# IMAGE BASED BIRD SPECIES IDENTIFICATION USING MACHINE LEARNING

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**ABSTRACT_**Birds are wonderful creatures who lead great lives alongside humans. Birds are one indicator of climate change. In every trophic level, from mid-level consumers to top predators, birds are important. Currently, several of these bird species are in danger of going extinct. Each bird is naturally different from the others in terms of characteristics and physical characteristics such as size, shape, beak, feathers, silhouette, and so forth. When it comes to species identification, bird photographs are very helpful compared to audio-based classification. Visual classification is by far the most comfortable way for people to recognise birds. The collected dataset of birds is an essential element in the process of image categorization. After obtaining the characteristics from the input image, classification is carried out. For both regression and classification, the Random Forest technique is employed. The input image is converted to grayscale first, and then to matrix format, in order to generate autographs using Tensor Flow. As a result, the attributes of the given bird image are retrieved, the bird's name is ascertained, and the bird's place of origin is additionally displayed.

## 1.INTRODUCTION

Birds are fascinating creatures that live in harmony with humans and have intricate lives. They are also important indicators of changes in the environment and can be found at a variety of trophic levels in ecosystems, from consumers at the middle level to top predators. Sadly, a number of bird species are currently in danger of extinction, making accurate identification and monitoring even more essential than ever. Each species of bird has its own physical characteristics, such as variations in size, shape, structure of the beak, patterns of feathers, and overall

silhouette. Traditionally, species identification is done through visual observation, which is intuitive and effective for humans. These distinctive characteristics are necessary for species identification.

In this venture, we influence the force of AI to robotize and improve the course of bird species recognizable proof from pictures. Our method focuses on extracting key features from bird images to facilitate accurate classification by building upon a comprehensive dataset of images. Visual classification provides a direct and dependable method for identifying birds, in contrast to audio-based methods, which are subject to limitations brought on by noise in the environment and other factors.

There are a few important steps in the classification process. To begin, the distinctive characteristics of each bird are captured by extracting features from the input images. The Random Forest algorithm, which is utilized for both classification and regression tasks, is then applied. In addition, TensorFlow is used to preprocess the images and convert them to grayscale before converting them to a matrix format, which makes it easier to precisely extract characteristics from the images. This nitty gritty examination permits the model not exclusively to recognize the bird species precisely yet additionally to give data about the bird's starting point.

The creation of a robust and user-friendly tool for bird species identification is the ultimate objective of this project. This instrument will be priceless for progressives following imperiled species, scientists concentrating on avian way of behaving and nature, instructors showing biodiversity, and bird fans who need to find out about the birds they experience. We hope that by automating the identification process, public appreciation and comprehension of birds will rise, as will scientific research and conservation efforts.

## 2.LITERATURE SURVEY

### 1) Speedy Image Crowd Counting by Light Weight Convolutional Neural Network

**AUTHORS:** Vivekanandam, B.

In image/video analysis, crowds are actively researched, and their numbers are counted. In the last two decades, many crowd counting algorithms have been developed for a wide range of applications in crisis management systems, large-scale events, workplace

safety, and other areas. The precision of neural network research for estimating points is outstanding in computer vision domain. However, the degree of uncertainty in the estimate is rarely indicated. Point estimate is beneficial for measuring uncertainty since it can improve the quality of decisions and predictions. The proposed framework integrates Light weight CNN (LW-CNN) for implementing crowd computing in any public place for delivering higher accuracy in counting. Further, the proposed framework has been trained through various scene analysis such as the full and partial vision of heads in counting. Based on the various scaling sets in the proposed neural network framework, it can easily categorize the partial vision of heads count and it is being counted accurately than other pre-trained neural network models. The proposed framework provides higher accuracy in estimating the headcounts in public places during COVID-19 by consuming less amount of time.

**2) Study of Variants of Extreme Learning Machine (ELM) Brands and its Performance Measure on Classification Algorithm**

**AUTHORS:** Manoharan, J. Samuel

Recently, the feed-forward neural network is functioning with slow computation time and increased gain. The weight vector and biases in the neural network can be tuned based on performing intelligent assignment for simple generalized operation. This drawback of FFNN is solved by using various ELM algorithms based on the applications issues. ELM algorithms have redesigned the existing neural networks with network components such as hidden nodes, weights, and biases. The selection of hidden nodes is randomly determined and leverages good accuracy than conservative methods. The main aim of this research article is to explain variants of ELM advances for different applications. This procedure can be improved and optimized by using the neural network with novel feed-forward algorithm. The nodes will mainly perform due to the above factors, which are tuning for inverse operation. The ELM essence should be incorporated to reach a faster learning speed and less computation time with minimum human intervention. This research article consists of the real essence of ELM and a briefly explained algorithm for classification purpose. This research article provides clear information on the variants of ELM for different

classification tasks. Finally, this research article has discussed the future extension of ELM for several applications based on the function approximation.

**3) Automated Bird Species Identification using Audio**

**AUTHORS:** Chandu B, A. M

In this paper, 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 pre-processing 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.

## 3.PROPOSED SYSTEM

Our system employes CNN(Efficientnet b3) algorithm to identify the bird species from image and before feeding the data set into the program we use a preprocessing techinque called Image data generator for increasing the accuracy of the program.

### 3.1 IMPLEMENTAION

#### 3.1.1 Pre-processing:

Deficiencies in the data acquisition process due to limitations of the capturing device sensor, or to prepare the data for subsequent activities later in the description or classification stage. Data pre-processing describes any type of processing performed on raw data to prepare it for another processing procedure. Hence, pre-processing is the preliminary step which transforms the data into a format that will be more easily and effectively processed. Therefore, the main task in pre-processing the capture data is to decrease the variation that causes the reduction in the recognition rate and increases the complexities. Thus, pre-processing is an essential stage prior to feature extraction since it controls the

suitability of the results for the successive stages.

### Classification:

A neural network is set of connected input/output units in which each connection has a weight associated with it. During the learning phase, the networks learns by adjusting the weights so as to be able to predict the correct class label of the input tuples. Neural network learning is also referred to as connectionist learning due to the connections between units. Advantages of neural networks, however, include their high tolerance of noisy data as well as their ability to classify patterns on which they have not been trained. They have been successful on a wide array of real-world data, including Malaria Detection, Pathology and laboratory medicine and training a computer to pronounce English text. There are many different kinds of neural networks and neural networks given tuples. The units in the input layer are called input units. The units in the hiddenlayer and output layer are sometimes referred to as neurodes, due to their symbolic biological basis, or as output units. The multilayer neural network has two layers of output units. Therefore, we say that it as a two-layer algorithms. The most popular neural network is back propagation.

### Feed-Forward Neural Network:

A multilayer feed-forward neural network consists of an input layer, one or more hidden layers, and an output layer. Each layer is made up of units. The inputs to the network correspond to the attributes measured for each training tuple. The units are fed simultaneously into the units making up the input layer. These inputs pass through the input layer and are then weighted and fed simultaneously to a second layer of “neuron like” units, known as a hidden layer. The outputs of the hidden layer units can be input to another hidden layer, and so on. The number of hidden layers is arbitrary, although in practise, usually only one is used. The weighted outputs of the last hidden layer are input to units making up the output layer, which emits the network’s predictionfor

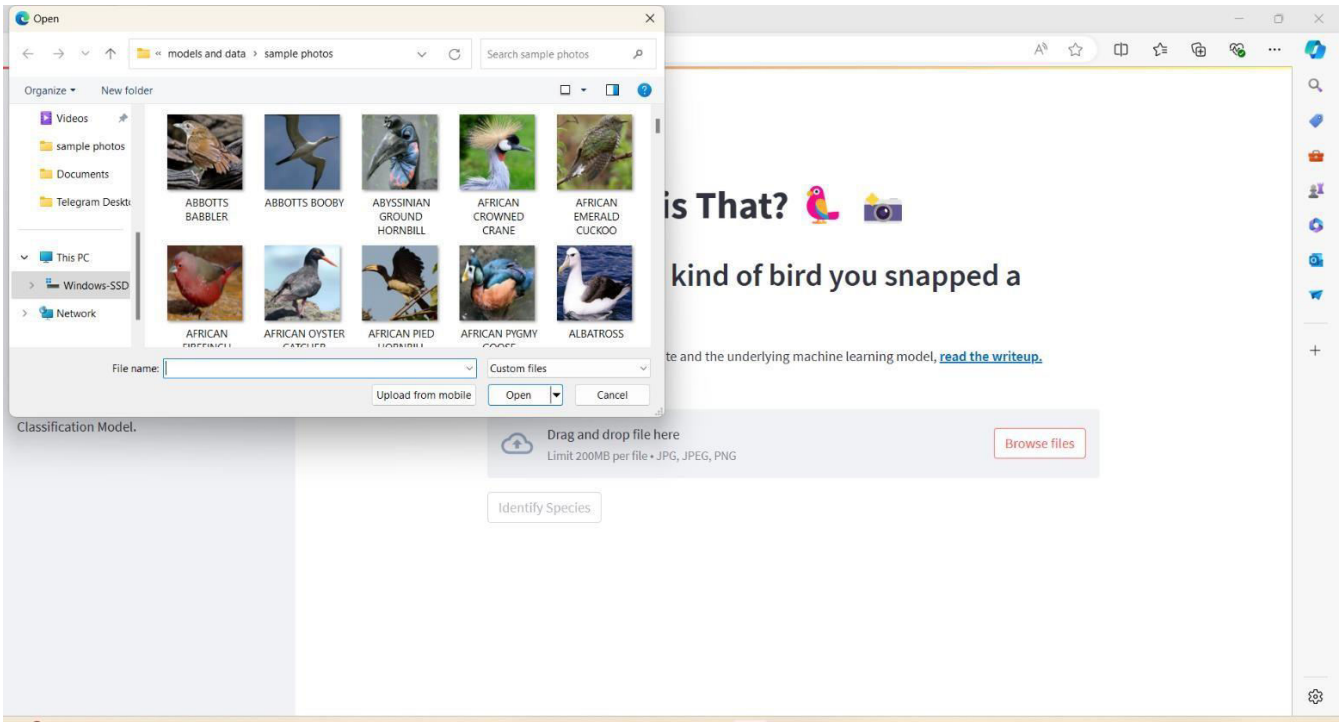
neural network. (The input layer is not counted because it serves only to pass the unit values to the next and so on. The network is feed- forward in that none of the weight cycles back to an input unit or to an output unit of a previous layer. It is fully connected in that each unit provides input to each

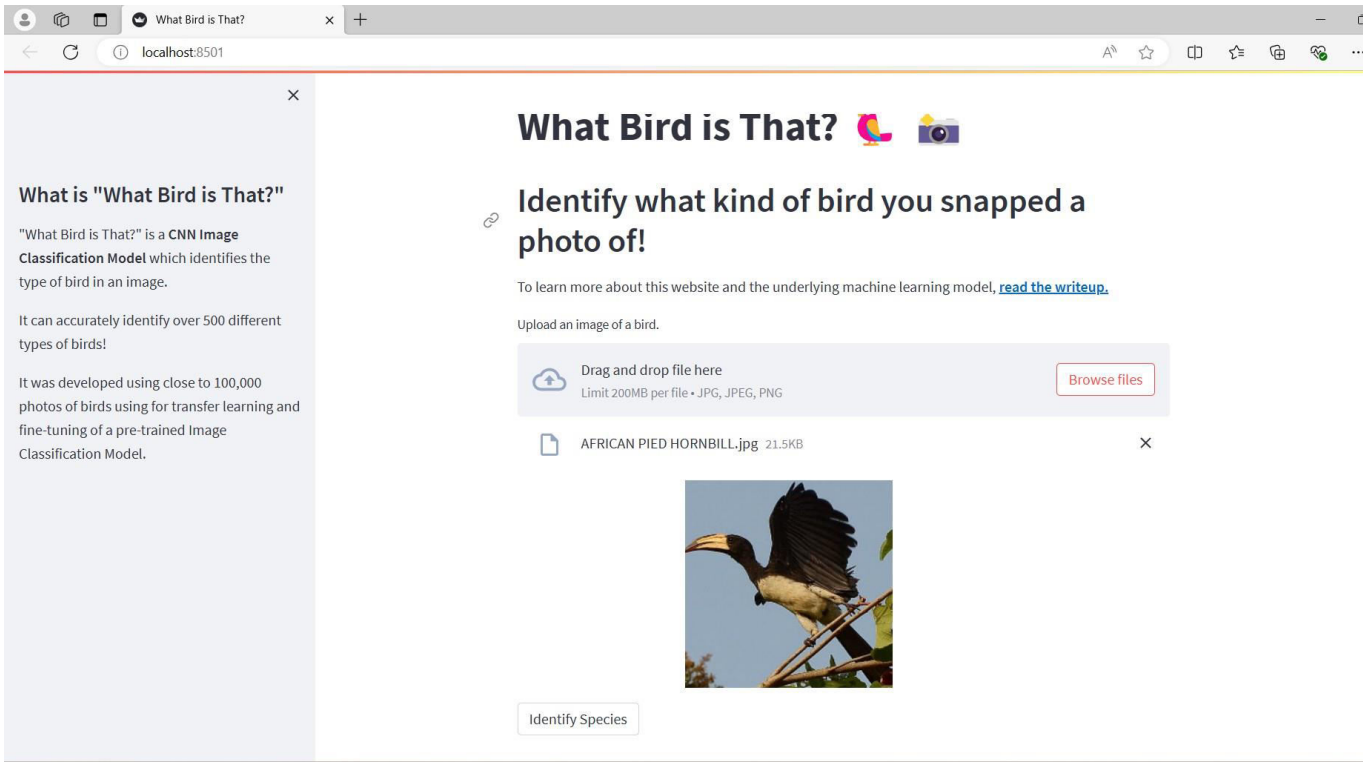
unit in the next forward layer.

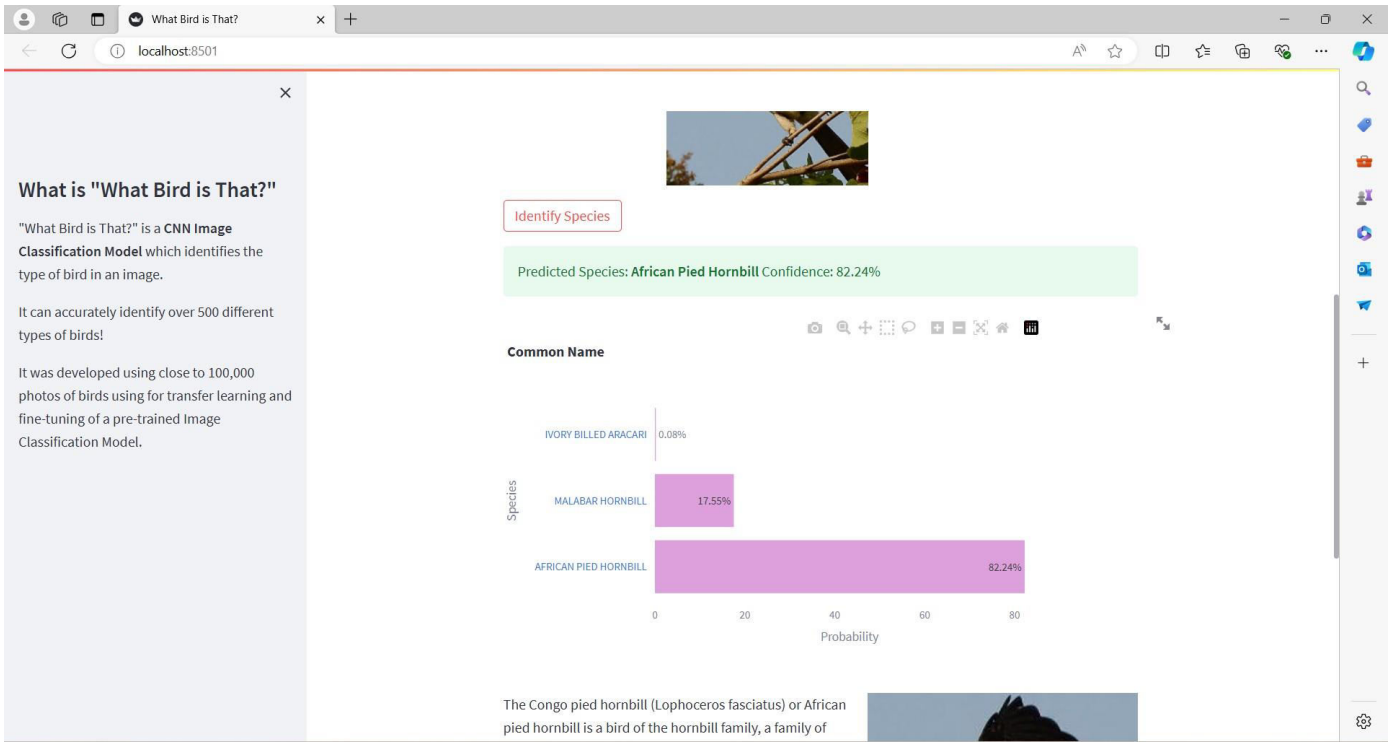
### Convolutional Neural Network (CNN):

The classifier presented by Sprengel et is a convolutional neural network (CNN).A convolutional neural network is a neural network architecture pioneered by LeCun et,and later popularized by Krizhevsky et with the introduction of the AlexNet. A typical CNN consists of convolutional layers and pooling layers followed by a fully connected neural network. The convolutional layers and the pooling layers are supposed to learn how to extract relevant, locally distortion invariant, features from the input, and the fullyconnected neural network is supposed to learn how to classify these features. The featureslearned by the convolutional layers could be, e.g., edges of objects in an image. In the rest of this section, convolutional layers and pooling layers will be defined, the input of the network will be summarized, the architecture used in the baseline will be defined, and the initialization, optimization and loss function used will be explained.

## 4.RESULTS AND DISCUSSION






## 5.CONCLUSION

- To identify bird species using the deep learning methods for classification of image. The design CNN algorithm is suitable solution for classification and to get good accuracy.

- The generated system is connected with a user-friendly website where user will uploadphoto for identification purpose and it gives the desired output.

- Using this project, we can easily identify species of a bird from the image that we captured.

- The accuracy of our algorithm is 95.09

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