

A Survey On Bird Species Identification Using Audio Signal Processing And Neural Network

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Abstract: an automatic bird species recognition system has been developed and methods for their identification has been investigated. Automatic identification of bird sounds without physical intervention has been a formidable and onerous endeavor for significant research on the taxonomy and various other sub fields of ornithology. In this paper, a two-stage identification process is employed. The first stage involved construction of an ideal dataset which incorporated all the sound recordings of different bird species. Subsequently, the sound clips were subjected to various sound preprocessing techniques like pre-emphasis, framing, silence removal and reconstruction. Spectrograms were generated for each reconstructed sound clip. The second stage involved deploying a neural network to which the spectrograms were provided as input. Based on the input features, the Convolutional Neural Network (CNN) classifies the sound clip and recognizes the bird species. A Real time implementation model was also designed and executed for the above described system.

Keywords: Bird, Computer Vision, Machine Learning, Classification, Neural Network, Self-Learning, Cnn, Audio Signal Processing.

I. INTRODUCTION

On large scale, accurate bird recognition is essential for avian biodiversity conservation. It helps us quantify the impact of land use and land management on bird species and is fundamental for bird watchers, conservation organizations, park rangers, ecology consultants, and ornithologists all over the world. So we come with an idea that help ornithologists to identify bird species.

The main Problem is to create a solution for counting and identifying different species of birds present in an area and classify them into categories.

Automatic identification of bird calls from continuous recordings gathered from the environment would be significant addition to the research methodology in ornithology and biology, in general. Often these recordings are clipped or contain noise due to which reliable methods of automated techniques have to be used instead of manual conventional methods. Manual inspections of the spectrograms are often error prone and usually the techniques are esoteric in nature and involves multiple experts which makes it unreliable, hence there is a need for automated systems. There is a significant commercial potential for such systems because bird watching is a popular hobby in many countries. Substantial international programs are also invigorating the ventures into the area of bioacoustics signal processing and pattern recognition.

An approach to accurately recognize Birds species using audio signal processing and neural networks.

In this project, different bird species were identified. The approach involved pre-processing of the bird sounds followed by the spectrogram generation of the same and these were used to train the model for classification.

The system was able to classify bird species based on the spectrogram image generated from their sounds with high accuracy.

An automatic bird species recognition system has been developed and methods for their identification has been investigated. Automatic identification of bird sounds without physical intervention has been a formidable and onerous endeavour for significant research on the taxonomy and various other sub fields of ornithology.

There are a number of birds, and hence creating a audio detection model that can be successful everywhere is a challenging problem.

II. RELATED WORK

The systems is a need in current age of development Automatic identification of bird sounds without physical intervention has been a formidable and onerous endeavour for significant research on the taxonomy and various other sub fields of ornithology.



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To avoid this problem we have used machine learning algorithms have been used.

Machine Learning is a sub-area of artificial intelligence, whereby the term refers to the ability of IT systems to independently find solutions to problems by recognizing patterns in databases. In other words: Machine Learning enables IT systems to recognize patterns on the basis of existing algorithms and data sets and to develop adequate solution concepts.

Therefore, in Machine Learning, artificial knowledge is generated on the basis of experience. In order to enable the software to independently generate solutions, the prior action of people is necessary.

For example, the required algorithms and data must be fed into the systems in advance and the respective analysis rules for the recognition of patterns in the data stock must be defined.

Once these two steps have been completed, the system can perform the following tasks by Machine Learning:

- Finding, extracting and summarizing relevant data
- Making predictions based on the analysis data
- Calculating probabilities for specific results
- Adapting to certain developments autonomously
- Optimizing processes based on recognize patterns.

For this, proposed work we have taken the input as a audio and here we pass the audio to the machine for the prediction. Firstly we train the model with the audio so it will train the model on that basis.

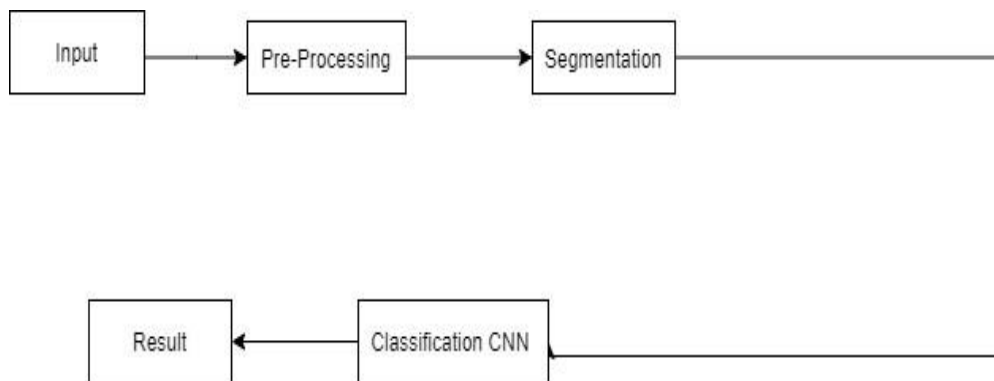


Fig.1. DFD level 1

Mathematical Analysis of Proposed Model :-

Let S be the Whole system $S = \{I, P, O\}$

I-input

P-procedure

O-output

Input(I)

$I = \{ \text{dataset} \}$

Where,

dataset – dataset

Procedure (P),

$P = \{ I, \text{Using I System perform operations and calculate the output} \}$

Output(O)-

O={output}

Applications:

- Use in study of Bird species.
- Identify Bird species easily.

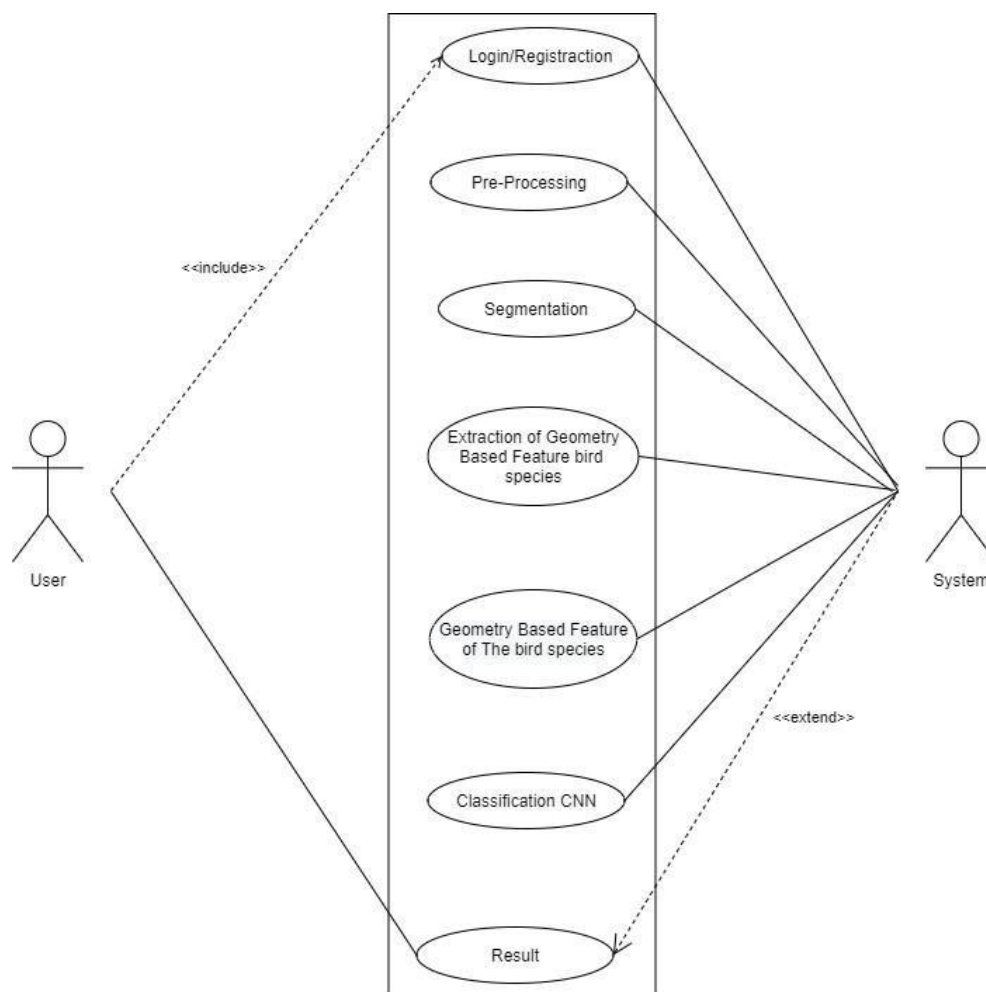


Fig.3. Use-Case Diagram

III. CONCLUSION

The system was able to classify bird species based on the spectrogram image generated from their sounds Convolutional Neural Network (CNN) classifies the sound clip and recognizes the bird species. The present study investigated a method to identify the bird species for classification of audio. The generated system is connected with a user-friendly website where user will upload or record audio for identification purpose and it gives the desired output. The proposed system works on the principle based on detection of a part and extracting CNN features from multiple convolutional layers. These features are aggregated and then given to the classifier for classification purpose. On basis of the results which has been produced, the system has provided.

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