

Automated Bird Species Classification With Deep Neural Networks

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ABSTRACT

Many bird species are becoming more difficult to locate, and even when they are, it may be difficult to anticipate their classification. Observed from a distance, birds may be seen in a wide range of sizes, shapes, colors, and orientations. The photographs show a great deal more variation in the bird's breed than the auditory categorization. Using photos, people are better able to discriminate between birds. Because of this, the Caltech-UCSD Birds 200 dataset is used for both training and validation in this technique. Deep convolution neural networks (DCNN) are used to turn an image into a grayscale representation, while the tensor flow is used to construct an autograph with a large number of nodes that can be compared. A rating table is developed as a consequence of evaluating the numerous entry points to the validation data. By examining the scoreboard and selecting the highest rating, it may be able to anticipate the required bird group. A look at the dataset (CUB-200-2011) reveals that the system has a bird identification accuracy of 89 percent. Linux and the Tensorflow framework were used in the study.

Key Words: Bird Species Classification Using Deep learning.

I. INTRODUCTION

In today's scenario, bird behaviour and population has become an important issue. Birds help to detect other organisms in the environment. Basically bird species identification from their sound is an important and challenging problem. There are also some different methods through which we can monitor bird species. As many birds migrate according to the environmental changes, so the use of automated methods for bird species identification is an effective way to evaluate the quantity and diversity of the birds which appear in the region. Artificial intelligence and machine learning sounded like a science fiction prophecy of a technological feature. Image recognition is one of the most accessible application of it. Machine learning embedded in consumer websites and applications is changing the way visual data is organized and processed. Image recognition and identification has grown so effectively because it uses deep learning algorithm. This is the machine learning method designed to resemble the way a human brain functions. Thus the computers are taught to recognize visual elements within an image.

By noticing emerging patterns and relying on large databases, algorithms can make sense of images and formulate relevant categories and tags. Classification of birds is generally based on its classes within one category. Classifying birds pose is an extra challenge over categories, because of the similarity between the classes. So, the bird's species identification plays an important role in identifying that a particular image of bird belongs to which species. Bird species identification means predicting the bird species belongs to which category by using an image objective.

Bird species identification means predicting the bird species belonging to which category by using an image. The identification can be done through image, audio, or video. An audio processing technology makes it possible to identify by capturing the audio signal of birds. But, due to the mixed sounds in the environment such as insects, objects from the real world, etc. processing of such information becomes more complicated. Usually, human beings find images more effective than audio or videos.

II. LITERATURE SURVEY :

Venkata Ramana and S P ChokkAlingam [6] presented The weighted average ensemble (WAE) technique which combines two forms or methods such as EfficientNet85 and VGG19 .The preprocessing Photos into a smaller 150*150 *3 format is advised to speed training it is RGB (red,green,blue) ChannelsVGG19,OpenCV,Keras, Tensorflow, InceptionV3,EfficientNetB 5,A lexNet .Accuracy rate :98.7%.

Sachin Agrawal and Smriti Sehgal [7] experimented with The dataset which they leveraged for their study consist of 24000 samples of bird audio from different species taken from Xeocanto .It converts all the audio format into a wav format and have a 41 attributes frames it has a

count channels and bird show recorded. Alex net , Resnet ,CNN model ,MFCC decision tree accuracy :78.40%.

Hardik Gupta , Pratik Kanani and Jash Bhatia [8] proposed the dataset has four parts such as a data extraction, species selection audio samples downloading and MP3 to wav file we should collect the 9 bird species audio list and extract the feature and steps by extraction step. The sound file is divided into parts during the preprocessing stage and has the signal preprocessing system . MFCC, GFCC , CBFS , Audio classification , CNN, LSTM and with accuracy : 84.2%

Rajeev and Raja Nomodia [9] has suggests the Recording of wild birds from the data description has three species and two files such as test files and train files. The duration of each bird audio is about 1.5 seconds each .In test files with 438 bird species audio with the 9 seconds duration we can have the overlapping of vocalization in time .MFCC-DNN framework with 0.61 and 0.50 Numerous attempts can be seen in the literature for classifying birds, from pre-segmented acoustic single label audio recordings CNN ,VGG-16,Resnet 50,Processing melspectrograms. Test files :1078 Train files:2046with the very nearly accuracy : 80%.

Sujitha Juliet and Persia Abishal [10] suggests the experiment has a demonstration of different bird species has graphics processing unit. The dataset used here is the significant accuracy which has a certain range of accuracy .. To expedite the training process, the image resolution is decreased to 80X80. The image is then converted to a matrix format. Random Forest Algorithm. Bootstrapping KNN Algorithm Recall. Accuracy :89%.

III. PROBLEM STATEMENT:

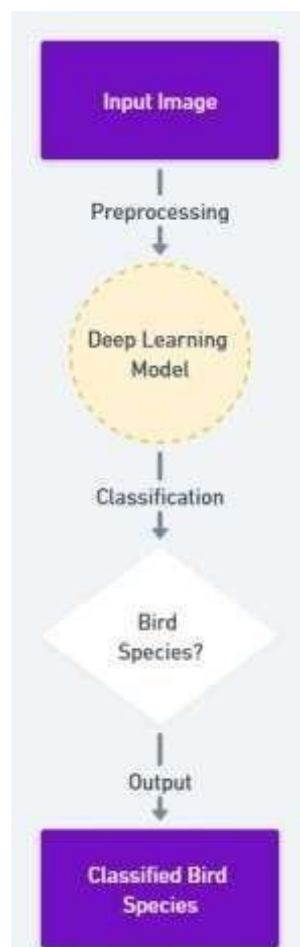
Traditional methods of bird species classification rely heavily on manual observation and expert knowledge, which are often time-consuming, labour-intensive, and subject to human error. These methods struggle to scale efficiently to large datasets and diverse species variations across different habitats and environmental conditions. Additionally, the should for correct and timely species identification is important intended for effective wildlife conservation and biodiversity monitoring efforts worldwide.

IV. METHODOLOGY:

Deep learning is a branch of Machine learning based on a set of algorithms that attempt to model high level abstraction in data by using a deep graph with multiple processing layers, composed of multiple linear and nonlinear transformation. Widely used algorithm of deep learning in image classification are convolutional neural network (CNN). Therefore, CNN allows classification based on Tenser Flow, Pytorch Models.

So in this system, the software contributes a major part that utilizes python language, Pytorch model and Raspberry pi to perform this bird classification. The input image is taken from electronic device and is converted into grey scale format. Deep learning models used to find vast number of neurons. These algorithms learns more about image as it goes through several neural networks. Following figure is used classify the Image for feature extraction.

V. CNN ARCHITECTURE:



• MODULES:

1. **Raw Data:** It is the data in unstructured form. We cannot predict some relevant information from it. It represents a single, implicitly structured data item in the table.
2. **Training set:** The training dataset comprises of raw data samples that were incorporated into the training model to determine specific feature parameters, Perform co-relational task.
3. **Deep learning CNN:** It module for extracting unique features of birds with the CNN and predicting the most classified labels for the input images. The model of CNN conjuration for bird identification utilized a stack of convolutional layers comprising of input layer, two FC layers and one final output layer
3. **Test Data:** The test dataset will used to test the classifier parameters and access the performance of actual prediction of the network model. Once the features will be extracted from the raw data, the trained prediction model will be deployed to classify new input images.

VI. RESULTS AND ANALYSIS:

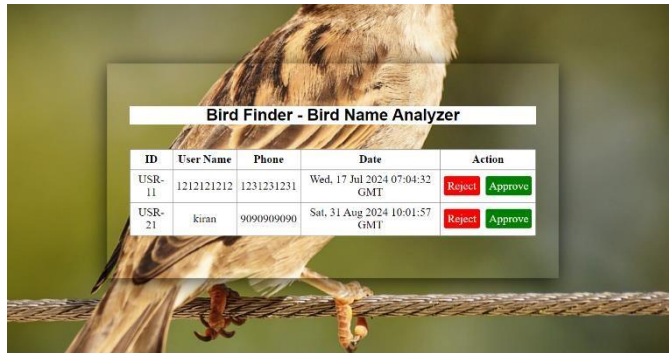


Figure 1: Registration page

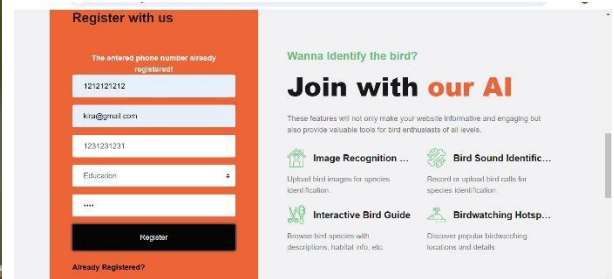


Figure 4: Admin Dashboard page

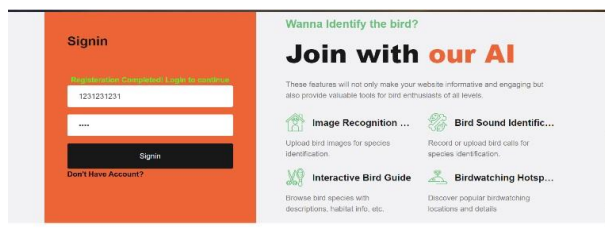


Fig-2 User Login page

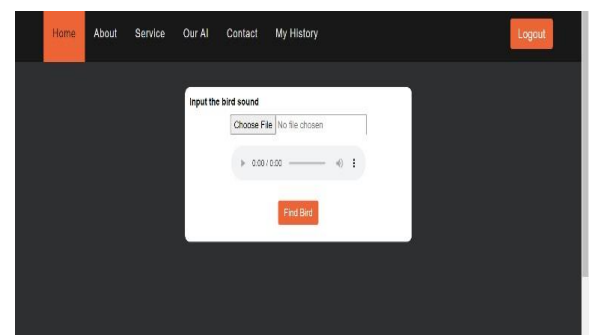


Figure 5: Audio upload page



Figure-3 Admin Login Page

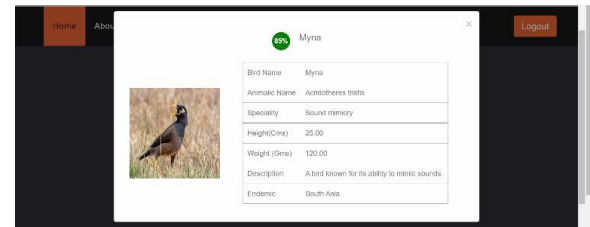
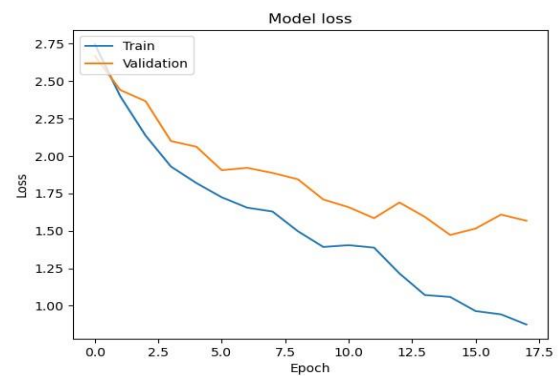
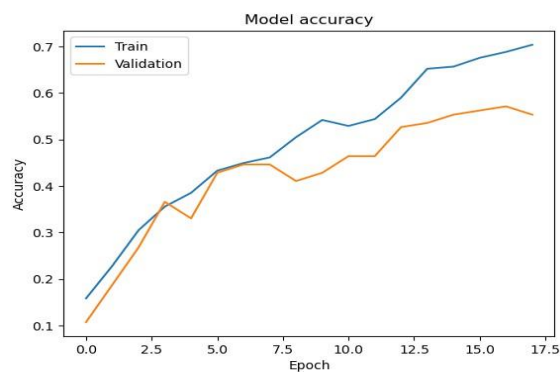


Figure 6: Results page



VII. CONCLUSION:

The study of classification investigates a method to identify the bird species using deep learning algorithm on the dataset for classification of image. The system will be connected with a user friendly system where user will upload photo for identification purpose and it gives the desired output. The proposed system will works on the principle based on detection of a part and extracting CNN features from multiple convolutional layers. These features will be given to the classifier for classification purpose. On basis of the results the system will try to achieve maximum accuracy in prediction of bird species. The system will conduct a series of experiments in a dataset composed of several image to achieve maximum efficiency

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