

Machine Learning Approach to Classify Taro leaf

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project/internship titled “**Machine Learning Approach to Classify Taro leaf**”, submitted by **Sohag Kumar Sarker** ID No:**181-15-11135** to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 24 January 2023

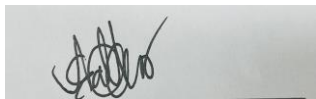
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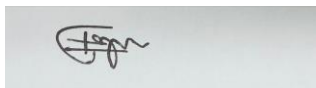


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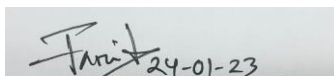


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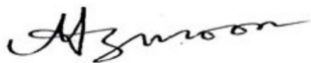
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DECLARATION

I hereby declare that this project has been done by us under the supervision of **Ms. Nazmun Nessa Moon, Associate Professor**, and co-supervision of **Mr. Md. Firoz Hasan, Lecturer**, Department of CSE, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

This project is titled “MACHINE LEARNING APPROACH TO CLASSIFY TARO LEAF ‘The traditional method of image recognition is to extract features manually, which cannot solve this problem well due to the complex background of the taro leaf. liparid try between their categories. With the advancement of science and technology. This work will help us to detect different taro leaves. I used deep learning algorithms like CNN, INCEPTION V3, RESNET50, RESNET152V2, VGG19, and MOBILE NET to detect 3 different types of water lilies. I achieved 100% accuracy at RESNET152V2, 99% accuracy at INCEPTIONV3, 99% at VGG19, and 99% at MOBILE NET. My system also achieved 86% accuracy at RESNET50.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Taro is a vegetative-propagated erotic root having its origin in Southeast Asia. It occupies 9th situation amongst earth meal crops, with its cultivation spread across Africa. Taro tubers are essential sources of carbohydrates as a soul power and are utilized as staple foods in erotic and subtropical countries. Classifying vitamins is a form of the pro where we can effortlessly find out the nutrients in numerous kinds of local foods. Right here we're the use of nearby fruits and greens to discern the nutrients. Although fruit or vegetables would possibly comprise unique varieties of nutrients. so, I categorized it via the predominant percentage of nutrients in fruit or vegetables. Those important organic food have vital capabilities. If my version predicts accurately then it might be very smooth to determine which meals a person needs to meet his nutrition demands. The list Taro leaves acquire omega 3, a crucial fatty acid that offers fabric for hormones to temper the contraction and relaxation of the arteries wall. If this mechanism is going well, the blood pressure could be controlled to an ordinary level If you're pregnant, taro leaves are excellent for you because furthermore being wealthy in nutrition, they additionally acquire folate. Beyond its wealthy nutrition, it contains folate acid which is fundamental for the advancement of the fetal brain and flustered treatment.

Table1.1: Different types of taros leaf

| S. No | Names | Language |
|--------------|--------------|-----------------|
| 1 | Taro | English |
| 2 | Arive | Hindi |
| 3 | Alupam | Sanskrit |
| 4 | Alavi | Gujarati |
| 5 | Alu | Marathi |
| 6 | Sempu | Tamil |

1.2 Motivation

- From the misconceptions people have about taro leaf.
- From my Curiosity.
- Extinction of taro leaf.
- Lack of research on taro leaf.

1.3 Rationale of the Study

AI (ML), the not-out as a part of artificial Intelligence (AI), is an area of CSE that workplaces extraction of the information base on instance acknowledgment. A computer gained from the past blend. After rehashed examination of information and experts' errands that paintings recently thought about as excessively complex for machines to degree advancement of this framework to decipher facts and data in the employment area wretchedness exam has given vital information to discover in a be counted of cooperation, shape, and machine of motives for sorrow in profession place each male and girl character in Bangladesh.AI (ML) frameworks are currently being actualized in clinical neurosciences to devise imaging-based analytic and characterization frameworks for certain neurological and insane troubles. In this paper, we look at the existing-day activity of AI zeroing in on professional vicinity gloom, investigating the statistics utilizing the calculations, and locating the crucial components in the back of the down.

1.4 Objective

1. To dispel people's misconceptions about taro leaf.
2. To Increase the interest in taro leaf Cultivation.
3. To prevent the extinction of the taro leaf.
4. To classify taro leaf.

5. To Demonstrate the accuracy and detection classification of taro using deep CNN, INCEPTION V3, RESNET50, RESNET152V2, VGG19, and Mobile net to classify 6 different types of taro leaf.
6. To standard model development that can be used by the developer so that they can create different apps to detect 6 different types of taro leaf.

1.5 Research Questions

1. Does it predict an actual output by giving sample data with the system?
2. What is the purpose of the thesis?
3. How all the data were collected?
4. Does every algorithm work perfectly (yes/no)?
5. How was the accuracy?

Yes, it can.

The dataset is properly collected and all the data were processed properly. The main purpose of the thesis is to enlighten people about the local food's Taro value and aware them.

Again, tried to foods available that can help to figure as per requirement. All the data were collected as raw data and all the taro. I collected through the village.

Yes.

Six algorithms have been applied. As for CNN, INCEPTION V3, RESNET50, RESNET152V2, VGG19, and mobile net, I h e got a good output but the rest of the algorithms didn't give us proper accuracy and feedback.

1.6 Expected Outcome

The detection methods assist us to create an expected result as said by the given dataset.in this place, we have taken 75 %of the dataset as a training dataset and 25 %of the dataset as test information. my goal is to work out the vitamin resources' accuracy which depends totally on the training dataset. my target is to search for the accuracy of the training dataset. Afterward completing all the needed procedures our vitamin detection will be finished. I have got 100 %accuracy at RESNET152V2, 97 %accuracy at INCEPTIONV3, 100 %accuracy at VGG19, and

93 %at CNN that have been applied to our scheme.

1.7 Report Layout

Table 1.2: Report layout

| Chapter | Discussion |
|------------------|--|
| Chapter 1 | Throughout this section, i have discussed our project's inspiration, objectives, and how we expected to achieve them. |
| Chapter 2 | The purpose of this section was to present the foundation of our work as well as examine related works, similar investigations, the scope of issues, as well as the difficulties. |
| Chapter 3 | There are several aspects to our research such as the research topic, the instrument used, the data collection process, the statistical analysis, as well as the implementation of our research project. |
| Chapter 4 | As a part of this chapter, we present our research experimental results as well as a descriptive analysis of the results. |
| Chapter 5 | In this chapter, i have mentioned the impact on society and the environment of my research. |
| Chapter 6 | In this chapter, i discuss a summary of my predictions and findings and add a further study approach. |

CHAPTER 2

BACKGROUND

2.1 Introduction

Taro leaves can grow in both terrestrial and aquatic habitats. However, the ground-grown lot is more in number. But grows well in moist soil near water bodies. Tubers are oblong or rounded. It grows like a potato from its native land. The base of its leaves is heart-shaped. The tip is thick and gradually tapers. The leaf stalks are up to about 2-3 feet. This tree has male-female differences. Depending on the species, roots, roots, or stalks, leaves and data are all human food. In Bangladesh, taro leaf tubers are used as a cook or curry. Bells are mainly made from their leaves. Taro leaf is made with the spiny part of Hilsa fish, small prawns. Its tubers are rich in starch. My throat itches after eating some tubers. This is commonly called strangulation. Some cards contain calcium oxalate-rich grains. These grains pierce the throat like a thorn. Before cooking taro leaf stalks contain a lot of water, so during the hot season, eating taro leaf stalks will fill up the body's water deficiency. Kale contains an adequate amount of fiber which aids in digestion. During fever, if the patient is fed raw milk, the fever gets better quickly. Taro leaves contains a lot of fiber, folate, and thiamine which are very useful elements for the human body.

2.2 Related Works

As stated by Ghazi and all [1], they analyze many parameters influencing the performance of these networks using deep convolutional neural networks to identify the plant species taken in an image. As stated by Mete and all [2], they are categorizing flowers to help with the development of the recognition of uncommon plant species, which will be helpful in areas like botany, agriculture, trade, and the pharmaceutical business.

As stated by Dias and all [3] early in the growing season, apple trees must have some of their blossoms and fruitlets removed to maximize fruit production.

As stated by Zambia and all [4], this work aims to develop an effective flower classification approach using machine learning algorithms. Eight flower categories were analyzed to extract their features.

As stated by Lin and all [5], in this study, researchers suggested a method for detecting strawberry flowers based on cutting-edge deep-level region-based visual representation architecture and the Faster R-CNN.

As stated by Mohammed and all [6], the relative composition of waterlily leaves, petioles, roots, rhizomes, and seeds collected from the marshes and floodplain of Tatabu was calculated and evaluated in percentage form.

As stated by Pinto and all [7], one of the most crucial methods in machine learning is classification. Data analysis is the primary function of machine learning. There are several classification methods available, including decision trees, Naive Bayes, backpropagation, neural networks, artificial neural, multi-layer perception, multi-class classification, support vector machines, and K-nearest neighbor, among others. Three strategies are thoroughly detailed in this study.

As stated by Mileva and all [8], plants from the Rosacea family are highly valued and employed in the food sector, perfumes, and cosmetics because they are abundant in natural compounds with advantageous biological qualities.

2.3 Research Summary

Taro leaf is an essential nutritious vegetable. Taro isn't very famous in the United States. Taro leaf appeared with a whole lot of disdain. But taro has quite a few nutrients A, 'B', and 'C', calcium, iron, and other vitamins. And in the meantime, we're falling from that elegance, that sufferers with nighttime blindness ought to be fed extra taro vegetables. Many vegetables are to be had in our country. Among them, the taro leaf is a beneficial vegetable. So, I research taro leaf so that people can recognize it without problems. Because my task is photo dataset based. I split the dataset into four elements. CNN, INCEPTION V3, RESNET50, RESNET152V2, and VGG19 algorithms to realize model accuracy, specification, and prediction. We attempted to get as excessive accuracy as viable because the better the accuracy the better for our gadget model. The specification is an essential point of the project. Specification means to perceive and eventually, prediction, and prediction models will help us to pick out the taro leaf foundation.

2.4 Scope of the Problem

The main reason for my research on the taro leaf is to present a correct idea about taro to people. I can see that many of us do not know the number of vitamins in taro and how beneficial it is for health and they have a negative attitude towards taro vegetables. Panchbibi Upazila of Joypurhat district is famous for taro lathi. This region produces a lot of taro lathi throughout the year and exports it abroad to meet the country's demand. taro lathi are also being exported abroad. taro lathi is being marketed in the markets of Great Britain, America, Saudi Arabia, Kuwait, Qatar, Oman, Bahrain, Malaysia, and Singapore, including Dhaka, Joydevpur, Tangail, Sylhet, Rajshahi, and Khulna. It is possible to do profitable business this late in the foreign market if there is cooperation and patronage. I aim to give details about taro through my research. Also, there are different varieties of taro available in different regions of the country which are very easy. again, their cultivation method is also very easy. I have tried to highlight those things in my research.

2.5 Challenges

It is very challenging to collect data in the subcontinent of our country. Because accuracy prediction depends on an accurate dataset. There was no private source for my datasets, so I was challenged to collect the data. I am to find out what vitamins are in taro plants. As the picture of taro leaves could be similar, I had to collect taro leaves from different varieties. Which was very difficult for me alone, as a result, I had to take a lot of trouble taking pictures. Another problem. Another problem is that I thought the images would be available from Google. But when I swatch, I see that it is not possible in any way. As a result, I have to go to the village. And there were several days of rain during data collection which caused many problems in data collection. Another problem is changing the background which has caused a lot of problems. Changing the background was difficult due to the different shapes of the leaves. Let me finally manage to successfully retrieve data across all hurdles. Then I explained it to them and I was able to collect the data. The background was another issue. I made an effort to gather photos that were all the same color and lighting. Getting a good picture was quite difficult. Since I took all of the photos using an iPhone, their file extensions changed to "heic," which is incompatible with Jupiter notebook and Google collab. Therefore, I changed the "heroic" extension of all the photos to "jpg".

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this particular part, I will talk about the examination strategy and techniques. Running against the norm, devices that have been utilized for the undertaking, information assortment, research subject, handling, and pre-handling. examination measurably, and its execution will be talked about in this part. The full system is displayed in figure 3.1

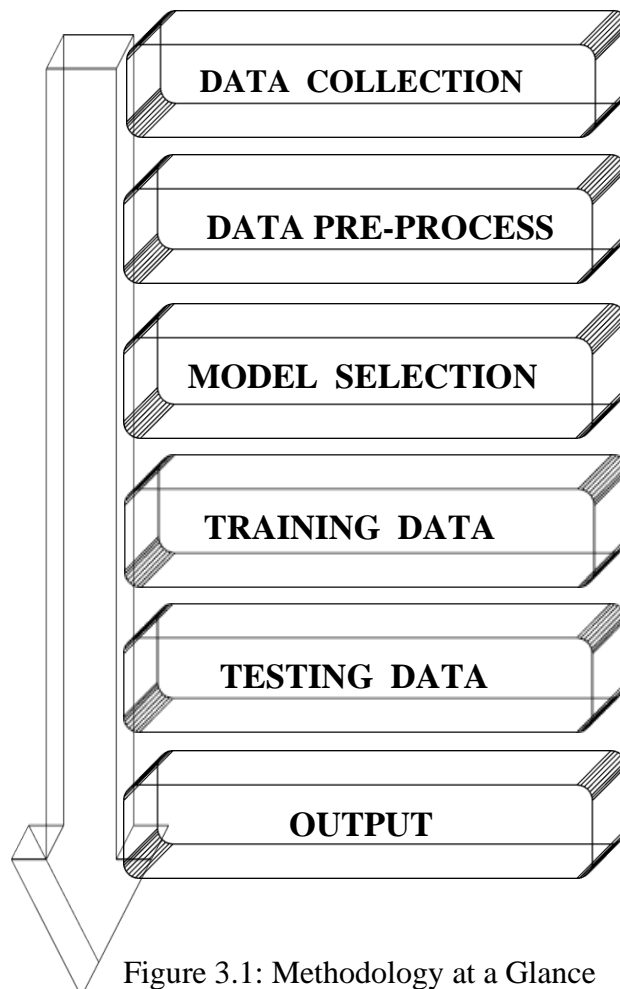


Figure 3.1: Methodology at a Glance

Research Subject and Instrumentation

I saw that nutrient source recognition from different leafy foods is a tuff task. We must be cautious about something.

- Which dataset must be gathered?
- ensuring the gathering turned into perfect.
- Organizing the information properly.
- labeling the dataset properly way.

3.2Data Collection Procedure

Information that we have utilized in the undertaking is gathered from both nearby and in town. In the circumstance of mid-assessment, I have gathered very nearly 25 thousand (2500). Furthermore, from that information, we have chosen 22 thousand (2200) (fig 3.2) information for my task. I have assembled every one of the information disconnected where we utilized iPhone 14max for a superior picture. In my dataset, there is practically a great taro leaf.

```
dataset = image_dataset_from_directory(directory,  
                                     shuffle=True,  
                                     label_mode = 'categorical',  
                                     batch_size=BATCH_SIZE,  
                                     seed = 42,  
                                     image_size=IMAGE_SIZE)
```

```
Found 3049 images belonging to 4 classes.
```

Figure 3.2: Amount of datasets

3.3.1 Dataset

From the dataset, I have almost 4 varieties of Taro leaf. I am 1500 bulbous taro, 1400 giant taro, 1600 sola taro 1300 black are available in our datasets shown in figure 3.4

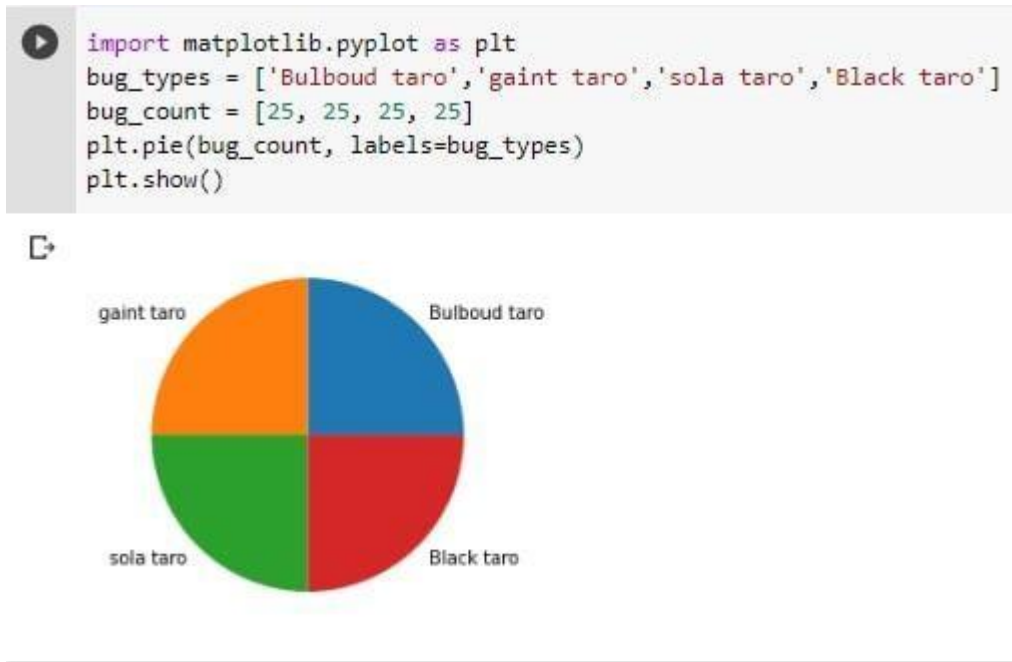


Figure 3.3: Datasets percentages

3.3.2 Class Labels

Here I have four classes are:

- Bulbous root taro
- Gaint taro
- Sola taro
- Black taro

Table 3.1: Amount of data

| Category | Count |
|------------|-------|
| Bulbous | 1500 |
| Giant taro | 1400 |
| Sola taro | 1600 |
| Black taro | 1300 |

Percentages of each leaf from the datasets are giant taro: 37.0%, bulbous: 23.0%, sola: 15.0%, black taro:25.0% Figure is shown 3.4

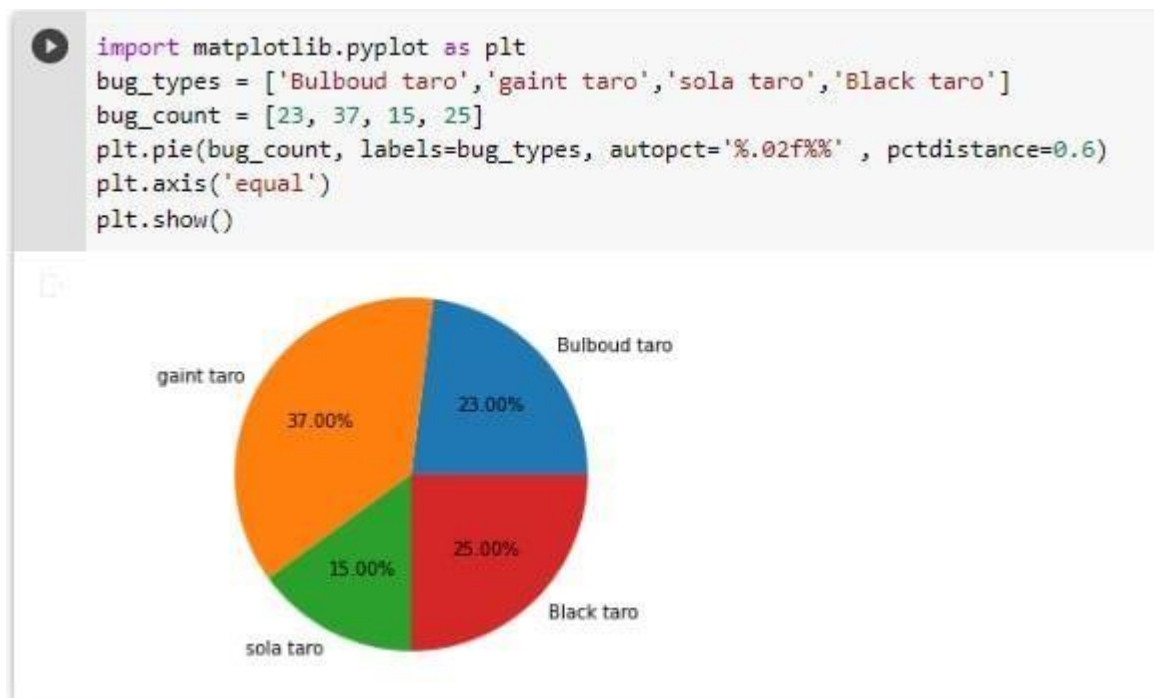


Figure 3.4: percentages of taro

3.3.3 Data Preprocessing

In the datasets, there are various kinds of regulations governing the images. If all the images are not converted into one specific regulation, the accuracy rate will be decreased. Such example before processing an image figure 3.5 has almost 2700*4000 pixels and after processing, the image has been converted to 224*224 pixels shown in figure 3.6

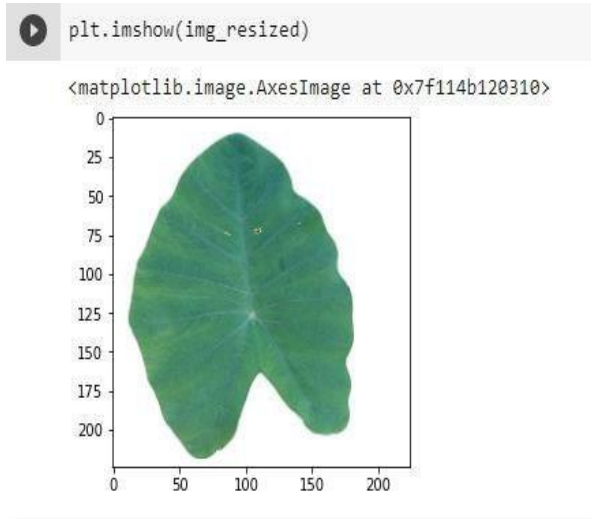


Figure: 3.6

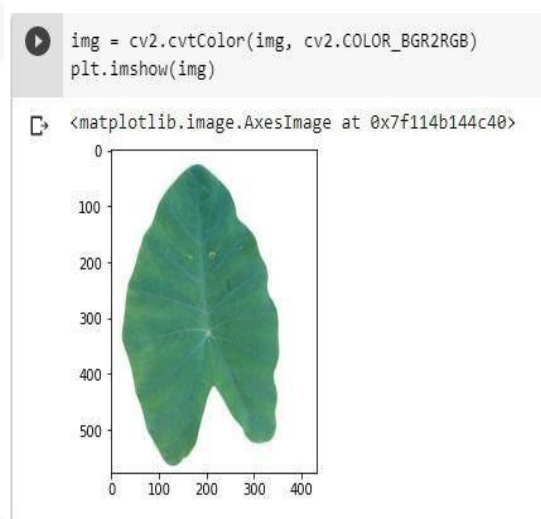


Figure: 3.7

Similarly, in figure 3.8 and figure 3.9 before processing the image had 3000*4200 pixels and after processing it becomes 224*224 pixels.

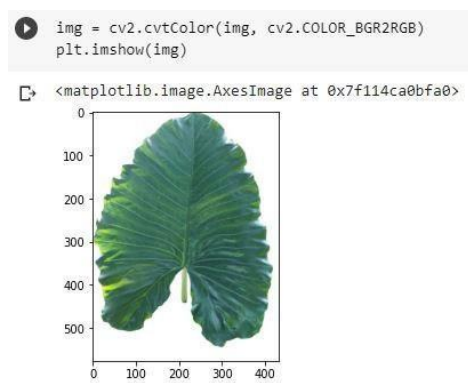


Figure: 3.8

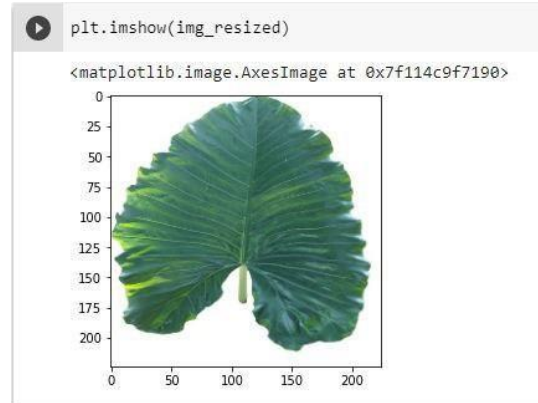


Figure: 3.9

Similarly in figure 3.10 and figure 3.11 before processing the image had 3000*4200 pixels and after processing it becomes 224*224 pixels.

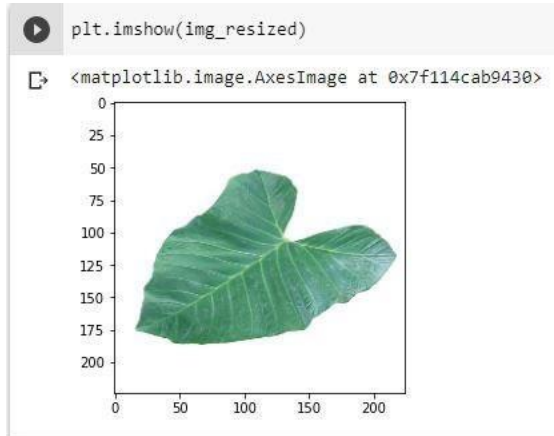


Figure: 3.10

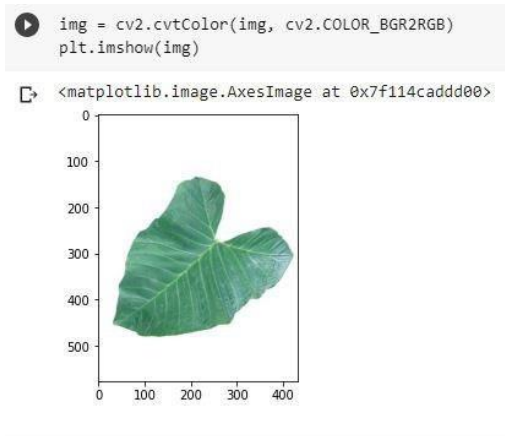


Figure: 3.11

Similarly, in figure 3.12 and figure 3.13 before processing the image had 3000*4200 pixels and after processing it becomes 224*224 pixels.

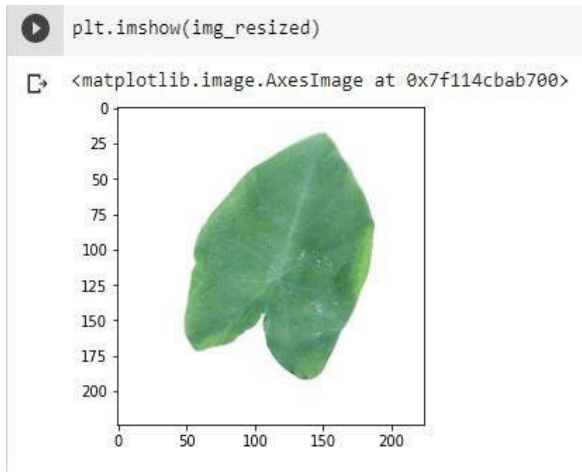


Figure: 3.12

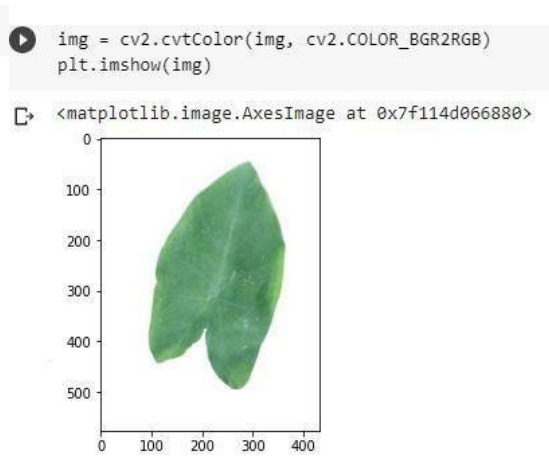


Figure: 3.13

3.3.4 Data Organization.

I have built two folders named training and test dataset. In the training dataset, we have four(4) classes and a complete of three thousand and forty-nine (3049) images. Each lesson of the training dataset contains a thousand (1000) images. else ways in the test dataset in four(4) classes we have one thousand five hundred and seventy-seven (1577) images and each course of the test dataset contains two hundred thirty-one (300) images, displayed in.



```
[13] # Make sure you provide the same target size as initialied for the image size
training_set = train_datagen.flow_from_directory('/content/drive/MyDrive/programs/Datasets/Train',
                                                target_size = (224, 224),
                                                batch_size = 32,
                                                class_mode = 'categorical')

Found 3049 images belonging to 4 classes.

[14] test_set = test_datagen.flow_from_directory('/content/drive/MyDrive/programs/Datasets/Test',
                                                target_size = (224, 224),
                                                batch_size = 32,
                                                class_mode = 'categorical')

Found 1577 images belonging to 4 classes.
```

Figure: 3.14 train and test the dataset

3.3.5 Data Storing

Afterward, the information organization information storing procedure has already begun. In this allotment, I stored the dataset both in the local PC's directory and google guide. As I utilized the Jupiter notebook, so local PC directory was obligatory. For security, I additionally utilized google cola. Therefore, I additionally uploaded those datasets into google guide. And if I have to use those datasets in the future for further improvement of the plan, uploading a google guide was the safest way. Because there may be any technical fault in the local pc, all the datasets would be lost. Therefore, I uploaded the dataset to google guide additionally.

3.3.6 Machine Learning Algorithms

I have utilized CNN, INCEPTION V3, RESNET50, RESNET152V2, VGG19, and MOBILE NET for better accuracy. We applied these algorithms to both training and test datasets. All algorithms are applied to python libraries such as TensorFlow, Keras, NumPy, PyTorch, Flatten, etc. These libraries help to initialize the program.

3.4 Statistical Analysis

In the dataset, I have 3500 images for the detection of taro. There exist nearly 3049 images as training datasets and the rest for the test dataset. I applied for several algorithmic programs but my major target was to get greater accuracy. CNN, INCEPTION V3, RESNET50, RESNET152V2, VGG19 and MOBILE NET. I preserved several procedures to have an idea of good accuracy. As an example.

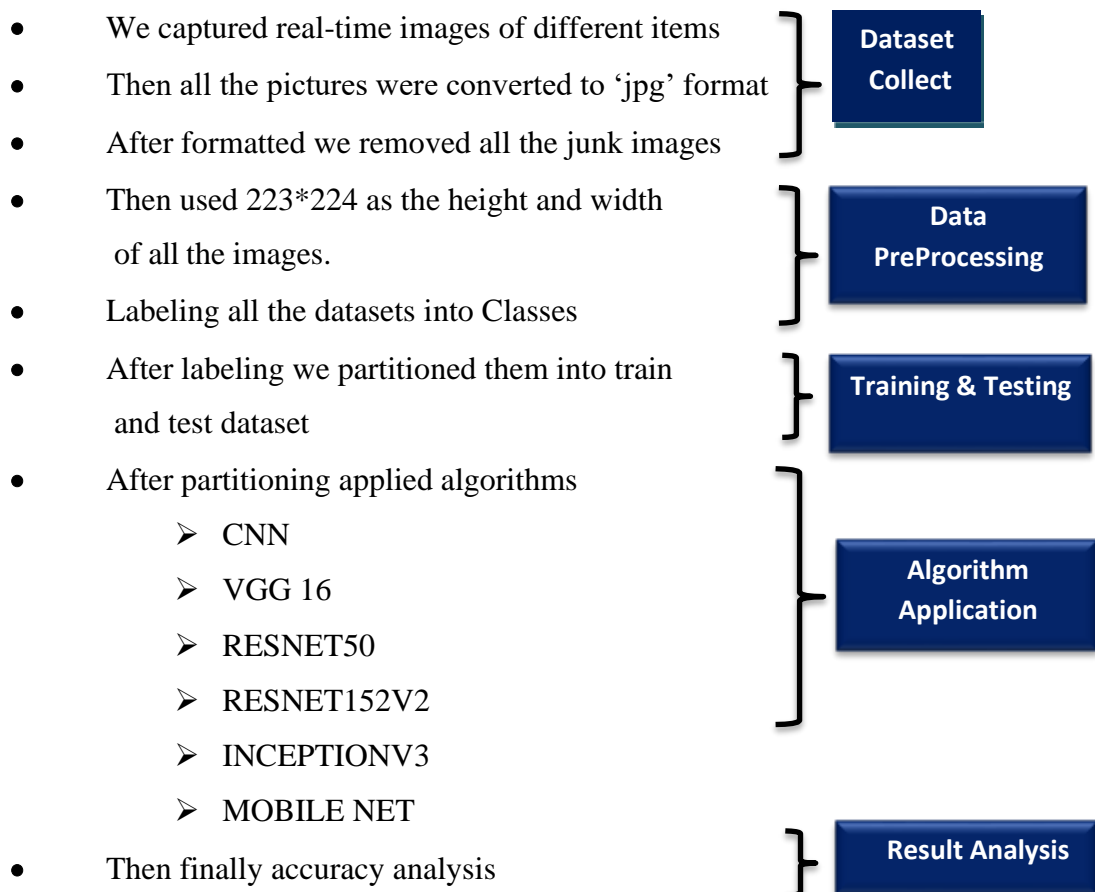


Figure: 3.15 Statistical Analysis

The flowchart of our working process: Method versions are processes of similar nature that are categorized together into an example in blue figure 3.16

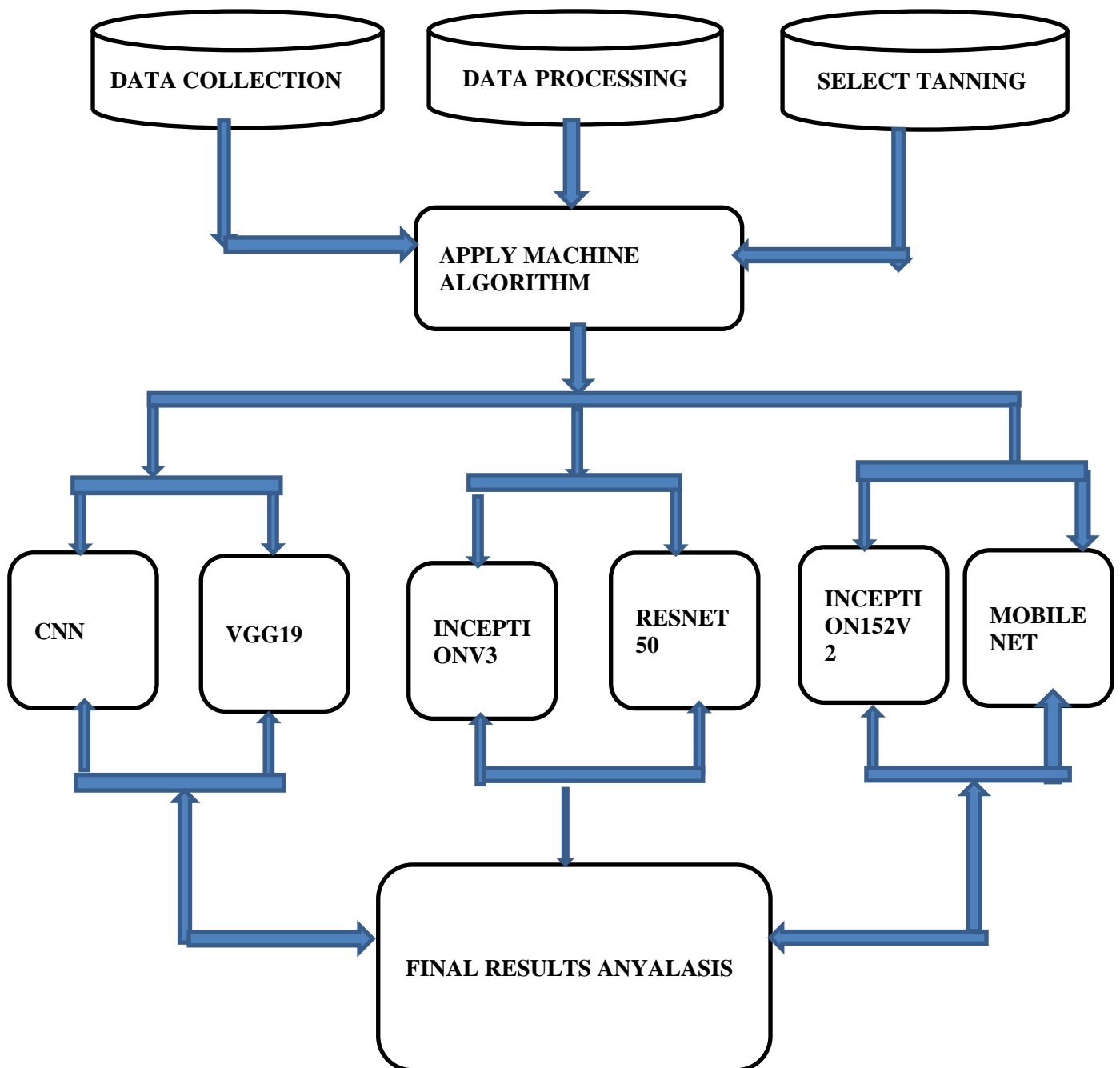


Figure 3.16: Proposed Model Structure

3.5 Implementation Requirements

- **Python3.10. 8**

Python 3.10.8 is the modern Python model. Python is an open-source high-level programming language that is simple to take advantage of, and it's imagined to be the strongest language among all programming languages. As the architecture of CNN, vgg19, inceptionV3, and resnet50 are extremely complicated so utilizing an additional language will be extremely hard. Because python commands and in-built functioning are extremely simple that it reduces the time to implement. In other programming languages that would have been utilized, it would take a lot of time.

- **Google Collab/Jupyter Notebook**

Cola is a hosted Jupiter, installed and configured so that we don't need to do anything on the pc but only work from the web browser to the resources of the cloud. It is working just like Jupiter. In this Python step, they're as said by notebooks or notebooks which could be content, image, or code, because at the moment only Python kernel might be utilized as opposed to Jupiter Collab. Jupiter notebook additionally does a similar thing. The disagreement between them is hardware functionality. If anybody has an outside GPU with a high-end construct, the Jupiter notebook is excellent. We utilized both as it's group work, so we had to work on both programs.

- **Hardware/Software Requirements**

- Operating System (Windows 10 or more / Linux)
- Web Browser (Chrome, Firefox, or Microsoft Edge)
- Hard Disk (At least 120GB)
- Ram (More than 4 GB)
- GPU (At least 4GB)

CHAPTER 4

EXPERIMENTAL RESULT AND DISCUSSION

4.1 Experimental Setup

As a first step in the implementation of our model and code, we gathered datasets. The further system process is given below:

In addition to collecting data from some local shops and villages, we also collected data from As my goal is to approach classify taro plants in Bangladesh.

The more important daunting task was to gather all information. An enormous time was spent because of gathering datasets.

And converting those datasets into 'jpg' format

4.2 Model Summary:

As it's a multiclass image processing my exemplar summary was kind of complicated. Therefore, I utilized soft max as activation. in this place. I have complete parameters, trainable parameters, and nontrainable parameters for each algorithm. And the compilation of the exemplar depends on the exemplar. I flatten the dataset and the piled layer is four (4). We utilized 20 epochs and each epoch has 20 layers.

4.3 Experimental Result and Analysis

I have built an exemplar that will deliver us a concept of the taro Then I predicted our exemplar as said by test datasets. The essential thing depends on the accuracy rate, and I am content with the accuracy we got. And then testing my exemplar was fertile. I have got 0.84 accuracy at Resnet50, .99 accuracy at Vgg19, .99 at CNN, .90 at InceptionV3, and .100 at Resnet152V2. Table 4.1 is presenting the accuracy of the training dataset. And table 4.2 is presenting the accuracy of the testing dataset

Table 4.1: Accuracy Table

| Algorithm Name | Accuracy(train datasets) |
|-----------------------|---------------------------------|
| CNN | 96% |
| Vgg19 | 99% |
| Resnet152V2 | 100% |
| InceptionV3 | 100% |
| Mobile net | 99% |
| Resnet50 | 96% |

Table 4.2: Accuracy Table

| Algorithm Name | Accuracy(test datasets) |
|-----------------------|--------------------------------|
| Resnet50 | 90% |
| CNN | 88% |
| Vgg19 | 98% |
| Resnet152V2 | 100% |
| InceptionV3 | 100% |
| Mobile net | 97% |

So, from tables 4.1 and tables 4.2, I can understand that the accuracy rate is highest at Resnet152V2 and inception V3. I have 100% of accuracy in both train and test datasets using the Resnet152V2 algorithm. Because as I have discussed before Resnet152V2 and inception V3 have the highest number of parameters. So, the execution will be very fast and accurate.

Now let's see the graphical view of training and lost dataset percentages. Vgg19: The accuracy model of vgg19 has given below in this figure 4.1

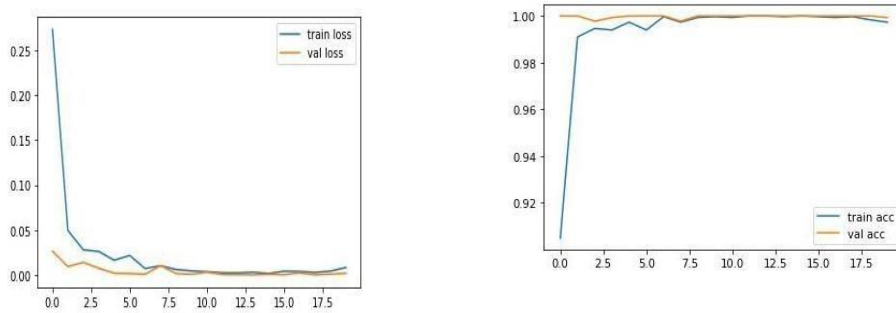


Figure 4.1: Vgg19 model accuracy

Resnet152V2: The accuracy model of resnet152v2 has given below in this figure 4.2

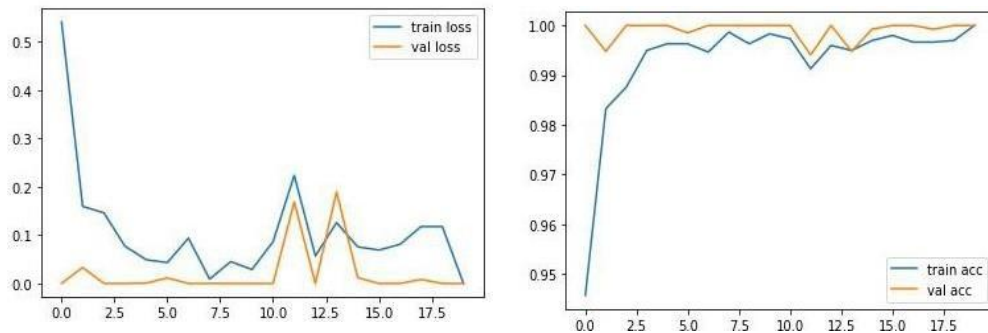


Figure 4.2: Resnet152V2 model accuracy

InceptionV3: The accuracy model of inceptionv3 has given below in this figure 4.3

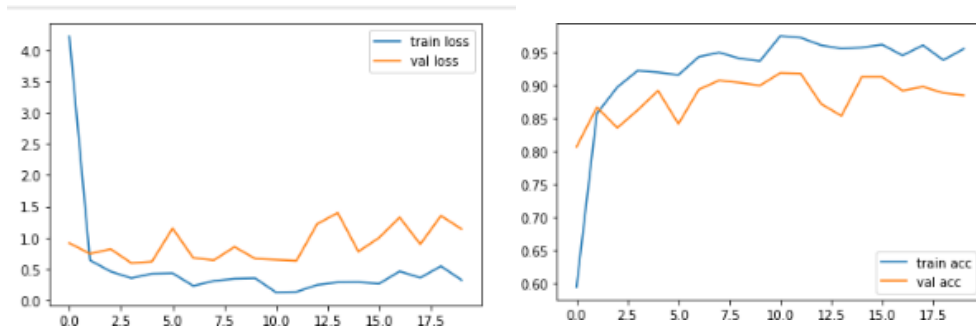


Figure 4.3: InceptionV3 model accuracy

Resnet50: The accuracy model of resnet50 has given below in this figure 4.4

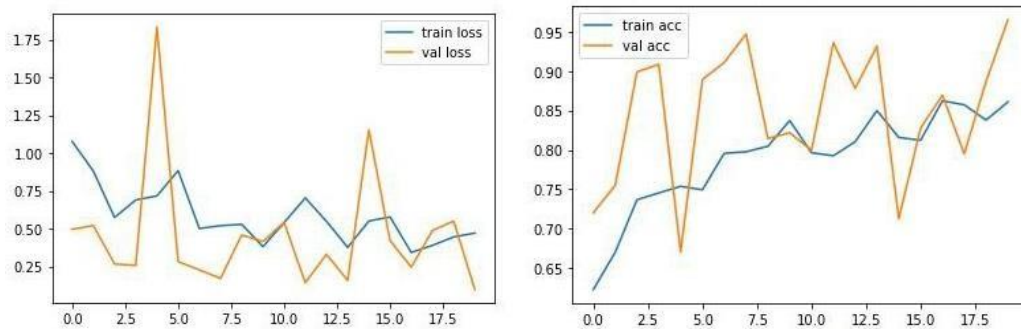


Figure 4.4: Resnet50 model accuracy

Prediction: I tried to use test data as the prediction in my model. Based on the test dataset, I will identify the Water lilies. The test code has been attached below in figure 4.5.

```
y_pred = model.predict(test_set)

85/85 [=====] - 10s 117ms/step

y_pred
array([[2.6980083e-11, 1.3255886e-15, 1.0000000e+00],
       [1.0000000e+00, 2.4194638e-13, 3.3591712e-12],
       [8.7483105e-09, 1.0000000e+00, 1.3230704e-11],
       ...,
       [9.9997759e-01, 2.2431332e-05, 2.3611351e-08],
       [2.4272025e-12, 6.3387504e-11, 1.0000000e+00],
       [7.4628888e-12, 1.9041988e-09, 1.0000000e+00]], dtype=float32)
```

Figure 4.5: predicting the test dataset

4.4 Discussion

I have developed a model that can be used to identify the sources. But the accuracy rate is what I mostly learn. The success of our future efforts depends on this accuracy rate. Furthermore, accuracy primarily depends on the dataset. Since the research is image-based, the image quality and clarity may be very high. And it worries me a great deal. the algorithms, second. A good algorithm is also essential to accuracy. Since accuracy increases with more parameters. Our accuracy ratio, therefore, reached 90% for the training set and 99% for the test set.

CHAPTER 5

PROJECTS ETHICS

5.1 Impacts on Society:

I have generally researched taro because there is not much research on taro in our country. So I research with everyone in mind. Although raw vegetable is nutritious, it is not valued according to their nutrition in our country. As a result, cultivation is less. However, the farmers of the Comilla district have created great potential in just five-six years of commercial farming. The taro and Lati of this region are being exported to more than 25 countries of the world, in addition, to supplying different districts of the country. Its value is increasing day by day among expatriates as well as foreigners. It has been found that after visiting on the ground, farmers are now cultivating taro commercially due to low cost and high yield. In the meantime, Barbera has started to become 'famous' as a small. Thousands of jobs have been created around taro and Lati. Seeing the success of farmers in this region, farmers are coming to collect seedlings from other districts. Last season, about 100,000 seedlings were planted in different districts of the country. The local agriculture department is also providing advice and assistance to increase the production and export of rice. I hope that my research will do a lot of good for society. Then people will keep taro along with other things which is the main aim of my research.

5.2 The Impacts on The Environment

The environmental behavior of paclobutrazol in soil and its toxicity were studied by field investigation and an outdoor pot clan, and the residue of paclobutrazol was detected by gas chromatography–mass spectrometry. Field investigation has found that the residual paclobutrazol in the preceding succession crop could severely inhibit the growth of succeeding crops of potato; with migration and transformation of residual paclobutrazol in the soil, the stems of potato were thickened with a residual number of, the advancement was slow, and the height of potato in soil with a residual number of and the control was remarkably clear. The degradation dynamics of paclobutrazol fit with the first-order degradation kinetics, but of paclobutrazol of the taro planting soil was days and the residual paclobutrazol remained detectable even on day 120 after application. Taro leaves were sensitive to the emphasis on paclobutrazol pollution.

5.3 Ethical Aspects

The greatest pronounced forename is taro. If we don't revert something, if we don't desire to accomplish the task at the right time, we display the thumb of the right out and say taro. If I don't like someone's speech in a seminar or workshop, I seamlessly deliver its taro'. The term is further stated jokingly. There're a variety of other words where we deliver the term taro. Although having too many qualities of taro why is it titled taro? Don't know the English language. The ethical aspect of taro.

1. Taro is claimed to have various Ayurvedic properties. Because of the elevated number of "vitamin A" in taro leaf, has helped prevent ringworm.
2. Taro is Being a crude fiber, it relieves constipation. Turmeric contains a lot of iron and calcium, which assists to strengthen our bones
- .3. Taro is Turmeric additionally has a lot of advantages in hair breakage and breakage. Turmeric is wealthy in iodine.
4. Taro of Turmeric has been helpful for those who have gastric or acidity. Because of the low glucose content material in Kanpur Lathe, even diabetic patient taro leaf.

5.4 Sustainability Plan

An exceptional right of tree with green leaves that grows in plains and wetlands is titled the taro tree. Its leaves are extremely composed and soft, because of which rainwater spills on the leaves and spills to the ground. What our squad found out from the research is that everything from the root to the trunk of the taro plant without the leaves is titled taro. But in several taro varieties, the roots of the plant enlarge underground like potatoes. As the put question for taro is growing day by day in the universe market, I'll take this research furthermore in such a way that my research assists in cultivating more sophisticated varieties of taro. I'll work on the issue in such a way that the raw fabric might be marketed in an extremely brief time. Numerous universities in our nation have begun research on this taro. I hope that taro will become a customary cultivation, sooner or later I'll get around to it. So, by and by I'll say too many qualities. So, let us say together- If you eat raw, there will be something What if you eat ghee?

CHAPTER 6

SUMMARY, CONCLUSION, RECOMMENDATION, IMPLICATION FOR FUTURE RESEARCH

6.1 Summary of The Study

I have built an exemplar that will deliver us a concept of the taro. My major point was that individuals can seamlessly peer taro. All the thoughts about taro might be known in my thesis. As a result, accuracy was an important portion because if the accuracy goes down, there will be no profit. After all, our test depends on the dataset. My tests and predictions count on the test dataset. so I need to be cautious about the accuracy of the test dataset with the training accuracy. From my five information versions, I can seamlessly say Resnet152v2 or inceptionV3 both deliver us nearly similar accuracy in terms of test and direct sets. Nearly 100% accuracy I got. Therefore, my test and prediction will be more active.

6.2 Conclusion

In this survey, spacing played a major part in determining the general performance of the taro. In this honest feedback, there exists important information about the nutritional significance of taro and several of the health advantages of taro corms and leaves. Taro is utilized as a staple meal or subsistence meal by millions of individuals in various developing countries. The corms of taro are utilized as vegetables and are considered a wealthy source of carbohydrates, proteins, minerals, and vitamins. Taro is little granules that are highly digestible. Taro might be grown as a root crop, leafy vegetable, and as an adorned and medicinal plant. it's a staple crop for countless southeastern Asia. Wider spacing enhanced the corm produce of individual taro plants while narrow spacing enhanced the complete corm produce of taro per unit place. as said by the outcomes of the surveys, planting at the closer spacing generated the highest corn produce in all accessions is advisable for farmers.

6.3 Recommendations

The use of fake intelligence is an endorsement of pc science where human intelligence and thinking power are applied. Put simply, the realization of human intelligence and thinking power over instruments is titled fake intelligence. What is the disadvantage of fake intelligence tech for mankind? The reply to this query is the writer in numerous ways. But in case we can enhance fake intelligence too much, then it's a replacement that is the greatest or the greatest abominable. Even mankind may have. But, we humans are incandescent and captivating. We desire to see what happens. And, brides are the ones who make fake intelligence greater.

6.4 Implication for Further Study

I will work with more data to make our examination more proficient. I will collect data as much as possible also, will try to add the vitamin percentage rate. Which food contains how many calories etc?

My main goal is to create a web application for the prediction dataset. If any images of vegetables can detect the taro leaf.

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APPENDIX RESEARCH REFLECTION

Building up this project was a difficult task. During the project, we faced a few problems. The first problem was collecting the proper dataset. At first, we collected some data online. But for better accuracy, those images were not appropriate. So we started collecting raw data which was very difficult. We had to visit many local and super shops for the image collection.

The second problem we faced, finding a proper algorithm. We found a CNN algorithm that gave only 40% accuracy. But after some research, we found that the parameters were not appropriate so again we modified the algorithm and then got a proper accuracy.

Another problem with the extension of the pictures. 'heic' to; jpg

Machine Learning Approach to Classify Taro leaf

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