

Digital Naturalist Using CNN

Developed by: D Sri Lahari,

Guided by: Smart Bridge-Remote Summer Internship Program

1. INTRODUCTION

A naturalist is someone who studies the patterns of nature, identifies a different kind of flora and fauna in nature. Being able to identify the flora and fauna around us often leads to an interest in protecting wild spaces, and collecting and sharing information about the species we see on our travels is very useful for conservation groups like NCC.

When venturing into the woods, field naturalists usually rely on common approaches like always carrying a guidebook around everywhere or seeking help from experienced ornithologists. There should be a handy tool for them to capture, identify and share the beauty to the outside world.

Field naturalists can only use this web app from anywhere to identify the birds, flowers, mammals and other species they see on their hikes, canoe trips and other excursions.

In this project, we are creating a web application which uses a deep learning model, trained on different species of birds, flowers and mammals (2 subclasses in each for a quick understanding) and get the prediction of the bird when an image is given.

Project Objectives

- Enlarging a dataset for all intents and purposes increment the size of little datasets to make our AI models work better.
- Preprocess the pictures to a machine-decipherable arrangement.
- Applying CNN calculation on the dataset.
- How profound neural organizations are foreseeing the class and subclass of a given picture.
- You will actually want to realize how to discover the precision of the model.
- You will actually want to fabricate web applications utilizing the Flask system.

1.1 OVERVIEW

An overview of CNN-based exploration endeavors applied in the agrarian space was performed: it analyzed the specific territory and issue they center around, recorded specialized subtleties of the models utilized, portrayed wellsprings of information utilized, and detailed the general exactness/precision accomplished. Convolutional neural organizations were contrasted and other existing strategies, as far as accuracy, as indicated by different execution measurements utilized by the creators. The discoveries demonstrate that CNN arrived at high exactness in the vast dominant part of the issues where they have been utilized, scoring higher accuracy than other famous picture handling strategies. Their fundamental favorable circumstances are the capacity to estimate exceptionally complex

issues viably. We use CNN to identify the birds, flowers, mammals and other species they see on their hikes, canoe trips and other excursions.

1.2 AIM

Our point from the undertaking is to utilize TensorFlow and Keras libraries from python to extricate the libraries for profound learning application on the picture order. Right now, When venturing into the woods, field naturalists usually rely on common approaches like always carrying a guidebook around everywhere or seeking help from experienced ornithologists. There should be a handy tool for them to capture, identify and share the beauty to the outside world. We use CNN for this reason.

2.2 Smart Solution

Deep Learning (CNN):

Our fundamental objective is to build up an Image classifier utilizing convolutional neural networks. The proposed framework will screen the whole yield at customary spans through a camera which will record the environmental factors for the duration of the day. When the edge coordinates our information then it will send data to the rancher and will deliver a fitting sound or alert to the individual who gives up that. This guarantees total security of harvests from wildlife animals consequently ensuring the yields misfortune. Subsequently, CNN is utilized to prepare the creature pictures.

1. LOGICAL ANALYSIS

According to Machine Learning, Artificial Neural Networks perform truly well. Artificial Neural Networks are utilized in different grouping errands like picture, sound, words. Various kinds of Neural Networks are utilized for various purposes, for instance for anticipating the grouping of words we utilize Recurrent Neural Networks all the more absolutely an LSTM, comparatively for picture characterization we use Convolution Neural organizations.

To accomplish our objective, we have utilized one of the renowned AI calculations out there which are utilized for Image Classification for example Convolutional Neural Network(or CNN). As far as we might be concerned an AI calculation for machines to comprehend the highlights of the picture with foreknowledge and recollect the highlights to figure whether the name of the new picture took care of the machine. From the outset, we made our own personal dataset. Presently in the wake of getting the informational index, we preprocess the information a bit and give marks to every one of the pictures given.

Libraries used:

- **DataGenerator-** The ImageDataGenerator is an easy way to load and augment images in batches for image classification tasks.
- **tensorflow** – To add layers as well as compare the loss and adam curve our result data or obtained log.

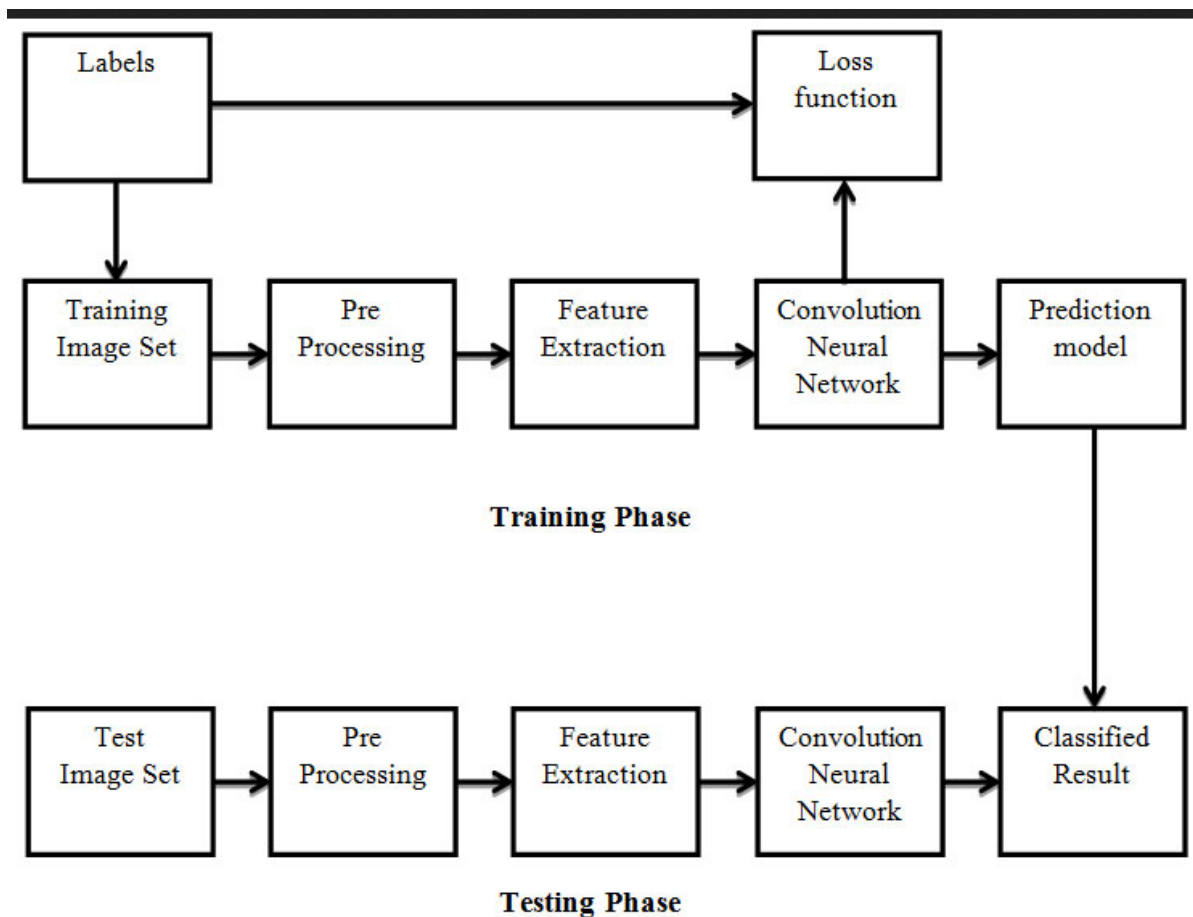
Layers used to build ConvNets

- **Input Layer:** This layer holds the crude input of the picture.
- **Convolution Layer:** This layer figures the yield volume by the processing dab item between all channels and picture patches.
- **Activation Function Layer:** This layer will apply a component savvy activation function to the yield of the convolution layer. Some normal activation functions are RELU: $\max(0, x)$, Sigmoid: $1/(1+e^{-x})$, Tanh, Leaky RELU, and so forth We have utilized RELU just as softmax for our model as this is a multi-characterization issue.
- **Pool Layer:** This layer is intermittently embedded in the remarks and its fundamental function is to lessen the size of volume which makes the calculation quick, diminishes memory, and furthermore forestalls overfitting. Two normal sorts of pooling layers are max pooling and normal pooling.
- **Dense layer** - It is the customary profoundly associated neural organization layer

Accuracy is characterized as the proportion of the number of tests effectively arranged by the classifier to the all-outnumber of tests for a given test informational index.

We have utilized the Non-Linearity (ReLU) enactment work. ReLU represents a Rectified Linear Unit for a non-direct activity. The yield is $f(x) = \max(0, x)$. ReLU's motivation is to present non-linearity in our ConvNet. Since this present reality information would need our ConvNet to learn would be non-negative straight qualities. We have utilized the softmax work as this is a multi-class arrangement issue.

3.1 Flow Diagram

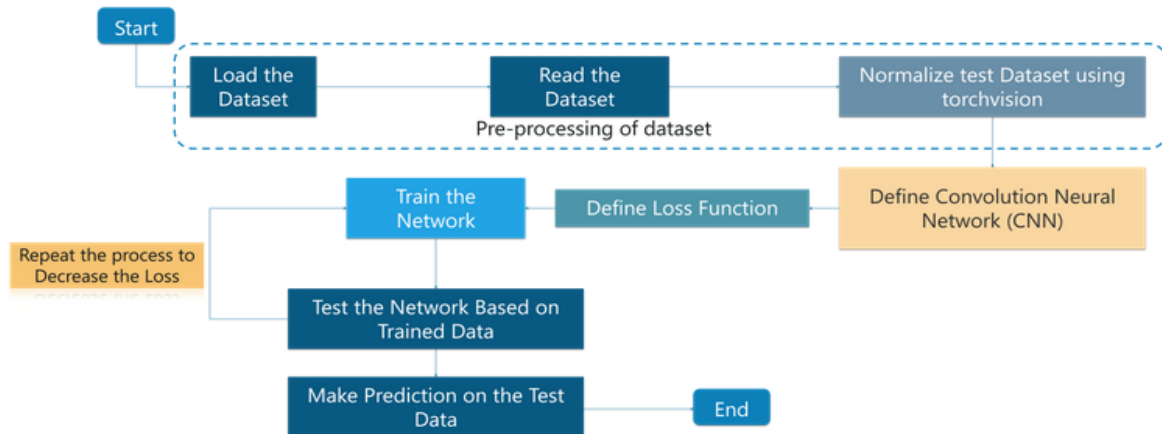


3.2 Toolkit Used

- Jupyter Notebook Environment
- Spyder Ide
- Machine Learning Algorithm (CNN)
- Python
- HTML
- Flask

We built up this yield security from creatures by utilizing the Python language which is a deciphered and undeniable level programming language and utilizing Machine Learning calculations. For coding we utilized the Jupyter Notebook climate of the Anaconda appropriations and the Spyder, it incorporated logical programming in the python language. For creature forecast, we utilized the Flask. It is a miniature web structure written in Python. It is named a microframework because it doesn't need specific instruments or libraries. It has no information base reflection layer, structure approval, or other segments where previous outsider libraries give normal capacities, and a scripting language to make a site page is HTML by making the layouts to use in the elements of the Flask and HTML


5. FLOWCHART



6. OUTPUT

We trained and tried our calculations on the total informational index, to begin with. Later we arbitrarily isolated the informational collection into preparing information and test information with the goal that we had tests from each class. 80% of information is utilized for preparing information and 20% is utilized for test information. The dataset comprises 1595 photos of these animals and was utilized as an advancement set for CNN. The model had the option to group over 90% of the pictures. The testing accuracy of the framework is about 97%. Contingent upon the order, the message and subtleties will be sent over to deliver sound or caution to the individual who gives up that division. Subsequently defending the yields. The accompanying figures and tables show the outcomes we noticed:

DIGITAL NATURALIST



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Prediction: Lady's slipper, (subfamily Cypripedioideae), also called lady slipper or slipper orchid, subfamily of five genera of orchids (family Orchidaceae), in which the lip of the flower is slipper-shaped.

7. MERITS & DEMERITS

MERITS:

- Except for the enhancements in accuracy seen in the arrangement/expectation issues at the reviewed works, there are some other significant points of interest in utilizing CNN in picture preparation. Beforehand, customary methodologies for picture arrangement undertakings depended on available designed highlights, whose presentation and accuracy extraordinarily influenced the general outcomes. Feature Engineering (FE) is a perplexing, tedious interaction that should be adjusted at whatever point the issue or the informational index changes. In this way, FE establishes a costly exertion that relies upon specialists' information and doesn't sum up well.
- Convolutional neural organizations appear to sum up well and they are very vigorous significantly under testing conditions like enlightenment, complex foundation, size and direction of the pictures, and distinctive goal.

DEMERITS:

- The fundamental weakness is that CNN can now and again take any longer to prepare. In any case, in the wake of preparing, their testing time proficiency is a lot quicker than different techniques
- Different hindrances incorporate issues that may happen when utilizing pre-trained models on comparable and more modest informational indexes, improvement issues in light of the models' intricacy, just as equipment limitations.

8. APPLICATIONS

- We are building up a framework that will screen the whole yield at ordinary spans through a camera that will record the environmental factors for the duration of the day.
- Being able to identify the flora and fauna around us often leads to an interest in protecting wild spaces, and collecting and sharing information about the species we see on our travels is very useful for conservation groups like NCC. Here CNN is utilized to prepare the creature pictures.

9. CONCLUSION

Model of a brilliant homestead assurance framework has been created which recognizes the animals. This undertaking is outstandingly practical in helping recognise the animals. These rare species are uniquely identified and users can utilise the information provided to understand these species better. Thus, the dataset which consisted of 1395 photos of these animals, was utilized as an improvement set for CNN. The CNN was tried with different test

pictures including pictures taken by portable cameras. CNN had the option to characterize over 80% of the animals totally well.

10. REFERENCES

https://smartinternz.com/Student/guided_project_info/457#

<https://www.sciencedirect.com/science/article/pii/S1877050919314565>

<https://www.github.com>