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Bird Species Identification Using Deep Learning

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ABSTRACT::

Now a day some bird species are being found rarely and if found classification of bird species prediction is difficult. Naturally, birds present in various scenarios appear in different sizes, shapes, colors, and angles from a human perspective. Besides, the images present strong variations to identify the bird species more than audio classification. Also, the human ability to recognize the birds through the images is more understandable. So this method uses the Caltech-UCSD Birds 200 [CUB-200-2011] dataset for training as well as testing purpose. By using a deep convolutional neural network (DCNN) algorithm an image is converted into grey scale format to generate an autograph by using tensor flow, where the multiple nodes of comparison are generated. These different nodes are compared with the testing dataset and a score sheet is obtained from it. After analyzing the score sheet it can predicate the required bird species by using the highest score. Experimental analysis of the dataset (i.e. Caltech-UCSD Birds 200 [CUB-200-2011]) shows that the algorithm achieves an accuracy of bird identification between 80% and 90%.The experimental study is done with the Ubuntu 16.04 operating system using a Tensor flow library

Key Word–Autograph; Caltech-UCSD; grey scale pixels; Tensor flow

Introduction Overview

The main proposal of this project is to identify bird species using deep learning.

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.

Proposed System:

In this paper, the author is describing the concept to identify species of birds by using Python TensorFlow and Deep Learning algorithms. Earlier techniques were using bird voices or videos to predict its species but this technique will not give accurate results as audio may contain background or other animal voices. So images can be the best option to identify species of birds.

To implement this technique we need to train all birds species and generate a model then by uploading any image deep learning algorithm will convert the uploaded image into the grayscale format and apply that image to the trained model to predict the best match species name for the uploaded image.

Advantages

- To train bird species we are using the 'Caltech-UCSD Birds 200(CUB-200-2011)' dataset which contains 200 species or categories of birds. The model will be built using that dataset and tensor flow deep learning algorithm.
- So the main aim of this project is to identify species of birds
- Emergency purpose.
- Cost efficient
- User-friendly.

Architecture

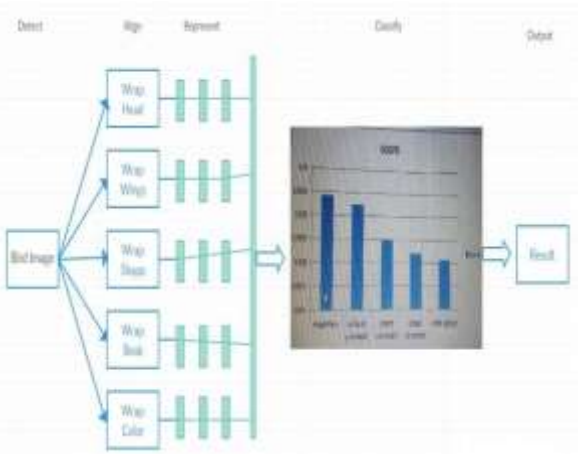


Fig.1 Architecture Diagram

Hardware Requirements

- RAM: 4GB and Higher
- Processor: Intel i3 and above
- Hard Disk: 500GB: Minimum

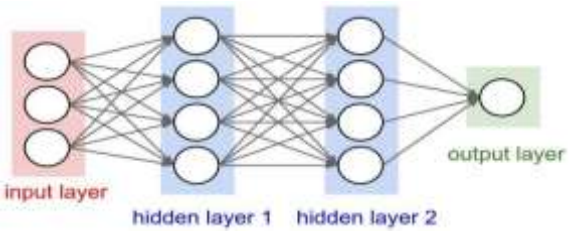
Software Requirements

- OS: Windows
- Python IDE: python 3.5
- Setup tools and pip to be installed for 3.6 and above
- Language: Python Scripting

Frontend: Tkinter

- **Backend:** Python
- **Libraries:** Dlib, Tensor flow, Keras, and OpenCV
- **IDE:** VS Code

A dataset is a collection of data**.** For performing an action related to birds a dataset named **Caltech- UCSD Birds 200 (**CUB-200-2011) is used**.** It is an extended version of the CUB-200 dataset, with roughly double the number of images per class, and also has new part location annotations for higher accuracy [8]. The detailed information about the dataset is as follows: Number of categories: 200, Number



Object Detection :

In this module, the system will detect the bird name using the data which is already given to the dataset we used we check using the image selection of the bird.

Training:

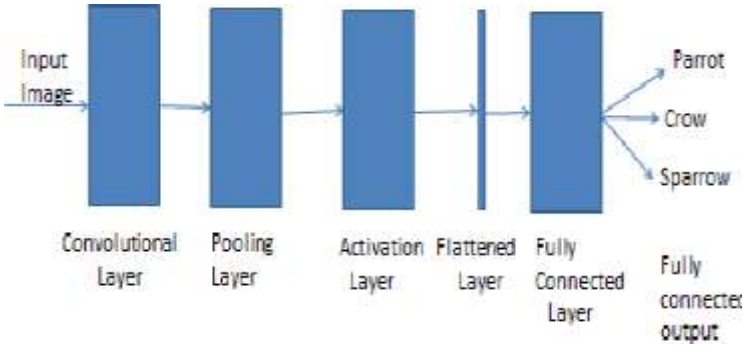
According to the nodes formed the autograph is generated which is understandable by Tensorflow to classify the image. This autograph is then taken by classifiers and the image is compared with the pre-trained dataset images of Caltech UCSD and the score sheet is generated. The score sheet is a result

that contains the top 5 match results by which the highest matching value of the score sheet is the result of bird species. Here a trial has been made to implement 80% accuracy in results by training the Caltech UCSD.

Algorithms

In this experiment, an unsupervised learning algorithm has been used for developing the system, because the inputted image defined is not known. Also, the data which is given to the unsupervised learning algorithm are not labeled, i.e. only the input variables(X) are given with no corresponding output variables. In unsupervised learning, algorithms discover interesting structures in the data themselves. In detail, clustering is used for dividing the data into several groups [4].

In-depth, deep learning models are used to find the vast number of neurons. Deep learning algorithms learn more about the image as it goes through each neural network layer. For classifying **Neural Network** is used. Figure 2 represents layers of neural networks for feature extraction. The neural network is a framework for many machine learning alg



System Design

Data Flow Diagram:

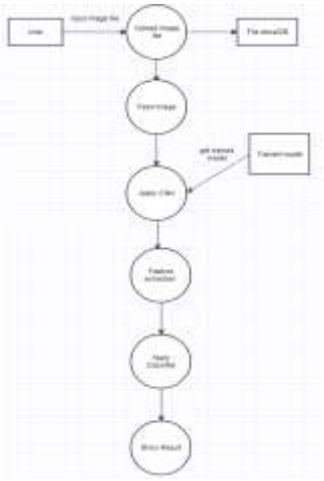


Fig.2 Data Flow Diagram

In the system module, it determines

1) live module
2) admin module
3) training module

1. Live Module :

In this live module, the system will do all things automatically. This means the system will count the number of birds data given in the list and after selecting the listed bird it will show in the output graph

2. Admin Module :

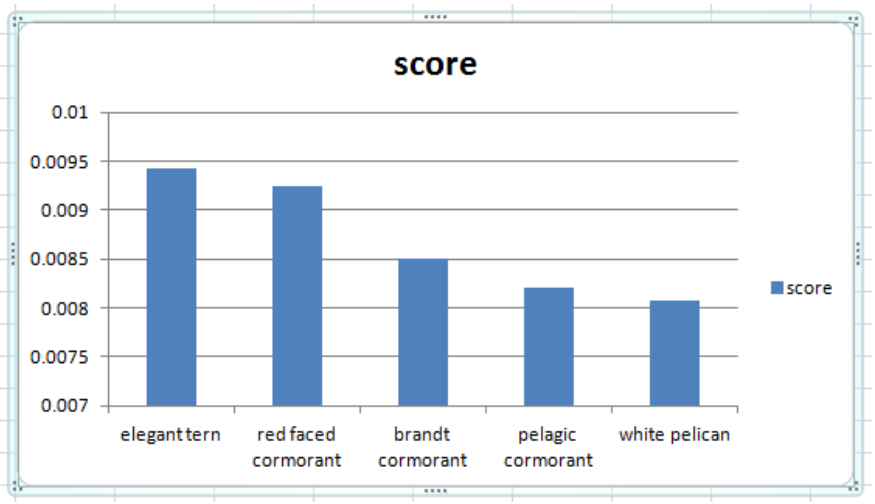
In this manual module, the system will do in manual. This means the system will give choices to the user to select the image from the list it compares with other birds' images and show the output as a graph.

This manual module is for checking the system. Is the system working correctly or not?

3. Training Module :

In this training module, the system will automatically train itself. And when we create one folder for each bird and added to the code from that we select the bird name and it will show.

Sr. No	Species	Score Obtained
1	Elegant tern	0.00943
2	Red faced cormorant	0.00924
3	Brant cormorant	0.0085
4	Pelagic cormorant	0.0082
5	White pelican	0.00808



The folder should be there with different bird images from which we have to select the image we needed.

Result:

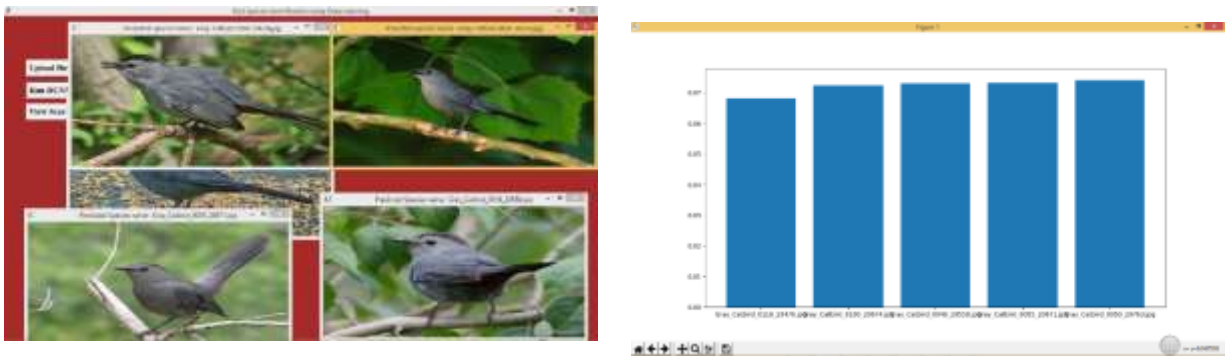


Fig.4 Identifying People

Conclusion:

The present study investigated a method to identify the bird species using a Deep learning algorithm (Unsupervised Learning) on the dataset (Caltech-UCSD Birds 200) for the classification of the image. It consists of 200 categories or 11,788 photos. The generated system is connected to a user-friendly website where the user will upload a photo for identification purposes and it gives the desired output. The proposed system works on the principle based on the detection of a part and extracting CNN features from multiple convolutional layers. These features are aggregated and then given to the classifier

for classification purposes. On basis of the results which has been produced, the system has provided 80% accuracy in the prediction of finding bird species.

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