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Survey paper on Aves Vocalization Detecting System Using Machine Learning

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ABSTRACT:

An area of interest in ecology is monitoring animal populations to better understand their behaviour, biodiversity and population dynamics. Acoustically active animals can be automatically based on their sounds and a particularly useful ecological indicator is the bird, as it responds quickly to changes in its environment. This can be done by using a method for purely audio-based bird species recognition through the application of support vector machines. The deep residual neural network should be trained on one of the largest bird song data set in the world so as to classify bird species based on their song or sound. The existing systems on this subject have various disadvantages in term of cost, efficiency or the maintenance of the records or the data collected for the longer period of time. The proposed technique followed the extraction of cepstral features on mel scale of each audio recording from the collected standard database. Extracted mel frequency cepstral coefficients formed a feature matrix. This feature matrix was then trained and tested for efficient recognition of audio events from audio test signals. Once the bird name is identified then it is even possible to get few features or information regarding that bird using this system.

Keywords:*Classification, Ceptral Coefficients, Feature Extraction, Mel, SVM.*

I. INTRODUCTION:

There are around nine thousand bird species in the world. Monitoring the birds by their sound is important for many environmental and scientific purposes. Identifying bird species based on their sound in audio recordings is an important task in wildlife monitoring for which the annotation is time consuming if done manually. We also come to know the population of the species of the birds that are going to be extinct. Reliable systems that would allow large-scale bird spices recognition from audio recordings could become a very valuable tool for researchers and governmental agencies interested in ecosystem monitoring andbiodiversity. preservation. Over the years, there have been numerous efforts to develop and evaluate methods of automatic bird species recognition based on auditory data/ Unfortunately, with over 10000 bird species worldwide, most experiments and competitions seemed rather limited when compared to the real-world problems. Therefore, the goal of this system is to verify whether an approach utilizing deep convolutional neural networks for identification could be suitable for audio analyzing audio recordings of birds.The main work of this project is to development

methodology for the system that could automatically recognize bird species or even individual birds by their sounds. It becomes easy for a common man or bird watchers to easily recognize the bird. Once the bird name is identified then one might feel like knowing few features of that identified bird. So, opening an application or a search engine might seem a time consuming process, thus this system will help the users to get few information or features of that identified bird using a webapplication.

II. LITERATURESURVEY:

"Conv-Codes: Audio Hashing For Bird Species Classification" has proposed a supervised, convex representation based audio hashing framework for bird species classification[1]. The proposed framework utilizes archetypal analysis, a matrix factorization technique, to obtain convex-sparse representations of a bird vocalization. These convex representations are hashed using Bloom filters with noncryptographic hash functions to obtain compact binary codes, designated as conv- codes."Bird Species Recognition Using Unsupervised Modeling of Individual Vocalization Elements" has investigated acoustic modeling for recognition of bird species from audio field recordings[2]. First, the acoustic scene is decomposed into isolated segments, corresponding to detected sinusoids. Each segment is represented by a sequence of the frequency and normalized magnitude values of the sinusoid. The temporal evolution of these features is modeled using hidden Markov models (HMMs). A novel method for an unsupervised modeling of individual bird vocalization elements is proposed. The element models are initialized using HMM- basedclustering.

"Compressed Convex Spectral Embedded For Bird Species Classification" has focused on the problem of bird species identification using audio recordings[3]. Following recent developments in deep learning, we propose a multi-layer alternating sparse-dense framework for bird species identification. Temporal and frequency modulations in bird vocalizations are captured by concatenating frames of spectrograms, resulting in a high dimensional super-frame based representation. These super-frame representations are highlysparse. "Spectrogram Segmentation for Bird Species Classification based on Temporal Continuity" presented an enhanced approach for bird species classification from their recorded audio signals[4]. Observing that textures of syllables in audio spectrograms have noticeable discerning capabilities among different bird species, they adopt these texture features for bird species classification. First, they compute spectrogram from recoded audio. They propose an enhanced syllable extraction technique to identify the syllables in thespectrogram.

"Bird Species Recognition based on SVM Classifier and Decision Tree" has specified that Bird species recognition is a challenging problem due to the variant illumination and different view point of camera[5]. In this paper, a new feature which is the ratio between the distance of the eye to the root of beak and the distance of the width of the beak is used to distinguish the different bird species. Integrated the new feature into the multi-scale decision tree and the SVM framework, a new bird species recognition algorithm is proposed to get the final recognitionresult. "Simultaneous Segmentation And Classification Of Bird Song Using CNN" has explained automatic animal voice detection and recognition from audio recordings is an emerging topic for animal preservation[6]. This research focuses on bird bioacoustics, where the goal is to segment bird syllables

from the recording and predict the bird species for the syllables. Traditional methods for this task addresses the segmentation and species prediction separately, leading to propagated errors. This work presents a new approach that performs simultaneous segmentation and classification of bird species using a Convolutional Neural Network (CNN). "Hierarchical Classification of Bird Species Using Their Audio Recorded Songs" has explained the task of hierarchical bird species identification from audio recordings[7]. They evaluate three types of approaches to deal with hierarchical classification problems: the flat classification approach, the local- model per parent node classifier approach and the global-model hierarchical classification approach. For the flat and local-model classification approach we employ the classic Naive Bayes algorithm. For the global-model approach we use the Global Model Naiıve Bayes (GMNB)algorithm. "An Automatic classification of bird species using audio feature extraction and support vector machines" has explained Automatic identification of bird species based on the chirping sounds of birds using feature extraction method and classification based on support vector machines (SVMs)[8]. The proposed technique followed the extraction of cepstral features on mel scale of each audio recording from the collected standard database. Extracted mel frequency cepstral coefficients (MFCCs) formed a featurematrix. "Fine-Grained Bird Species recognition Via Hierarchical Subset Learning" proposed a novel method to improve fine-grained bird species classification based on hierarchical subset learning[9]. They first form a similarity tree where classes with strong visual correlations are grouped into subsets. An expert local classifier with strong discriminative power to distinguish visually similar classes is then learnt for each subset. On the challenging Caltech200-2011 bird dataset they show that using the hierarchical approach with features derived from a deep convolutional neural network leads to theaverage "Wavelet Transform Digital Sound Processing To Identify Wild Bird Species" has explained the application of digital signal processing for detection and preservation of different species has been progressing rapidly[10]. In this paper, one such better approach as applied to wild bird species is presented. Feature extraction is done by first performing wavelet transform on sampled bird sounds. After which frequency conversion and determination of mean value that determine the strength of the frequency ingredient is obtained; furthermore, the uniqueness of the modulation spectrum is used as an additional input for the detection mechanism of the birdcall's frequency. The obtained feature quantities then become input to the neural network to simplify classification of nocturnal wild birdspecies.

III. METHODOLGY

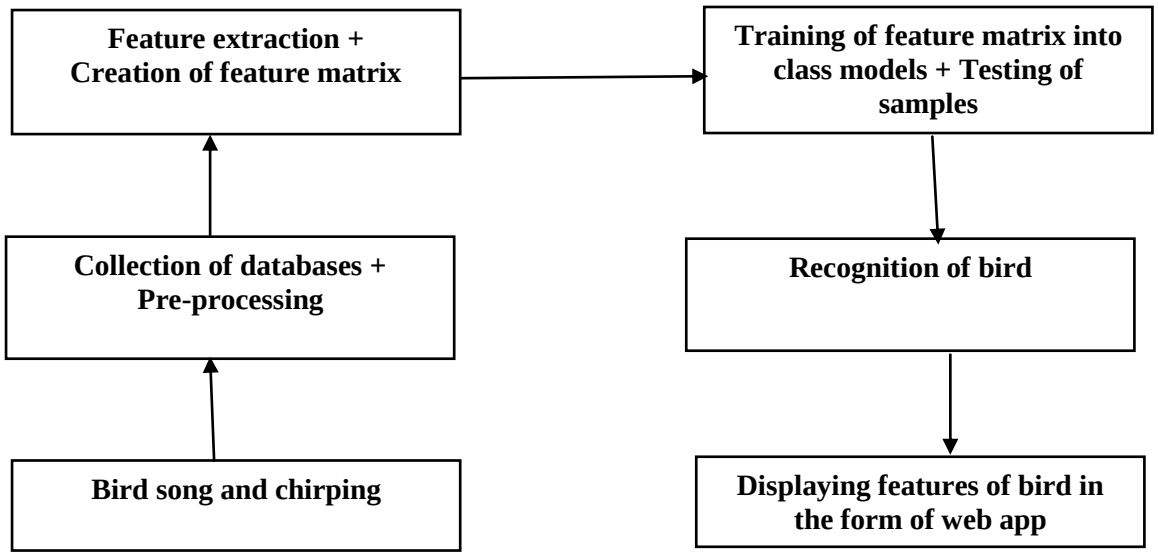

Fig.1: Scheme used in Identification of Bird Species.

Methodology is a specific way of performing an operation that implies precise deliverables at the end of each stage.

The main steps that the system will undergo is shown in the above Figure1: Identification of bird. A user records the chirping or sound of the bird, then the recorded audio is stored in a database or any storage. In the later stages feature extraction and the creation of the feature matrix is done. The feature matrix is trained to form the class models, then the recorded data is compared with the dataset to identify the bird. Once the input match is found with the data set then the user will be given with the bird name along with its few features or information through web app. Features of the bird are stored at the back end of the web app.

A. Bird song and chirping

Main input for this system is bird sound or chirping. Initially different bird sounds are collected and stored. This sounds are later sent for pre-processing.

B. Collection of databases and Pre-processing

Noise reduction techniques have to be used to remove from signal some unwanted noise components like, wind, rain etc.

C. Feature extraction and Creation of feature matrix

Feature Extraction are the most used features used to describe the spectrum of an audio recording in very compact yet informative manner.

D. Training of feature matrix into class model and Testing of samples

A feature is an individual measurable property or characteristic of a phenomenon being observed. Feature

extraction starts from an initial set of measured data and builds features intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. In later stages testing of samples is done.

E. Recognition of bird

After pre-processing and classification of the sound recorded it is compared with the data set. If dataset contains the input then match is found else not found.

Once the bird sound match is found with the dataset, details are convied to user through a web application. Few Features of the bird are displayed along with bird name.

IV. CONCLUSION

In this system we presented a method of automatically classifying real time recordings of bird sound. We have used machine learning techniques and the number of recordings of bird sound for improving the performance of the identification tasks.

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