

System Design

The system design for the "Recognizing Bird Sounds" project involves the detailed planning and structuring of various components necessary to achieve the project's objectives. This section outlines the system architecture, data flow diagrams, and UML diagrams to provide a clear understanding of how the system operates and interacts.

System Architecture

The system architecture defines the overall structure of the bird sound recognition system, highlighting the major components and their interactions. The key components of the system include:

1. **Data Acquisition:** Collecting bird sound recordings from various sources and storing them in a structured format.
2. **Preprocessing:** Converting audio files to a uniform format, reducing noise, and normalizing the audio signals.
3. **Feature Extraction:** Using the Librosa library to extract relevant audio features such as Mel-frequency cepstral coefficients (MFCCs) and chroma features.
4. **Model Training:** Splitting the dataset into training, validation, and test sets, and training machine learning models using TensorFlow and Keras.
5. **Model Evaluation:** Evaluating the trained models using metrics such as accuracy, precision, recall, and F1-score.
6. **Deployment:** Developing a web application using Flask that allows users to upload audio recordings and receive real-time bird species predictions.

