

IntelliChirp

Machine Learning Classification of Acoustic Data Components

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 Team Lead
 Recorder
 Architect
 Testing Lead

 Clients: Colin Quinn | Patrick Burns

 Mentor: Fabio Santos







"A report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) found that about

1 million animal and plant species are now threatened with extinction"

Our Clients

Colin Quinn PhD student NAU

Soundscapes2Landscapes

Current Value \$1.1 million









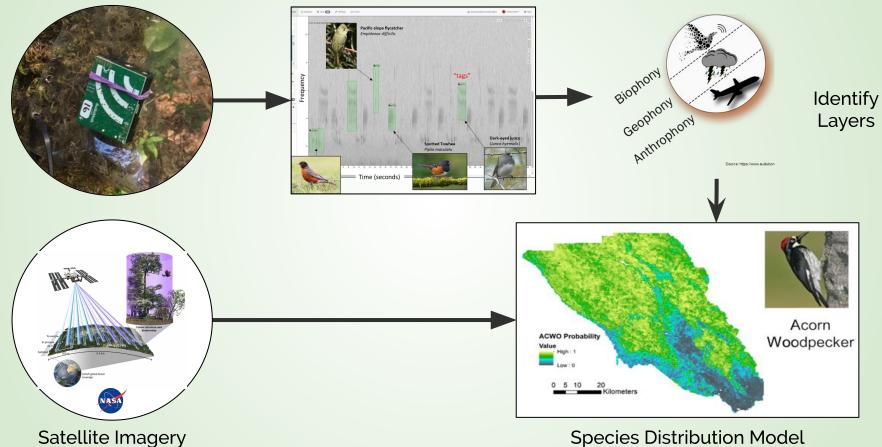
GLOBAL EARTH OBSERVATION & DYNAMICS OF ECOSYSTEMS LAB (GEODE)

Ecosystem Science - Environmental Change - Remote Sensing

Soundscape Recording Data

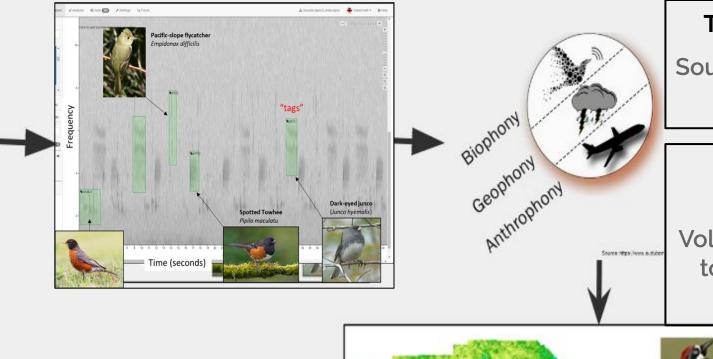
Sound Identification/Analysis

The Process



What's Wrong?

Sound Identification/Analysis



Time Consuming

Sound identification is done manually

Not Volunteer Friendly

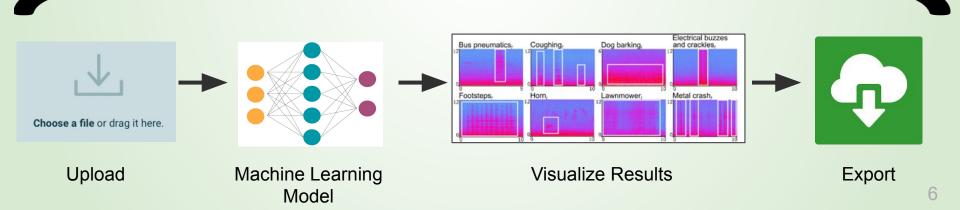
Volunteers are unable to use the current analysis tool



A Solution

Soundscape Noise Analysis Workbench (SNAW)

(a)	



Implementation Overview

Acquisition \rightarrow Key Requirements





Application will be able to **upload audio file/s** in **WAV** format.



M.L. algorithm will **classify individual sounds** in user uploaded audio file/s.



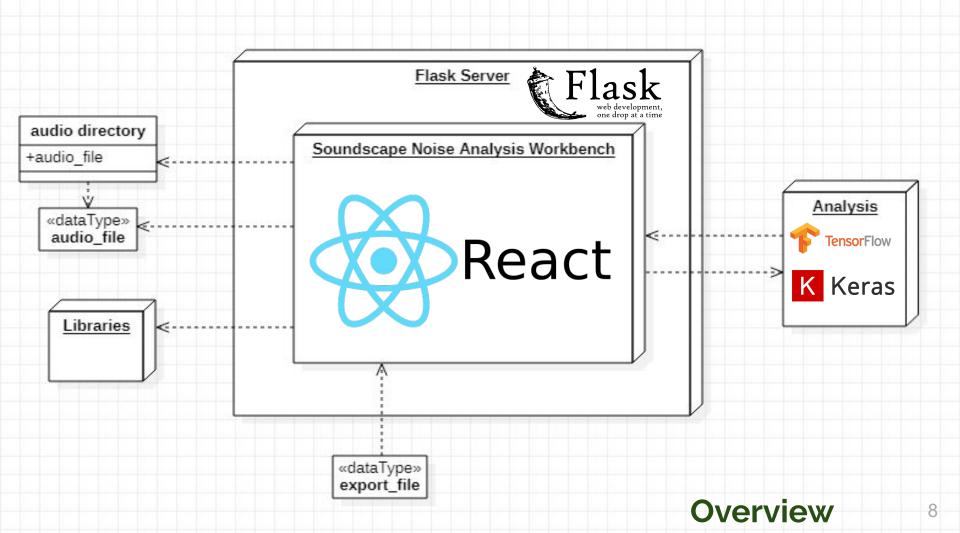
Application will **display the results** of the completed M.L. analysis.



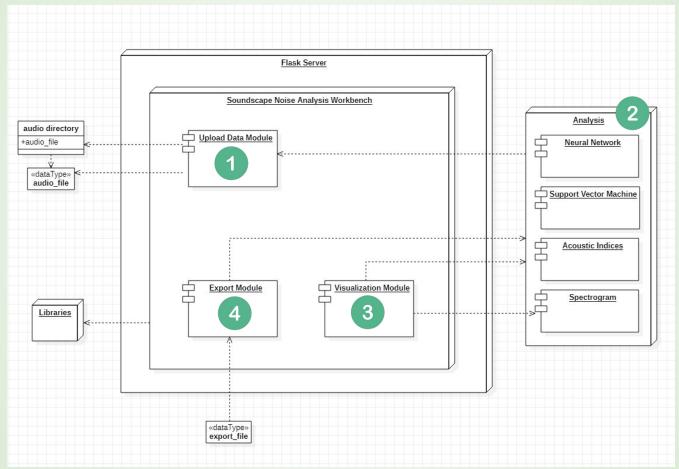
Application will be able to **export the results** of the analysis.



The application will be able to be used **offline** in the field.



Architecture Overview



Upload Data Module

Input

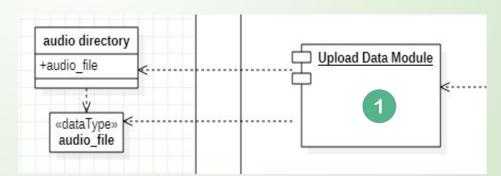
Single audio file or multiple audio files

Saves audio files to the server file directory

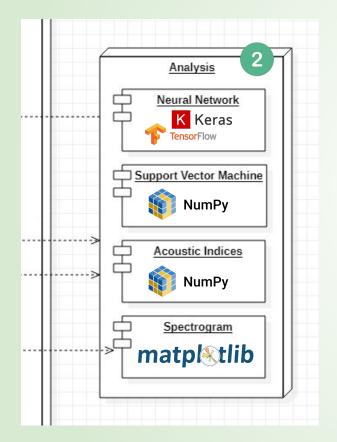


Soundscape Noise Analysis Workbench





Analysis Module



Input: audio file locations from Upload Data Module

- Neural Network Module
- Support Vector Machine Module
 - Calculates a prediction for each sound component present at 1 second intervals

Acoustic Indices Module

Calculates audio statistics used by researchers

• Spectrogram Module

• Creates a spectrogram image for the audio file

Output: JSON object with results from each analysis module

Visualization Module

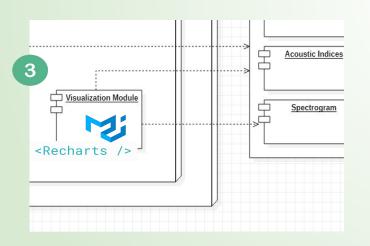
pench

Input:

JSON Results from the Analysis Module

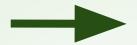
Output:

- Labelled Spectrogram
- Pie Chart
- Acoustic Indices Table



Results of Analysis												
Results of	rainforest_sc.wav		~									

Challenges



Improving Neural Network Implementation

Gathering more training data

Create an offline version that can be run on a **HPC cluster**



Resolutions

- **Training the Neural Network** with a solid set of training data from onsite recorders and open source datasets.
 - Manual audio classification sessions with clients.

- Gradually adapting web application code base to have the same execution, all in one command line script.

Schedule

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In Conclusion

Problem

An application that determines biodiversity through manual identification Alpha

Prototype

Coming Soon

Final Solution

An application that uses machine learning to automatically identify the biodiversity





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