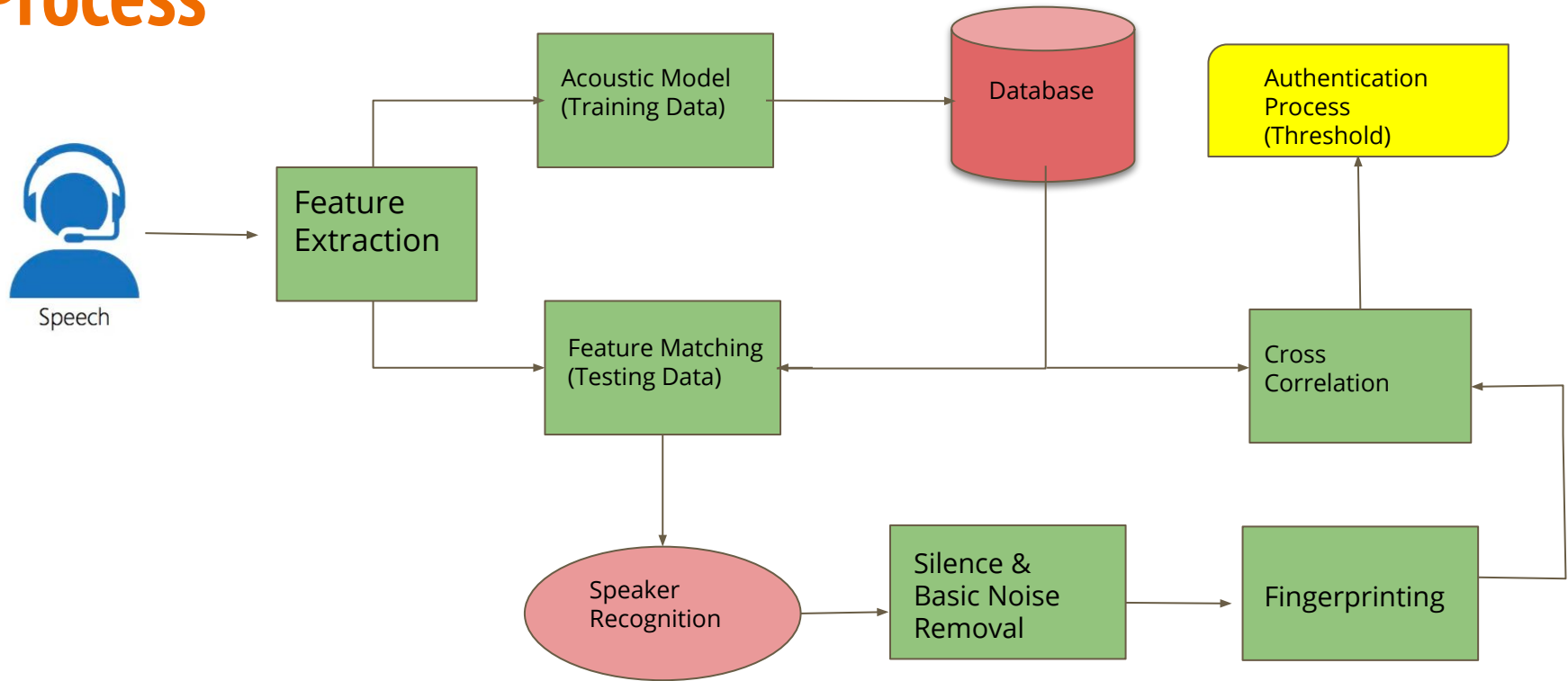

Speaker Recognition & Authentication

— Group 3 —

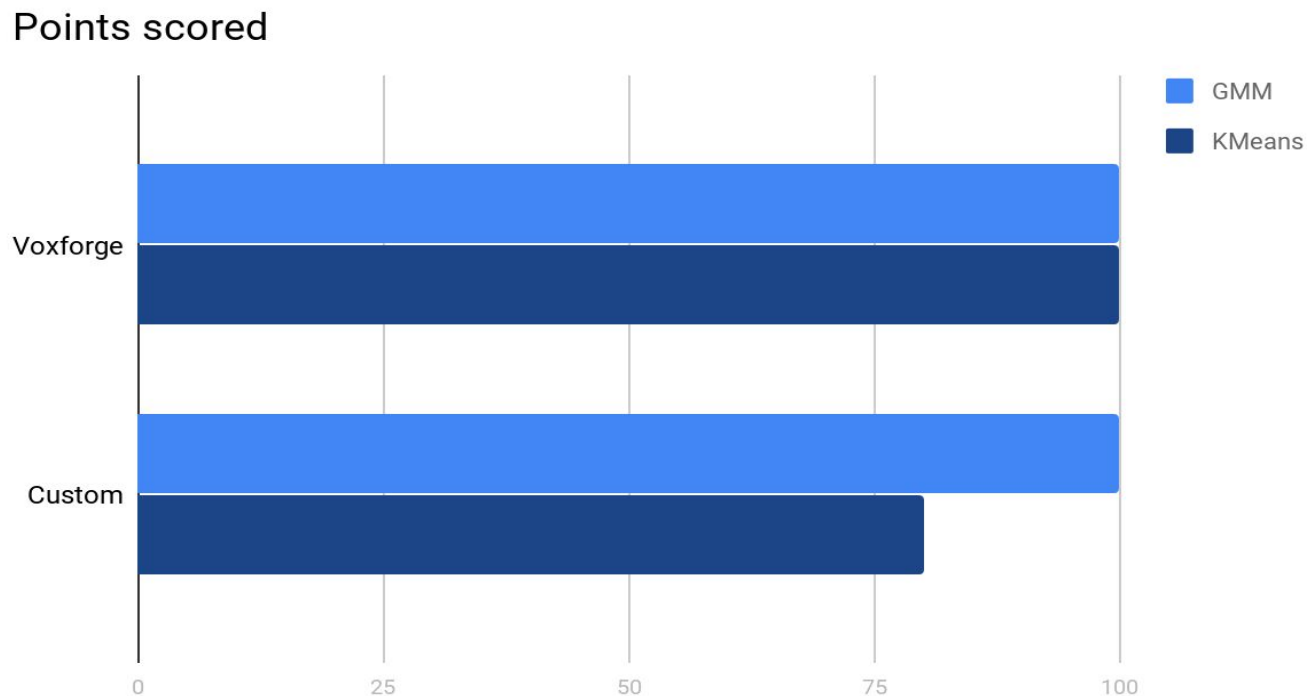
Process



Speaker Recognition

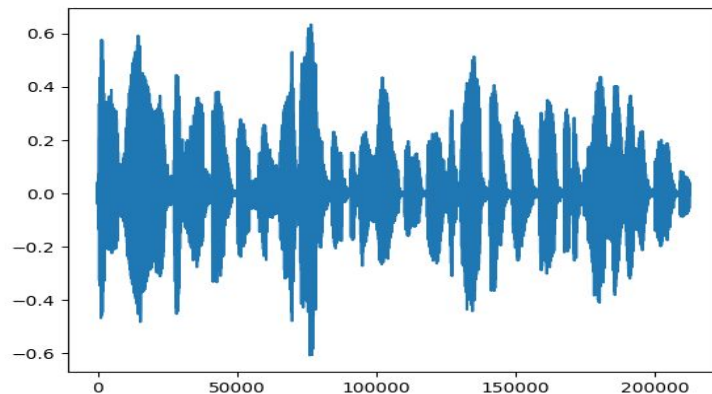
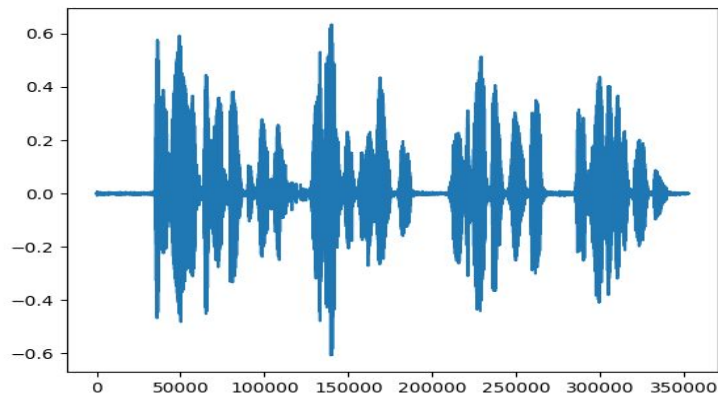
- First we extracted MFCC features from the recorded audio files
- To make the model robust we have calculated delta MFCC features and combined them with MFCC
- Model Training Technique
 - K-Means on MFCC feature
 - Gaussian Mixture Model (GMM) on MFCC + Delta MFCC features

Results for Speaker Recognition



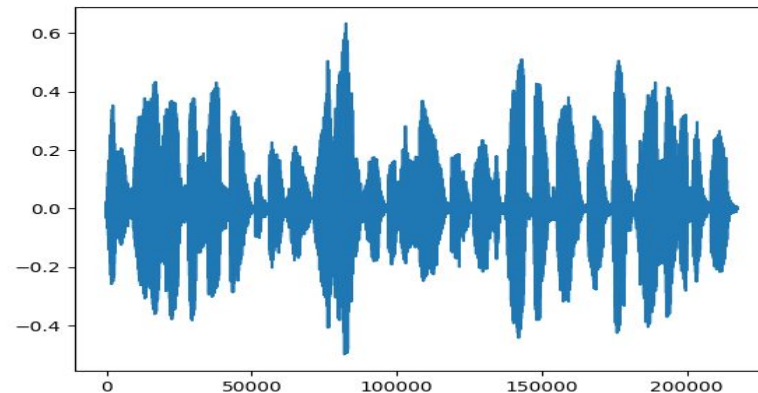
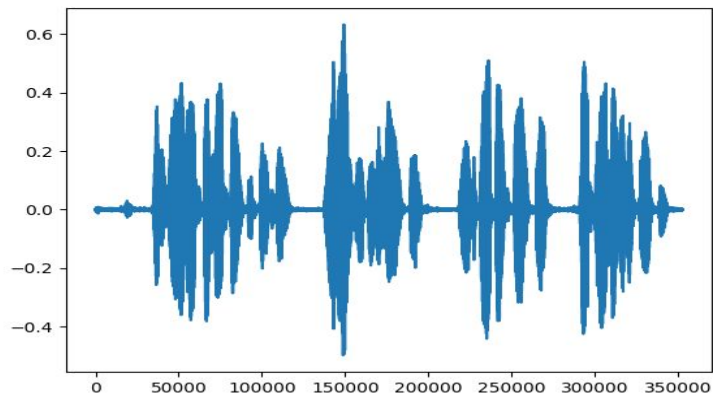
Processed Audio Data

- Left image is the recorded voice and the right one is the output after removing silence from audio



Processed Audio Data

- These waveforms are of the same sentence but recorded again
- We can see that the waveforms look similar as previous ones



Why Audio Fingerprints

- We need to match the recorded audio from our database
- Direct comparison is very inefficient
- Fingerprints are generated only from the key features in audio, so help in reducing the data
- Also the recording environment might not be the same every time

Authentication Process Flowchart

Step 1

We have the speaker identified now, recorded voice will be pre processed to remove silence.

Step 2

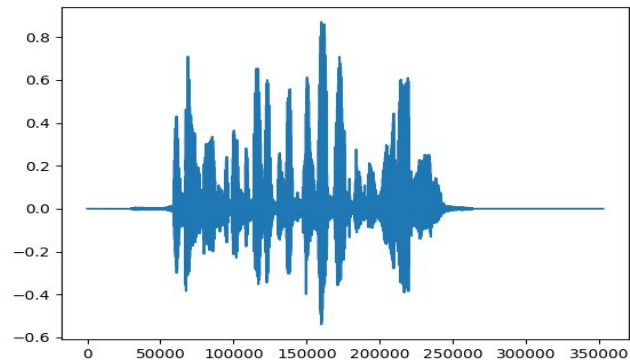
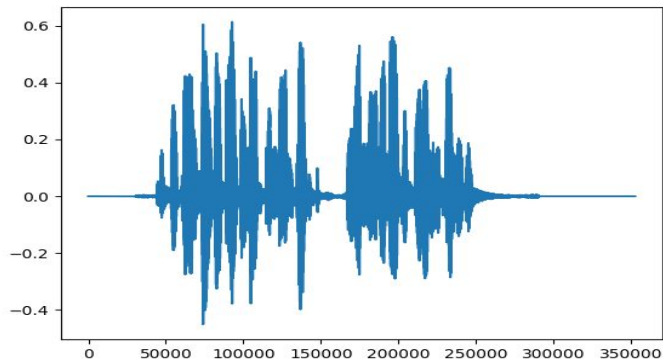
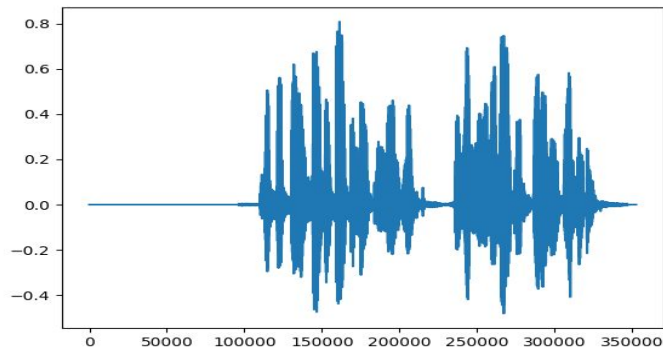
Audio fingerprints are generated from the voice samples that we have recorded.

Step 3

Matching the fingerprints with the saved ones to authenticate the speaker.

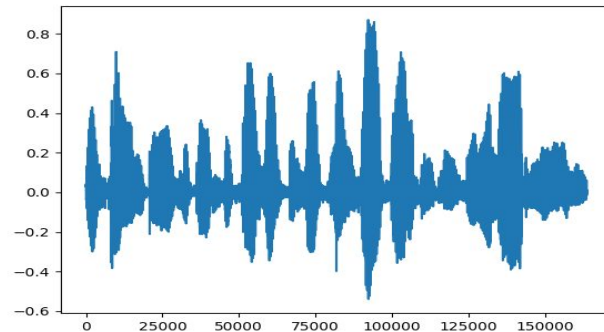
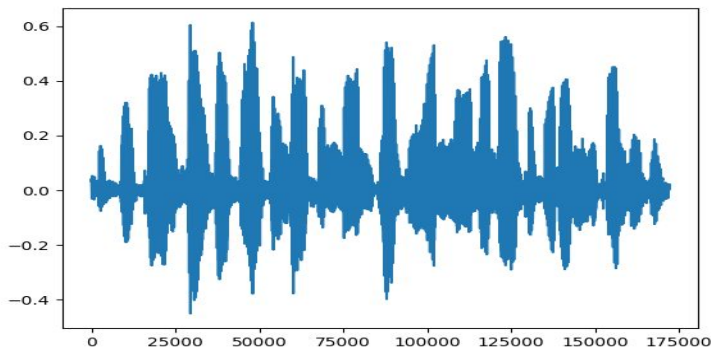
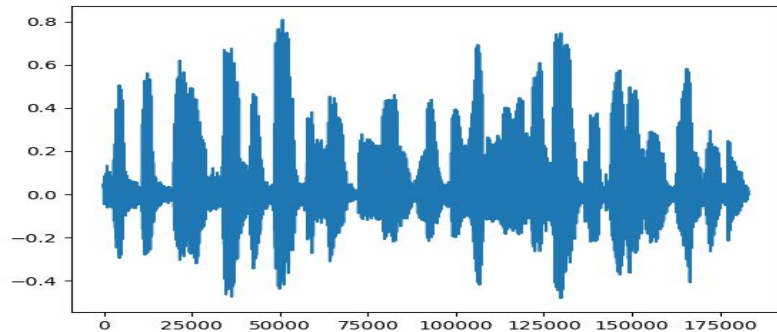
Results for Speaker Authentication

Image on the right and bottom left are very much similar as they are of same sentence and on the bottom right we have a different sentence.



Results for Speaker Authentication

Same audio files as the previous one but the noise and silence is removed which makes matching more reliable.



Work Distribution

- MFCC and K means clustering : Sarthak and Nitish
- Dataset Collection : Rahul and Manav
- Training GMM models with mfcc and delta mfcc, silence removal, audio fingerprinting and matching, testing, making presentations : Utkarsh and Deepak