Software Requirements

- Operating System: Windows
- Coding Language: Python 3.6
- Front-end: HTML, CSS, JavaScript
- Back-end: Django Framework
- Code Editor: Visual Studio Code

The system leverages various Python libraries and frameworks to implement the bird sound recognition pipeline. Key software components include:

- Flask: A lightweight web framework used to develop the web application.
- Pandas: A data manipulation library used for handling and processing data.
- Librosa: An audio processing library used for feature extraction from audio recordings.
- Numba: A library used to optimize numerical computations.
- Numpy: A fundamental package for scientific computing with Python.
- Matplotlib: A plotting library used for visualizing data.
- TensorFlow and Keras: Deep learning libraries used for training and evaluating machine learning models.
- Pillow: An imaging library used for image processing tasks.
- ffmpeg: A multimedia framework used for handling audio data.

System Study

The system study involves a detailed analysis of the project requirements, constraints, and performance metrics. The study aims to ensure that the system meets the desired objectives and provides a robust solution for bird sound recognition. Key aspects of the system study include:

- Data Quality: Ensuring the dataset is diverse and representative of various bird species and audio conditions.
- Model Performance: Evaluating the machine learning models using appropriate metrics to ensure high accuracy and reliability.
- Scalability: Designing the system to handle large volumes of audio data and accommodate future expansions.
- User Interface: Developing a user-friendly web application that allows easy upload of audio files and provides accurate predictions in real-time.

By addressing these aspects, the system study aims to create a comprehensive and effective solution for bird sound recognition, leveraging state-of-the-art machine learning techniques and audio processing tools.