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Classification of Bird Species Using Deep Learning Techniques

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Abstract: ***Nowadays some bird species are not being located often than we used to see them in our childhood and if we do observed them we can't predict the type of bird species as it is very hard to predict as we haven't familiar enough with them. naturally, birds found in numerous situations appear in one-of-a-kind sizes, shapes, coloring, and angles from the human perspective. except, the robust to discover the bird species extra than audio category. additionally, the human capability to apprehend the birds through the photos is more comprehensible. So, this approach makes use of the dataets made by many researchersa and bird enthusiasts for schooling also in addition to testing purposes. through the usage of a convolutional neural network (CNN) basically set of rules a photo that is converted into a greyscale layout to generate an autograph via the usage of tensor-flow, where the multiple nodes of comparison are generated. those different nodes are compared with the traing and testing dataset and a score sheet is received from it. After reading the datasheet describing the accuracy of our proposed trained model, it can predicate the desired species with the aid of using the highest precision we could get. Experimental evaluation at the dataset shows that the algorithm achieves an accuracy of identity among 86% to 87% The experimental observed is accomplished with visual studio book with the usage of a Tensor flow library.***
Keywords: Machine Learning, CNN, faces, emotions, etc)

I. INTRODUCTION

As the increase in unnatural calamities faced by almost every living beings around our world many species are in the verge of extinction or got impacted heavily due to that. One of them is birds behavior. Their behaviour and population trends have become a key component of reissue nowadays. Birds are important for the while nature cycle of our beloved forests also they assist us to detect other organisms in the environment (e.g., insects they feed on which are also very important part of cycle) easily as they reply and respond quickly to whatever the environmental changes happen in the living forests. But collecting and gathering databases of species of birds needs enormous human work moreover becomes an extremely costlier method and much tired process . In such a case, a dependable entity or we can say an advanced computer generated algorithm that will supply large-scale processing of databases about species of most of the birds existed now and will be achieved as a indispensable tool for researchers, governmental agencies, etc. is much required in recent times of many unnatural calamities created. So, bird species identification plays an prominent role in identifying them in more detailed manner. Bird species identification intends predicting the bird species belongs to which type by utilizing an image.

This exemplar may be expedient in identifying the endangered species and assist society in spreading awareness about the requirements of all the species for balance in nature. As the exemplar implies the knowledge of Deep Convolution neural networks, we can be capable to know that CNN is the best algorithm for analyzing any images. For researchers working outdoors, shoot photos can be categorized and analyzed instantly by the system, it will also infuriate people's interest in birds and could benefit in the global cause of the protection of birds.

II. LITERATURE REVIEW

In the field of bird species detection and classsification many researchers and analysts roposed different algorithms to efficiently gather the birds data so that we can identify them in a more precise manner. Fisrst paper is wriiten by Andreia Marini, Jacques Facon et al (2013) [5] they proposed a novel approach model based on color features extracted from unconstrained images, by applying a color segmentation algorithm to eliminate background elements and to delimit candidate regions where the bird may be present within the image. They also implemented aggregation processing to reduce the number of intervals of the histograms to a fixed number of bins. In this paper, the authors experimented with the CUB-200 dateset and results show that this technique is more precise in detection.

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Peter Jancovic and Munevver Kokuer et al (2012) [7], investigated acoustic modelling for recognition of bird species from audio field recordings. Developed a hybrid deep neural network hidden Markov model (DNN-HMM). The developed models were employed for bird species identification, detection of specific species and recognition of multiple bird species vocalizing in each recording. In this paper, the authors achieved an identification accuracy of 98.7% and recognition accuracy of 97.3%.
Juha Niemi, Juha T Tanttu et al (2018) [2], executed a Convolution neural network trained with various deep learning algorithms for images detection and classification. It also proposed a data augmentation method in which images are converted and rotated in accordance with the desired color. The final identification they proposed is based on a fusion of parameters provided by the radar and predictions done by the image classifier.

III. OBJECTIVES

To identify the species of the birds by analyzing an image. Even some Of the well known experts around the world like ornithologists couldn't identify species of the bird correctly by looking at an image, so at times it is very necessary that we let machine learning do its job and identify them effectively-

1) Bird classification can be done manually by domain experts, this rapidly becomes a tedious and time-consuming process. So, by this model, we can identify the species of the birds accurately and in less time
2) By some features like size, shape, and color birds can be classified. By using CNN, we can classify the species of the birds

IV. METHODOLOGY

A. Preparation of Dateset

The dataset used in the experiment is the FER-2013 dataset, a widely used dataset for benchmark and assessing the performance of facial expression recognition systems and approaches.fitting of the training data.

B. Pre-Processing Of The Convolution Neural Network Model

Flatten to convert image to 1- dimensional array. 1- dimensional array becomes the input to the fully controlled layers. Output layer has two techniques: dense and soft-max.To study the accuracy of the model, the metrics are set to accuracy. The data has to be classified into 7 different categories and each image can belong to one classification type only for that we need to make the loss set to categorical_cross-entropy.

C. Training and Testing the Model

After pre processing and defining various parameters like batch size, epochs, training images and testing images, dropout values, we can finally train our model with considering mentioned parameters in an number of iterations as epochs are defined. We can see different ac curacies like train accuracy and test accuracy of every iterations where every one of image is examined and extracted features from it to train for our ML model. Train loss and validation loss is also generated to efficiently analyze how is our model training on the images from the designated dateset

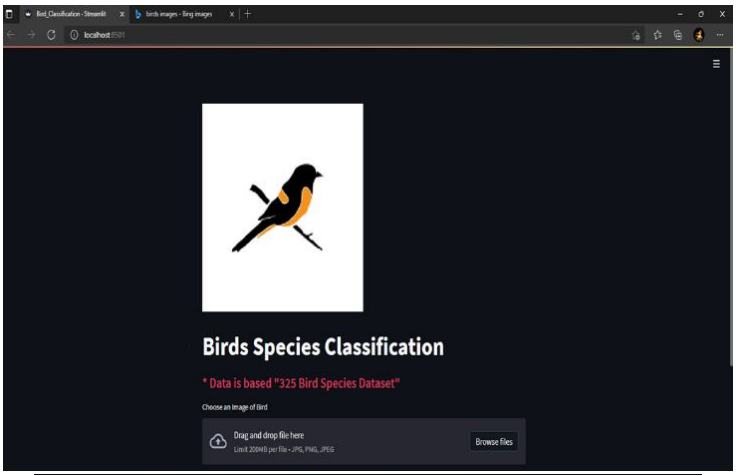
D. Synthesis/Algorithm/Design/Method

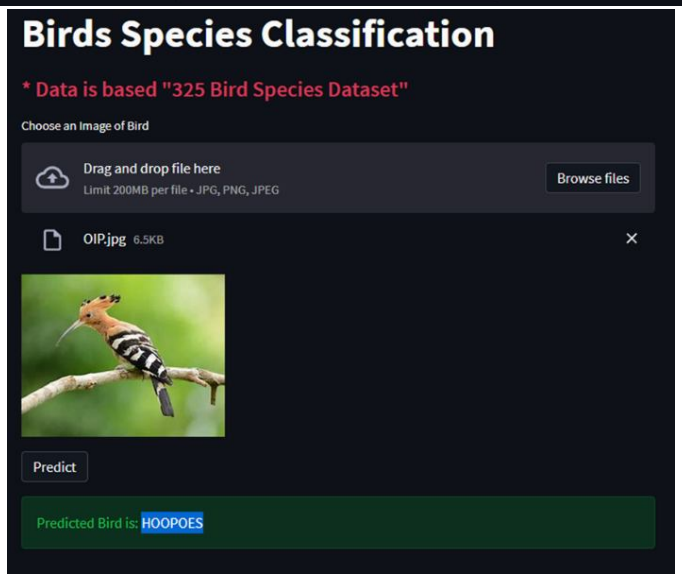
For the project, I will be using the dataset that includes 325 categories of bird species.
We trained the model with the help of CNN and the vgg16 algorithm.
The dataset is divided into training and testing. First, it trains the system then it tests for accuracy.
Save the trained model and use it for classifying new images outside the dataset.
Created an architecture of CNN and Trained the models with the help of convolutional NN and vgg16 which is based on the Imagenet dataset. Build the interface with a streamlit GUI interface provide any bird's image and it gives us the bird's name with the image as an output.

V. RESULTS AND DISCUSSION

The scenario of experiment gives us prominent result about the system performance with the average accuracy rate of 86-87%.Designing the CNN Model: By following the above CNN architecture six activation layers are designed. Four convolution layer and 2 fully controlled layers. Then we define batch size, epochs, dropout layers and max-pooling layers, activation functions, fit generators for training and testing of images in the datasets. We then analyze the performance of the model by evaluating the accuracy vs loss ratio between train and validation results.

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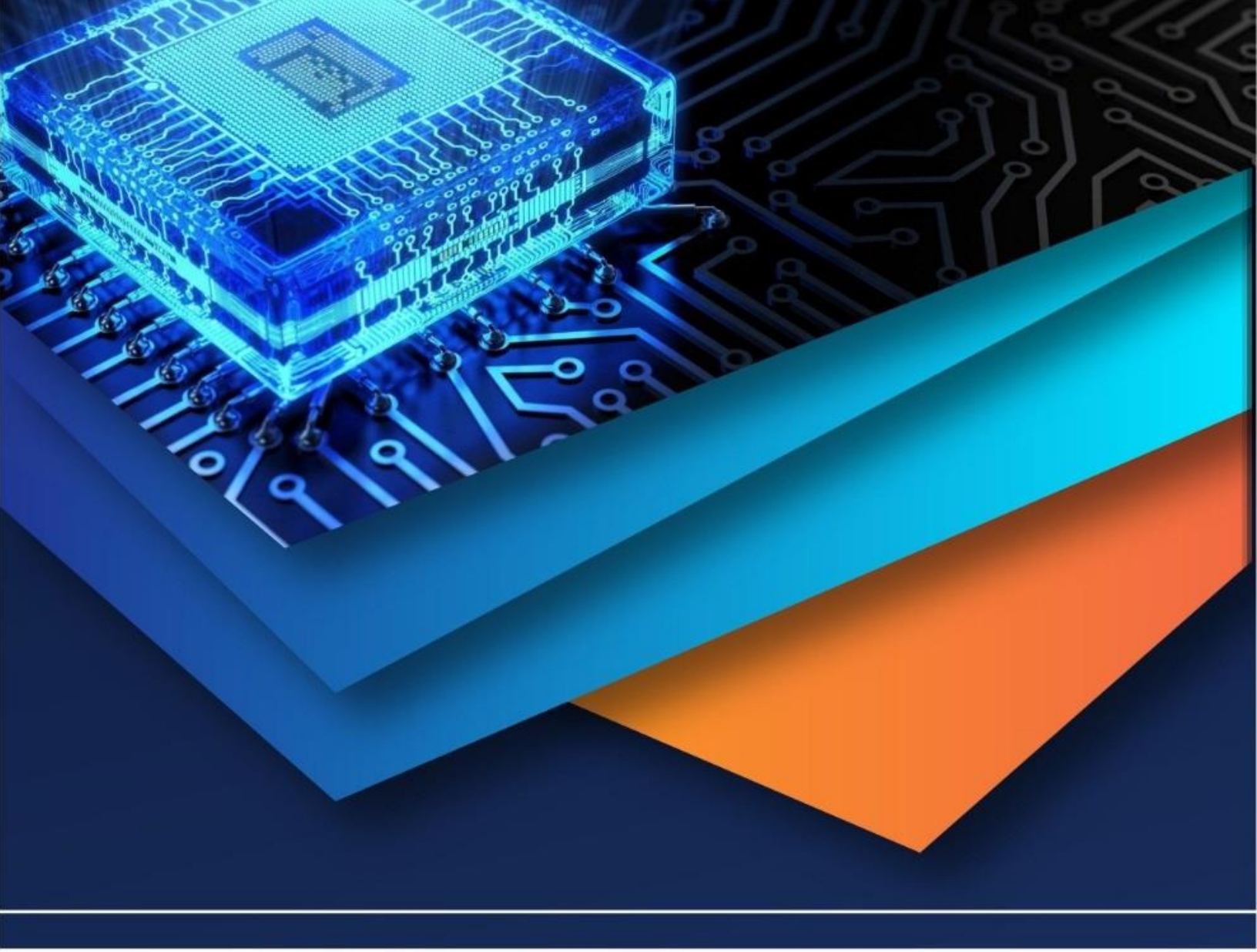
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VI. CONCLUSION

The main purpose behind our project is to identify the bird species from an image or even a video in real time given as input by the user of this system. I used CNN because it is suitable for implementing advanced algorithms and gives a great precised results to accurately detect what comes in front of camera. It is also general-purpose and scientific. I managed to achieve an accuracy of 86%-87% . Now I am working on this project to extends to a great deal of scope as the purpose meets. In wildlife research and monitoring, this concept can be implemented in monitoring the wild life by placing the cameras on trees all over the forest to efficiently monitor their health and overcome difficulties faced by them and also maintain the record of wildlife movement in specific habitat and the day to day life of almost all the species which are on the verge of endanger.
And countless populace have no knowledge about the species which are very few in numbers in recent time.

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