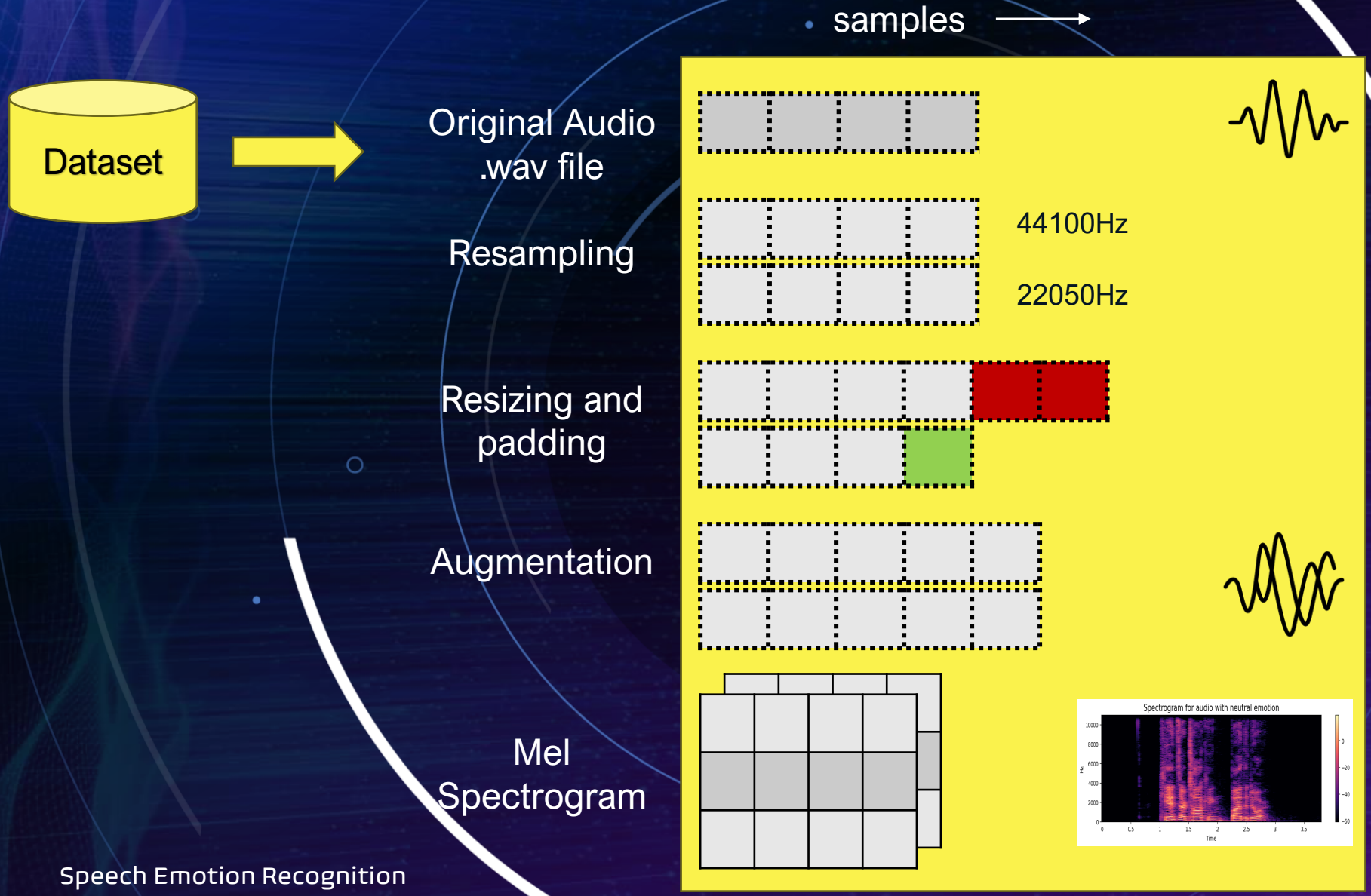


Wave plot and Spectrogram

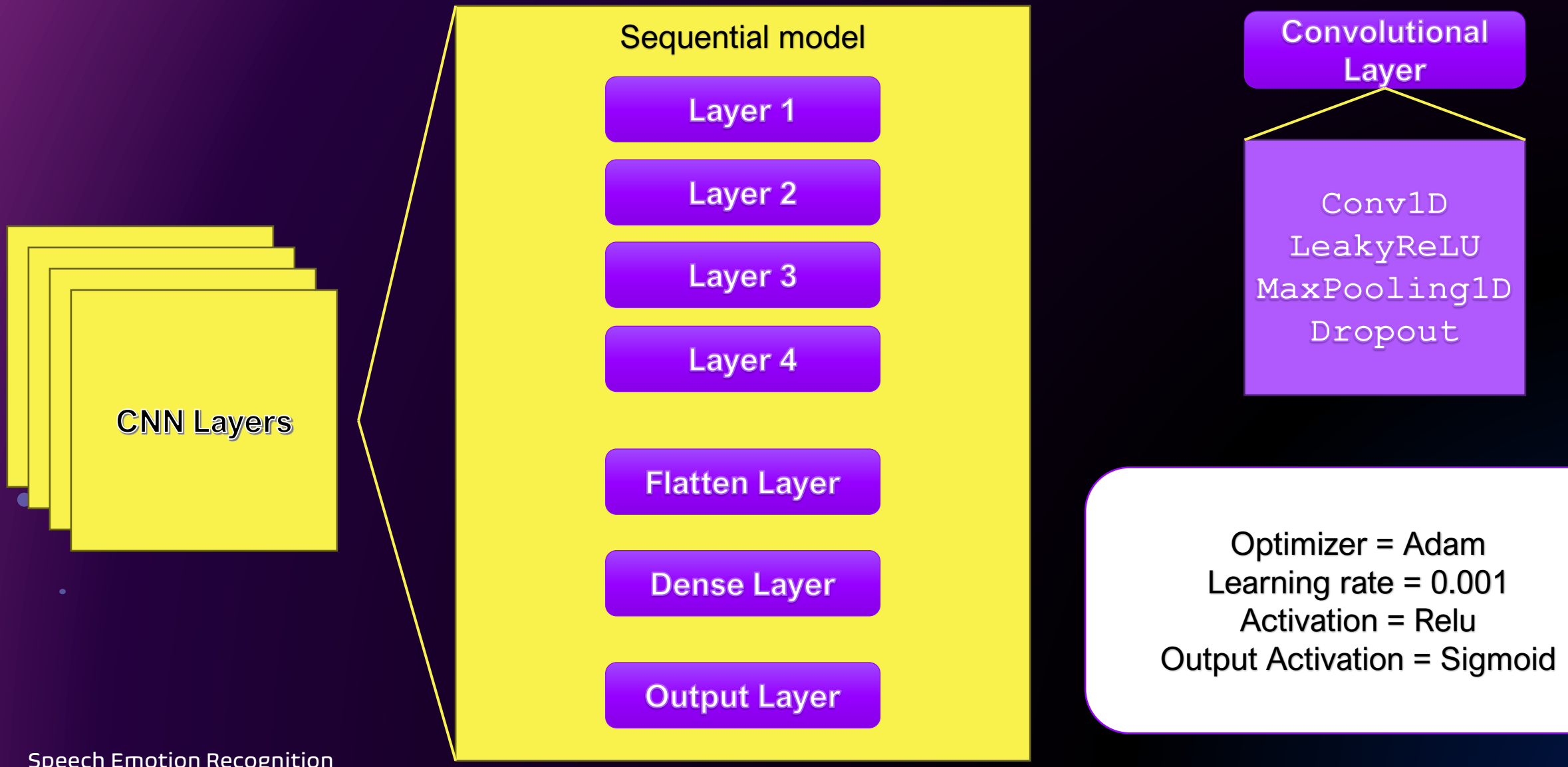




Architecture

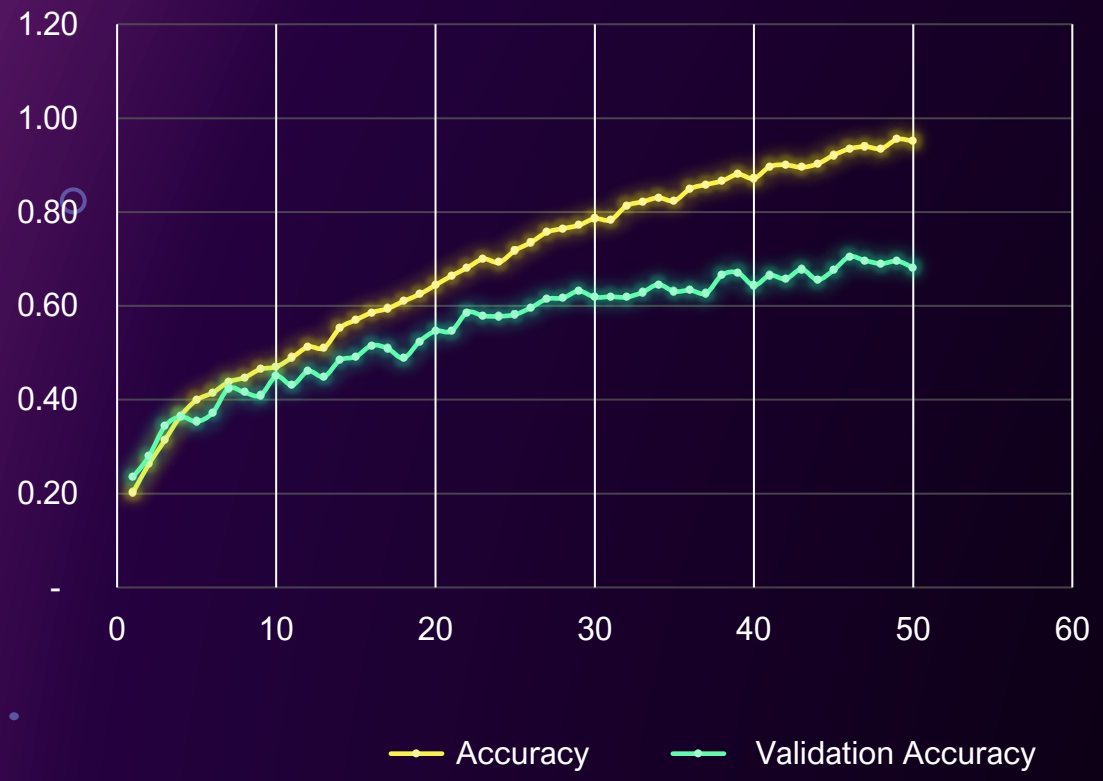


CNN - Architecture



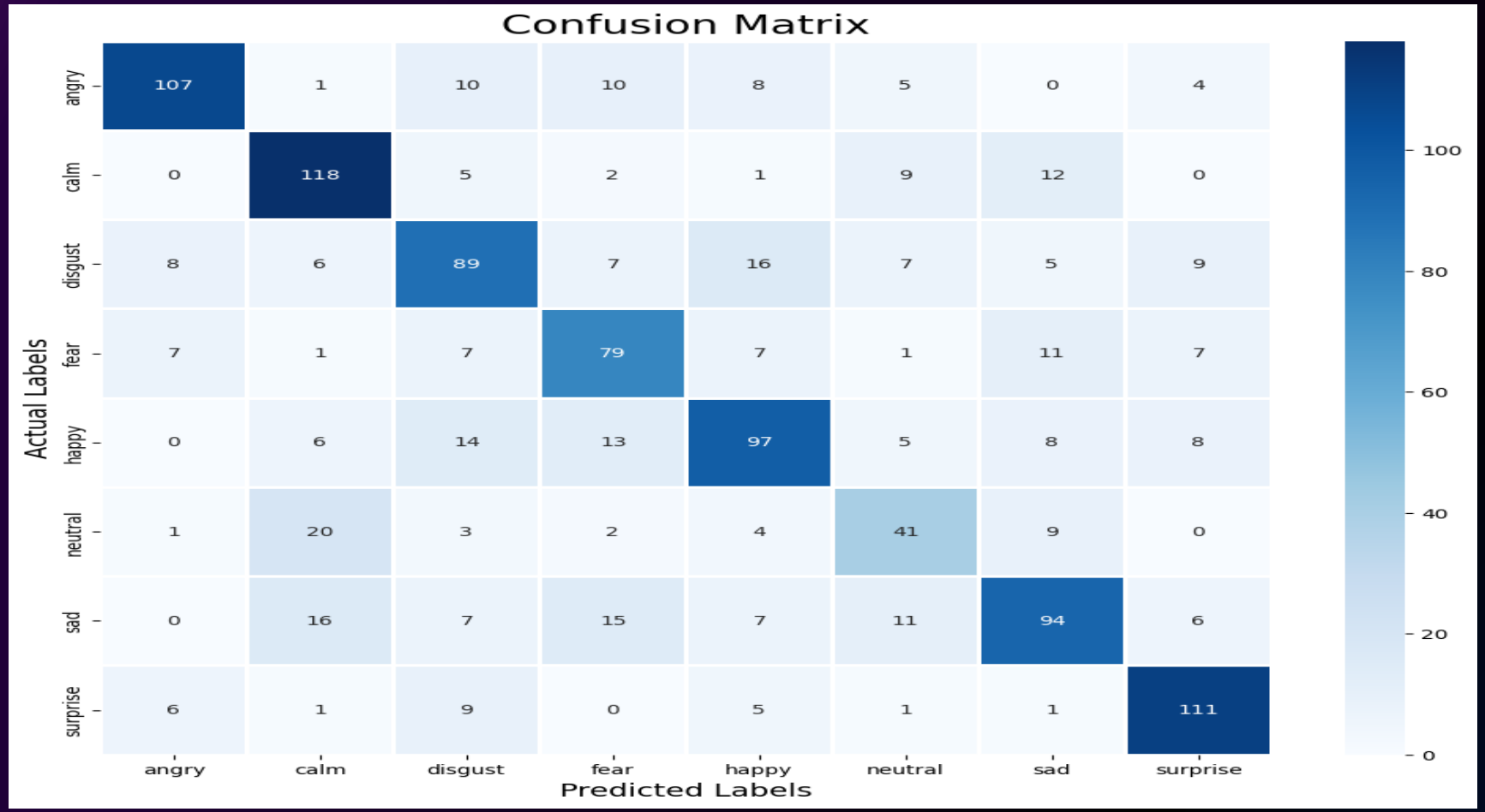
Optimizer = Adam
Learning rate = 0.001
Activation = Relu
Output Activation = Sigmoid

Results


1.20
1.00
0.80
0.60
0.40
0.20
-
0
10
20
30
40
50
60
Accuracy
Validation Accuracy


0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40
50
60
Loss
Validation Loss

Confusion Matrix



Classification Report

	Precision	Recall	F1-Score	Support
Angry	0.83	0.74	0.78	145
Calm	0.70	0.80	0.75	147
Disqust	0.62	0.61	0.61	147
Fear	0.62	0.66	0.64	120
Happy	0.67	0.64	0.66	151
Neutral	0.51	0.51	0.51	80
Sad	0.67	0.60	0.64	156
Surprise	0.77	0.83	0.80	134
Accuracy			0.75	1080
Macro Avg	0.67	0.67	0.77	1080
Weighted Avg	0.68	0.68	0.78	1080

Conclusion

- The model demonstrates effectiveness in speech emotion recognition, with notable improvements in both training and validation metrics. As i move forward, ongoing refinement and exploration of advanced techniques will be crucial for achieving even higher accuracy and ensuring robustness across diverse real-world scenarios.

Thank you

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Data 606 Data Capstone project

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