



Identifying Bird Species from Audio: An Overview

We explore automated bird species identification using sound recordings. This aids conservation, research, and monitoring efforts. Challenges include noise interference, overlapping calls, and species variation.



Project Objectives

Identification

Design a real-time, user-friendly identification system.

Scalability

Build a maintainable and scalable solution for broad use.

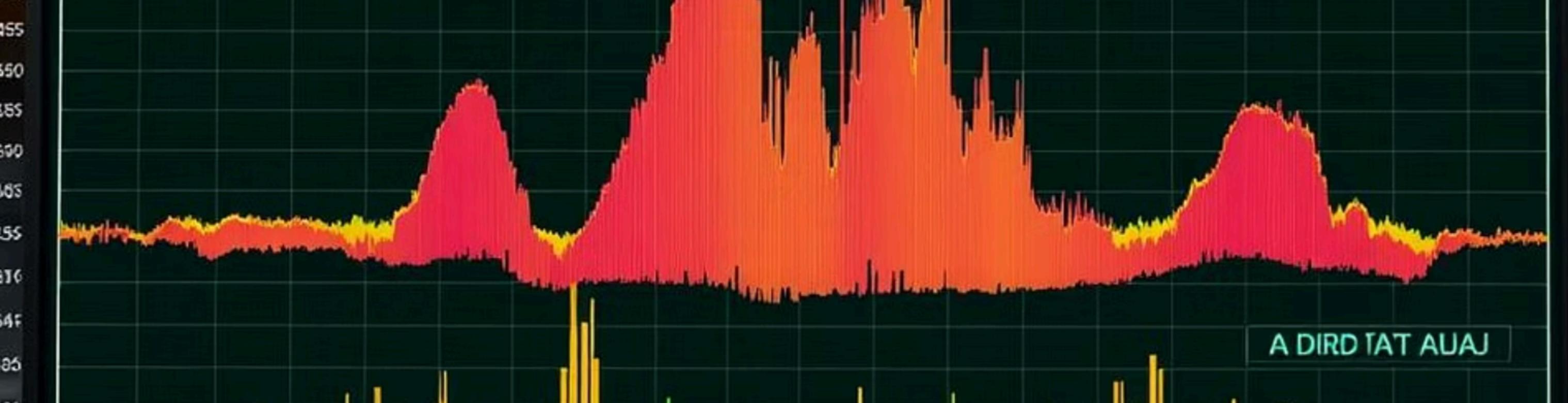
Data Acquisition and Preparation

Data Sources

- Field recordings in diverse habitats
- Public datasets like Xeno-canto & Macaulay Library

Augmentation & Cleaning

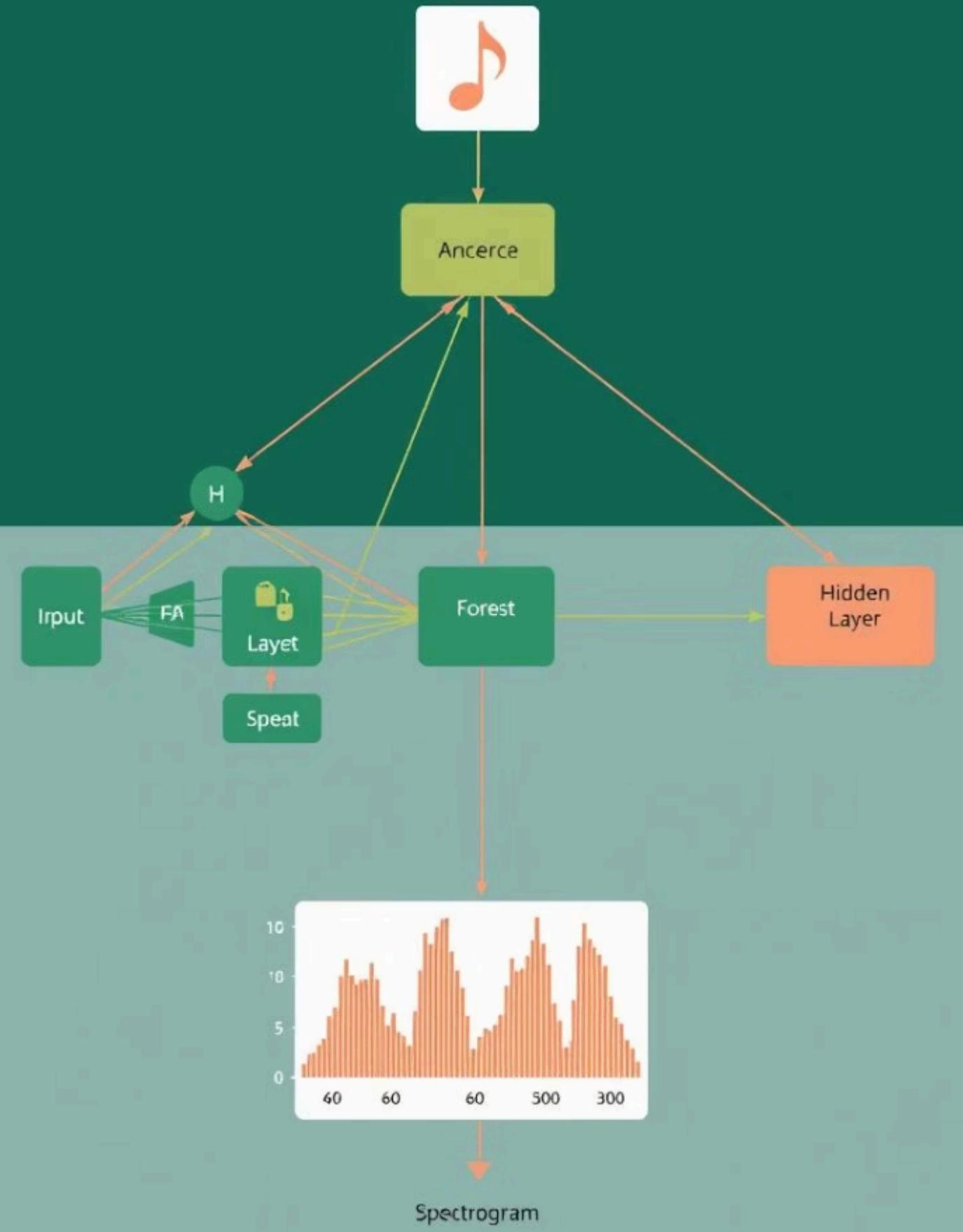
- Filtered silences and background noise



Feature Extraction

Spectrogram Analysis

Visual frequency representation to analyze patterns, by creating Spectograms



Machine Learning Models



CNN

Processes spectrogram images; selected model with 92% accuracy.

System Architecture

Audio Capture

Real-time recording and preprocessing at device level.

Cloud-hosted model accessible through API.

User Interface

Displays species results, supports citizen science integration.

Uses mapping tools for geographic context of sightings.



Evaluation and Validation

1 Performance Metrics

Precision, recall, and F1-score on unseen data.

2 Error Analysis

Confusion matrix highlights common misclassifications.

3 Expert Comparison

Validated results match human expert annotations closely.

4 Continuous Improvement

Ongoing monitoring and retraining enhance system accuracy.

Conclusion and Future Directions

Achievements

Built a reliable bird call identification system.

Supports conservation, research, and education.

Next Steps

- Expand species and environment coverage
- Improve robustness in noisy settings
- Deploy in more geographic areas