CONSER-VISION

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***Abstract*— In recent years, automated surveillance system called camera traps help conservationists study and monitor a wide range of ecologies while limiting human interference. Camera traps are triggered by motion or heat, and passively record the behavior of species in the area without significantly disturbing their natural tendencies. However, camera traps also generate a vast amount of data the quickly of humans to sift through. The main objective of this paper is to propose a system used to classify different animal species, its trained with real-life dataset collected from Taï National Park, South Africa. When comes to Computer Vision Deep Learning has been efficient in handling large dataset and able to learn complex pattern from data. The experimental output shows that the proposed system has substantial performance along with better accuracy.**

Keywords— Computer vision, Deep Learning

I. INTRODUCTION

Automation is a recent tread and whole world is trying to that direction but is it possible that every action or work can be automated? Answer for that would be straight No because there are lots to roadblocks in achieving this state.

Climate Change is a global issue, along with habitat destruction and pollution, are one of the important stressors that cause ecological imbalance to tackle that many countries initiating biological zone to preserve existence of wildlife species. These species are being monitored 24/7 weeks using camera traps. Camera traps are triggered by motion or heat, and passively record the behavior of species in the area without significantly disturbing their natural tendencies. However, camera traps also generate a vast amount of data the quickly of humans to sift through.

How it would be collecting images, stored, and extracting information into centralized database. So, we can achieve automation, but a new problem would arise that is reliability of the system in other term how accurate does the system perform and how far it can justify?

II. LITERATURE REVIEW

Jeff Clune suggests that we harness deep learning, a state-of-the-art machine-learning technology that has led to dramatic improvements in artificial intelligence (AI) in recent years, especially in computer vision 13. Here, we do not harness the data we automatically extract to test a specific ecological hypothesis. Instead, we investigate the efficacy of machine learning to enable many future studies by offering a far less expensive way to provide the data from large-scale camera-trap projects that has previously led to many informative ecological studies.

Sharam Taheri recommends that we use two systems, The first approach constructs complex features which represents and discriminates sample images better but creating such a feature is complicated and it is problem dependent. The second approach combines the extracted features from different methods and concatenates them to build a more powerful feature vector. Increasing the size of feature space causes increased problem computation cost. Instead of using complex representation, the information is consolidated from different classifiers and a decision is made according to it. This method is known as score-level fusion.

Abdul Harris also suggests that we use two methods for classification are applied for animal through different approach. One method is working with the images and applies the naïve Bayesian classifier to distinguish the different and classify that image into one animal category. Several image processing techniques as well as machine learning and probability methods are researched and applied for this approach. The other is based on question and answer which can be described by " logic-based " model.

Rukiye Pollatimur used a Principal Component Analysis (PCA) based system was developed for the recognition and classification of different species of animals. Thanks to the application software in the structure of the developed system, it is possible to identify the animals most resembling an animal in the image dataset. Experimental studies on cow, cat, dog, goat, and rabbit animal species shows a success rate of 92% in the first nearest recognition and 83% in the second nearest recognition. It has been seen that the improving of this developed system can be used in the classification process of different kinds of animals.

Kaitlyn M. Gaynor used a Convolutional Neural Network (CNN) using a deep learning algorithm (VGG-16, as described

elsewhere and on a fully annotated dataset from Gorongosa National Park, Mozambique that has not previously been subjected to machine learning. For purposes of comparison, we repeated the training using a ResNet-50 CNN architecture, as discussed in Appendix. After training, we interrogated our network to better understand the features it used to make identifications by deconstructing the features on the following three aspects of our implementation.

Sharath Kumar used segmentation is carried out to get the object of our interest and discard the background. Animals are often surrounded by plants or trees and shadow in the background. So, segmentation is carried out to get the animal region which is only the region of our interest in it. Pixel based segmentation, which uses only pixel appearance to assign a label to a pixel. Region based segmentation; the algorithm detects for valid segments at each scale further segments extracted at various scale are integrated to get the result.

IV. PROBLEM DEFINITION

The traditional way to monitor the specimens in the wildlife sanctuary is to send people down to manually identify and count them. With the progress of technology, they have installed cameras to eliminate the need of going out into the field directly. However, this poses a new problem where there are hours and hours of raw data but not enough manpower to filter through them all. This is the problem we are trying to solve using our model.

V. PROPOSED SYSTEM

Our fundamental objective is to foster a successful Deep Learning model for image classification. The proposed system is trained by a real-time dataset harvested from Tai National Park using Deep-Convolution Neural Network algorithm and classify into different animal species.

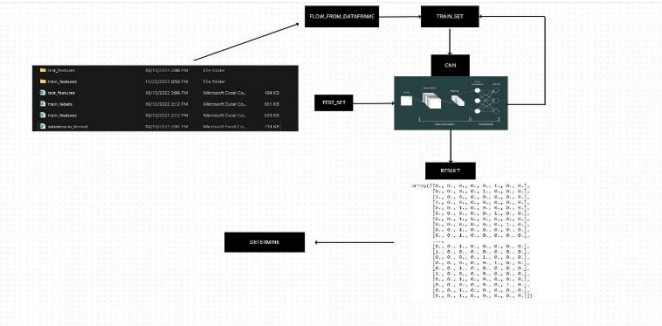


Fig 1: Block Diagram of Project

Fig 2: CNN-Model Representation

VI. METHODOLOGY

[1] Dataset-

Each record in the dataset corresponds to a single image captured by a camera trap. Each record has one .jpg file accompanied by additional information in train_features.csv and test_features.csv, which contain the following fields:

i. id (string, unique identifier) - a unique identifier for each image
ii. filepath (string, feature) - image path including its split directory (train or test)
iii. site (string, feature) - the site in which the image was taken

[2] Pre-processing-

The aim of pre-processing is to improve the image data that suppresses unwanted image data distortions or to enhance some image features important for the further processing so that it do not affect the accuracy of the algorithm.

In this model image is reshaped to (224 x 224) pixels, and rescaled every pixel value of image to 0 – 1

[3] CNN-

Data is sent to model as tensor data structure along with their labels using ImageDataGenerator function provided by TensorFlow image module.

The Proposed model has two convolution layers with kernel size of (3x3x3) that convolves with the input followed by two RELU activation function respectively and image is reduced using MaxPooling layer to get the features that is more important or that influences more. At last, we flatten the reduced image and pass this to fully connected dense layer to identify the patterns in the obtained features and classify based on the same. During training process, all the parameters, the kernel, and the weights and biases in the fully connected layers are optimized.

Model is compiled and iterated 100 epochs and Using accuracy as its metrics

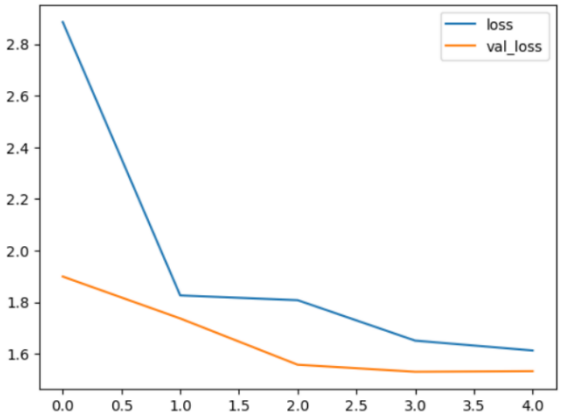


Fig 3: Model's Loss value over training

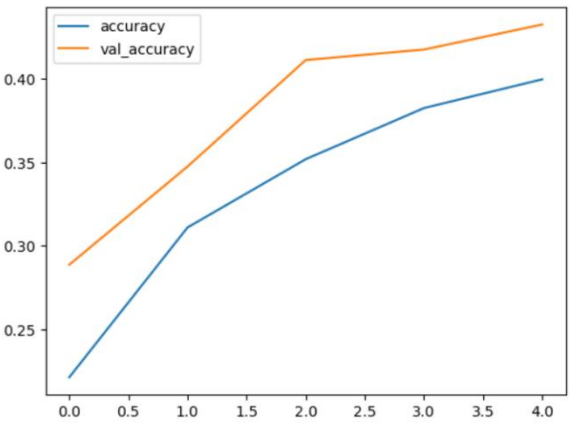
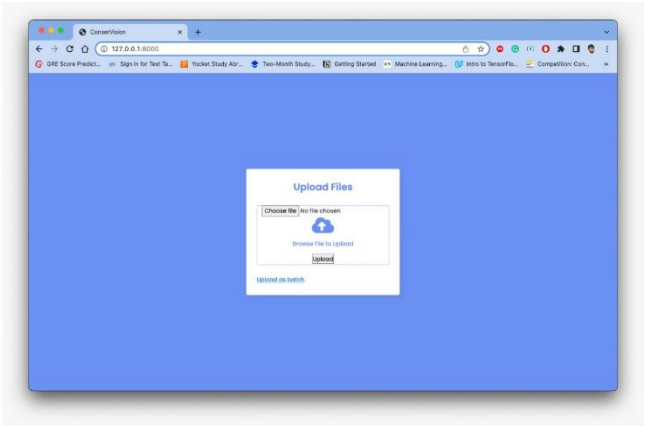


Fig 4: Model's Accuracy during training

VII. IMPLEMENTATION

Modules:

I. Prediction of Single Image:



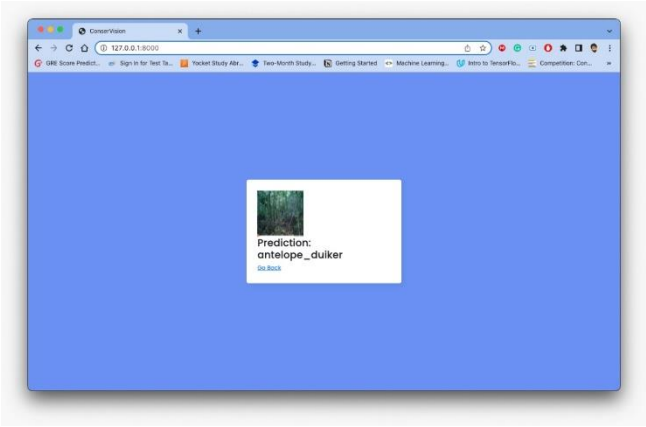


Fig 5 and Fig 6: Single Image Prediction UI

II. Prediction of Multiple Images:

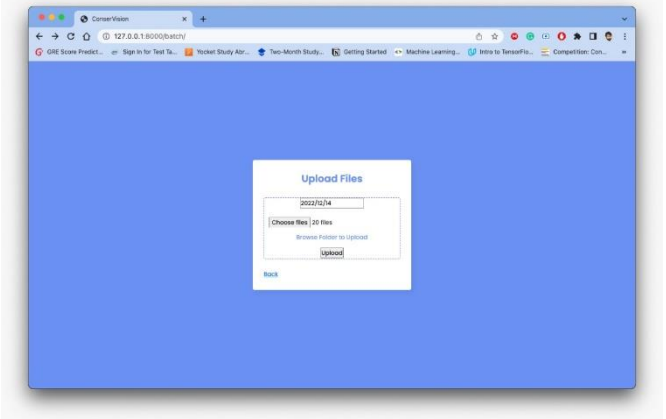
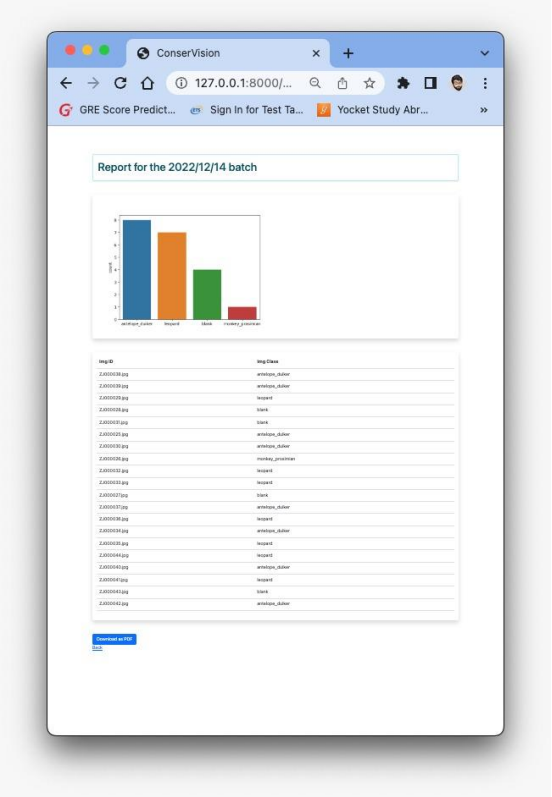


Fig 7: Multiple Image Prediction UI

III. Prediction Report:



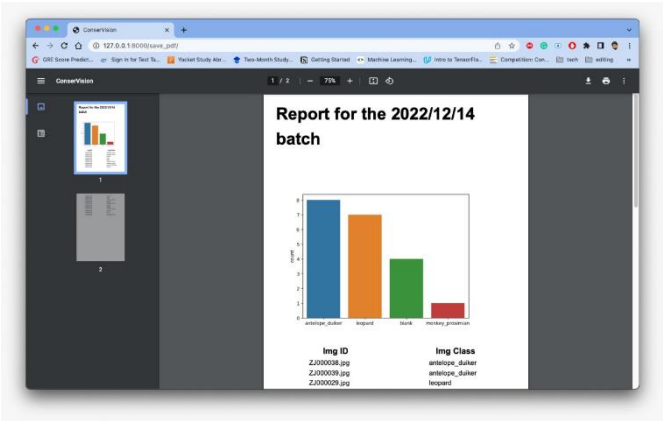


Fig 8 and Fig 9: Prediction Report UI

VIII. CONCLUSION

This Project is all about, classifying and count the number species that appear in camera trap images collected by the Wild Chimpanzee Foundation and the Max Planck Institute for Evolutionary Anthropology to help them in saving time to count and identify where each species is located without the need for a person to manually look through all the footage that requires a lot of work.

So, when they collect the camera trap images for an entire day, they can upload them as a batch folder and get the classification of the animals found and get it as a report. Also, they can download the report as a pdf for later use.

IX. REFERENCE

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