Software Environment

The "Recognizing Bird Sounds" project leverages a range of software tools and libraries to achieve its objectives. This section outlines the software environment, including the programming languages, libraries, frameworks, and technologies used in the project.

Python

Python is the primary programming language used in this project. Its simplicity, readability, and extensive library support make it ideal for both audio processing and machine learning tasks. Python enables efficient development and integration of various components within the bird sound recognition system.

Modules Used in the Project

The project utilizes several Python libraries and modules for different aspects of the audio processing and machine learning pipeline. Below are the key modules used:

1. Flask
   - Flask is a lightweight web framework used to develop the web application for this project. It allows for easy creation of web interfaces, handling user requests, and integrating backend processing.

2. Pandas
   - Pandas is a powerful data manipulation library used for handling and processing data. It provides data structures and functions needed to manipulate structured data seamlessly.

3. Librosa
   - Librosa is an audio processing library specifically designed for music and audio analysis. It is used in this project for loading audio files, extracting features like MFCCs, chroma features, and spectral contrast.

4. Numba
   - Numba is a just-in-time compiler for Python that is used to optimize numerical computations, making them faster and more efficient.

5. Numpy
   - Numpy is a fundamental package for scientific computing with Python. It provides support for arrays, matrices, and a large collection of mathematical functions to operate on these data structures.

6. Matplotlib
   - Matplotlib is a plotting library used for visualizing data. In this project, it is used to visualize audio features and model performance metrics.

7. TensorFlow and Keras
   - TensorFlow is an open-source machine learning framework, and Keras is an API built on top of TensorFlow. These tools are used for building, training, and evaluating the deep learning models in the project.