

8. Pillow

- Pillow is an imaging library used for opening, manipulating, and saving different image file formats. It is used in the project for any image processing tasks related to visualizing results.

9. ffmpeg

- ffmpeg is a multimedia framework used to handle audio data. It is utilized in the project for converting and processing audio files.

10. xlrd

- xlrd is a library used to read data from Excel files. It is used in the project to handle any dataset stored in Excel format.

The required modules and their versions are specified in the `requirements.txt` file as follows:

- Flask==2.3.2
- pandas==0.24.2
- librosa==0.7.0
- ffmpeg==1.4
- numba==0.50
- numpy==1.22.0
- matplotlib==3.1.0
- tensorflow>=2.4.0
- Keras==2.2.4
- Pillow>=8.1.1
- xlrd == 1.0.0

## Front-end Technologies

The front-end of the web application is developed using standard web technologies:

- HTML: Provides the structure of the web pages.
- CSS: Used for styling the web pages to ensure a user-friendly interface.
- JavaScript: Adds interactivity to the web pages, allowing for dynamic content updates and improved user experience.

## Back-end Technologies

The back-end of the web application is built using the Flask framework, which handles:

- Routing: Managing different routes in the web application to handle user requests and serve the appropriate responses.
- Data Processing: Integrating with the audio processing and machine learning modules to process uploaded audio files and generate predictions.
- Model Deployment: Hosting the trained machine learning models and serving predictions through API endpoints.