JACKFRUIT DISEASE RECOGNITION USING COMPUTER VISION

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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 titled "**Jackfruit Disease Recognition using Computer Vision**", submitted by Md. Robel Mia, ID No: 152-15-5538 and Mominul Islam Janik, ID No: 151-15-4895 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 2 May, 2019.

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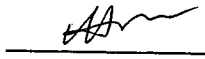

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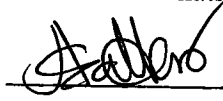

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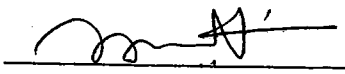

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Tarek Habib, Assistant professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Agriculture is the mother of all cultures. It has played an important role in the development of human civilization. Bangladesh economy depends on agriculture and a large number of people directly or indirectly related to this sector here. For this reason, the increasing demand in the agricultural industry, they need to effectively grow a plant and increase its yield is very important. In order to do that, it is important to monitor the field during its growth period, as well as, at the time of harvest. Fruit disease is crucial causes that which reduce quantity and can degrade the quality of the agricultural products. It is difficult and challenging to recognition the Jackfruit diseases manually. This paper represents various approaches for recognition and segmentation method along with image acquisition, pre-processing, segmentation, feature extraction and classification for recognize of diseases. This disease recognition system uses an image database for training and testing. The images are recognized to their respective disease categories on basis of different features such as contrast, correlation, energy, homogeneity, mean, standard deviation, entropy, variance, skewness. In our proposed system, we are going to develop an integrated image processing system to help automated inspection of jackfruit and helps identify the disease type. This prototype has a very great potential to be further improved in the future.

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CHAPTER 1
INTRODUCTION

1.1. Introduction

Bangladesh is a cultivated state. Agriculture is the largest employment era in Bangladesh where in about 80% of the population depends on agriculture. The contribution of this zone has an outstanding control on foremost economic intentions like service holder, less the need of life and increase the property, improve the social capital and improve meal purity. Fruits are the most important agricultural products. Farmers have wide range of diversity to select suitable Fruit. The aim of our project is in agriculture is to increase the productivity and food quality at reduced expenditure and with increased profit because in Bangladesh most of the population depends on agriculture. There are many kinds of fruits. Among them Jackfruit is a more and more interested and delicious meal or food in our state. It is our national fruit that is in stands 3rd location in this era and 2nd in origin. It's has been over view by a great deal of republic in the modern era. Its play a vital rule to increase the overall food product for our farmer as well as general people. And here is listed which is used to increase the creation of yield about more than 28% to protect against different recognition system [1].

Cultivation of Jackfruit has gained immense popularity among the farmers of the district from the last few years. It has important sources of income generation leading to economic self-reliance in the area. Recognize diseases of jackfruit species were not thoroughly investigated by researchers of Bangladesh prior to this study. The quality of agricultural products may be reduced due to plant and fruit diseases. Automatic recognition of fruit diseases is essential to automatically recognize the symptoms of diseases as early as they appear on the growing fruits. Currently chemicals are applied to the plants periodically without knowing the requirement of plants. Because of that, healthiness of product may decrease and it will directly affect to human health. So to protect plant from degradation of quality or heavy losses, these require careful diagnosis and timely handling.

In this paper, we propose an adaptive approach for the recognition of types of bacterial jackfruit diseases using the digital images taken directly from the database.

This approach helps in increasing the marketing of fruit producing in packaging companies and also improves the quality of a fruit in marketing. The recognition in the fruits can be identified easily with the difference in the color that appears when compared to the normal fruit, but it is difficult to recognize the type of bacterial diseases affected in the fruit. In this paper the approach introduces the designing of an automatic system to achieve near human levels of recognition. The various digital image processing steps are performed like preprocessing, segmentation, classification, recognition of a fruit image. The user will be able to input the image from database. By performing the image processing steps can easily recognize the diseases of jackfruit and display the percentage of affected area of the fruit in the image. So the aim of research in fruit is to increase the productivity and food quality at reduced expenditure and with increased profit because in Bangladesh most of the population depends on agriculture where fruits are the most important agricultural products [2].

1.2. Motivation

Bangladesh economy depends on agriculture and a large number of people directly or indirectly related to this sector here. It is very important for general people to increase industrial farming product, so their work is to improve the take care and also need to grow the plants more and more in yield that is most significant. So it is more & more essential part for the farmer and its need to observe the field in time to cultivation as the creation time. Now days people are producing more jackfruit but due to different type of disease decrease jackfruit production. For this reason, we are interest to work in this field. This thinking is motivated to me more and more to implement this project [3].

1.3. Expected Outcome

So our expected outcomes in this project are given here to see at a glance:

- ✓ To improve the demonstration of jackfruit illness.
- ✓ To acceptance the jackfruit illness using the computer vision based IP (Image Processing).
- ✓ To set Image Processing formula to experiment the model of jackfruit illness.

1.4. Layout of the Report

The purpose of our project is to set up a demonstration which is show the exactly output from our experimental designed project. It show the jackfruit diseases determination or recognition using the computer vision. This project report is connected to case study, relevant model, executional and experimental work of this proposed system. Our main goal is to improve a system that is recognize the jackfruit diseases and properly classify using SVM through this system than manually doing this.

CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

Farming is the biggest business segment in Bangladesh. It utilizes a vast number populace contrast with the aggregate GDP of the nation. Development of Jackfruit has increased tremendous prevalence among the ranchers of the area from the most recent couple of years. There are many plant disease recognition systems available but most of the system for paddy and leaf diseases, so we want to make a specific system for jackfruit disease. This system will help them to recognize diseases, increase jackfruit production and decrease production cost.

2.2. Related Work

But there is no one existing specific system or related works to recognize the jackfruit diseases to improve the system to help the farmer. But others categories are worked in previously. Here I given result of the comparison of our work and others work.

Table 2.1: Discrimination between our project work and other workers

Work Done	Goal (s)	Complication State	Experiment Shape	Segmented Algorithm	Classif-ication Perfo-rmed	Shape of feature set	Classifier	Accuracy
Our work	Jackfruit (Both fruit & leaf)	Recognition	120 image	k-means clustering	p	10	SVM	91.48%
M.T. Habib et al. (2018)	Papaya (Both fruit & leaf)	Recognition	126 image	k-means clustering	p	10	SVM	90.15%
Chapaade & Bhagyashari, (2016)	Papaya, Mango, Banana (leaf)	Detection	NM	Histogram based threshold	x	NA	NA	NA
Samajpati & Degadwala (2016)	Apple (fruit)	Recognition	80 image	k-means clustering	p	13	Random forest classifier	60% - 100%

Batule et al. (2016)	Leaf (NM)	Recognition	NM	k-means clustering	x	Na	NA	NA
Kumiawati et al. (2009)	Paddy (Leaf)	Recognition	94 image	Local entropy threshold	p	5	Rule based classifier	94.7%
Rozario et al. (2016)	Apple, Banana, Patato, Tomato (fruit)	Detection	63 image	Otsu method k-means clustering Modified k-means clustering Otsu method	x	NA	NA	61.2% NM
Naikwadi & Amoda (2013)	Plant (leaf)	Recognition	32 image	k-means clustering	p	10	Neural Network (NN)	NM
Kumar & Suhas (2016)	Fruit	Recognition	243 image	k-means clustering	p	NM	k-nearest neighbor	87.47%

So for this purpose we implement the project according to our work. In this project we work for five types of jackfruit diseases including diseases free jackfruit. These are:

- Rhizopus Fruit Rot
- Jackfruit Pest and diseases
- Leaf spot of jackfruit
- Pink Diseases
- Diseases free jackfruit

In further discussion I will described in briefly for more concern and for more knowledge.

2.3. Scope of the Problem

Scope of the Problem are included here for more concentration:

- Some of the picture are makes a great deal of noisy and it makes our project system muck to give the proper output of jackfruit.
- This system unable recognize and classify the jackfruit disease automatically.
- Image collection.

2.4. Challenges

One of the challenges is collection of jackfruit images. We make a dataset to collect the image of jackfruit and stored them in dataset. Because without dataset we cannot run the project in a proper away. We have to face a various problem during to run the project. Some of the picture are makes a great deal of noisy and it makes our project system muck to give the proper output of jackfruit. Because of noisy we have to do hard work. And we also have to face some problem because of the quality of the image collection and sometimes it waste our valuable time. But we do not backpack. After all we have succeed.

CHAPTER 3
DISEASES

3.1. Introduction

There are many types of Jackfruit diseases. Among them the following are the commons diseases. These are:

- Rhizopus Fruit Rot
- Jackfruit Pest and diseases
- Leaf spot of jackfruit
- Pink Diseases
- Diseases free jackfruit

3.2. Rhizopus Fruit Rot

A common diseases of jackfruit is Rhizopus rot for flower & fruit. Common Name: **Jackfruit Rhizopus fruit rot**. Scientific Name: ***Rhizopus stolonifer***, previous names are ***Mucor stolifer, Rhizopus artocarpi, Rhizopus nigricans*.**

Symptons:

At first soft, watery, brown spots develop on the flower and fruit. Subsequently, a powdery fuzzy looking mass of back spores and white fungal mycelia covers the jackfruit surface. The pathogen engulfs the young fruit, resulting in the characteristic black, rotten, shrunken and sometimes mummified fruit remains. Fruit symptoms can appear on the tree that can develop on the fruit that are in storage or transit [4].

Figure 3.1: Rhizopus Fruit Rot diseases.

3.3. Jackfruit Pest & Disease

There are a number of wood boring insects that may attack wounded or dead wood along the trunks and branches. A pest is an animal or plant detrimental to humans or human concerns including crops, livestock, and forestry [5].

Figure 3.2: Jackfruit pest and diseases.

3.4. Leaf spot of jackfruit

Leaf spot is another disease problem for jackfruit that is affected by the vegetation of ornamental & dark tree. It is mainly affected by mildews, but sometimes it is also affected by bacteria. A record of leaf-spot disease of jackfruit trees by Colletotrichum gloeosporioides Penz from Bangladesh. Lookup the document at a record of leaf spot disease of jackfruit trees by Colletotrichum gloeosporioides Penz from Bangladesh [6].

Symptoms

It creates gray adverts with broad dusky margin for the leaves which may be extract by covering Bordeaux combination (1.5%). Another fungus Pestalotiopsis classical also causes leaf spots. It is characterized by dark brick red spots on both the leaf surfaces in mature spots and the centers become grayish with erupted dark acervulus (colletotrichom gloeosporioides). The margins of the spots turn dark brown.

Management

The illness is successfully controlled by spraying Carbendazim (0.1%) or Thiophanate methyl (0.2%) or Difolatan (0.2%) [7].

Figure 3.3: Leaf spot of jackfruit

3.5. Pink Diseases

There are a number of wood boring insects that may attack wounded or dead wood along the trunks and branches [8].

Figure 3.4: Pink Diseases

3.6. Diseases Free Jackfruit

Here is shown diseases free jackfruit:

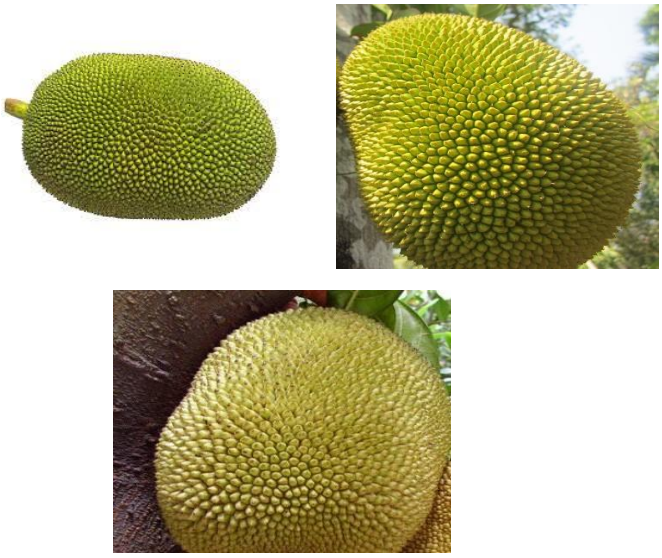


Figure 3.5: Diseases Free Jackfruit.

CHAPTER 4
RESEARCH METHODOLOGY

4.1. Introduction

To increase the conduct of jackfruit diseases and also for a good skill for jackfruit, there should be a specific system to develop the system which is recognize the jackfruit disease, as a result it will be benefited to farmer as well as general people. Our proposed methodology contains the predefined processing which means that take image, resize it and also removes the noise. Then it use the segmentation method like k- means segmentation and use the SVM classification to classify the disease of jackfruit. Theses the procedure is used to recognize as well as classify the jackfruit disease through this proposed method.

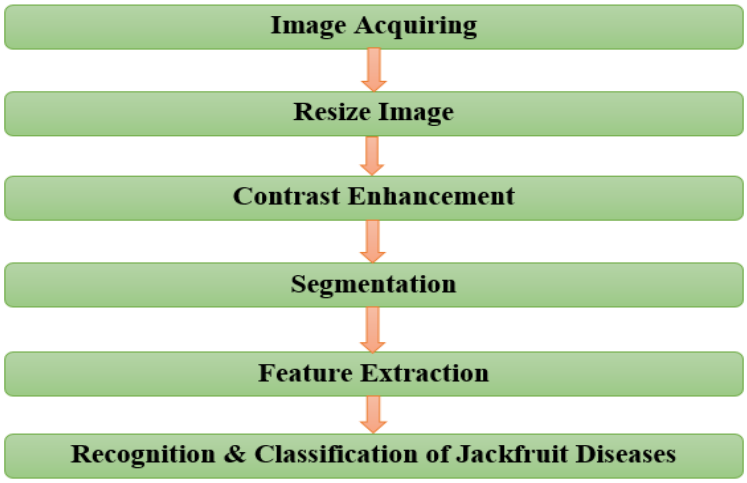


Figure 4.1: Jackfruit diseases recognition system & classification.

In “Fig. 4.1” shows the overall whole process that is implemented and proposed in this system for jackfruit diseases. That means it shows the jackfruit diseases recognition & classification system.

Now here we will talk about the pathway and appearance about our development project. Model, pathway, skill and others necessaries are needed to design and performing the proposed method to show the experimental outcome of jackfruit. Here we discussed about the research contingent and documents, data article action and executional needed [9].

4.2. Research Contingent and Documents

The major things of our work is to begin the enchantment or promotion of jackfruit disease to recognize the proposed work that is being used image procedure for better planning.

A very significant part is a pathway during disease analysis in jackfruit disease detection system, which has not been done before in any other part. Disease analysis helps understand the disease properly, and give clues to appropriate feature. In this paper, we have deal with four types of disease, which jackfruit disease frequently occur in Bangladesh namely: Rhizopus Fruit Rot, Jackfruit Pest and diseases, Leaf spot of jackfruit and Pink Diseases etc. Including Diseases free jackfruit.

4.3. Data Article Action

In our project, we recognize jackfruit diseases by using image processing, so image collection is one of the essential part of our project. We collect images from different sources some images captured by our camera, few images collected from internet and also from BARI (Bangladesh Agricultural Research Institute), Kapasiya & Sripur.

4.4. Executional Needed

To run the project there are some specific requirement to improve the proposed model and also make sure that the proper needed are full filled to the initial phase. For this purpose we need to Software obligation and also needed Hardware obligation.

The Software Obligation for Jackfruit Disease Recognition Model to improve which is given in down tabled:

Table 4.1: Method Software Obligation

	Software Obligation	**Motive**
Computer Functional Structure	Window ten (10)	Used for window operative scheme
Software	MS Word 2013	Used for massive file
	MS Word 2013	Used for drawing flow diagram (manually).

	MS PowerPoint (ppt) 2013	Used it for make presentation slide
	MS Edge	Used it for see the pdf & for reading from any kind of sources.
	MATLAB R2016a	Used it for coding part

The Hardware Obligation for Jackfruit Disease Recognition Model to improve which is given in down tabled:

Table 4.2: Method Hardware Obligation.

	Module	**Min Obligation**
Personal Computer	Workstation	INTEL inside CORE i3
	Random Access Memory (RAM)	4 GB
	Central Processing Unit (CPU)	32-bit / 64 bit (we used 64-bit)
CAMERA	Instrument	15 Mega pixel
	Random Access Memory (RAM)	4 GB
	Monitor Exhibition	5.00 inch
	Shoot up & Slot	12x visual zoom & SD slot

CHAPTER 5
EXPERIMENTAL RESULTS AND DISCUSSION

5.1. Introduction

Here is discussing about the implementation of our development project that is include overall demo, demonstration, model, overall style for our project. Here we used 120 examples of jackfruit which is being applied as dataset & also applied it to training test period to improve the develop project. Here also explains about the experimental results, descriptive analysis etc. [10].

5.2. Experimental Results

For this experimental outcome we used different types of jackfruit image & store them in a dataset. We composed this jackfruit image data in various location like: field investigation & survey and also composed from internet source for training and checking [11].

After using MATLAB imadjust function increase image brightness than resize the image using imresize function.

(a) (b)

Figure 5.1: (a) Original Image, (b) Contrast Enhanced.

In “Fig. 5.1 (a)” shows the tester taken image for checking period and “Fig. 5.1 (b)” shows the contrast enhanced using various function in MATLAB.

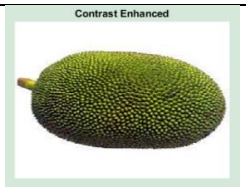
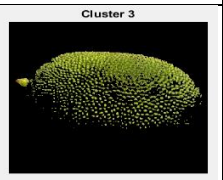
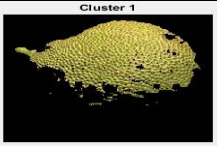
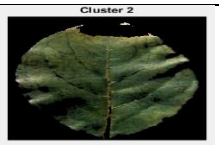
Segment the image using k – means segmentation algorithm and choose the affected part (here choose the specific cluster as affected part). And in the input dialog box type the cluster number and continue feature extract.

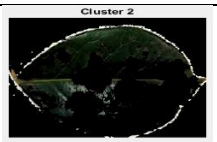
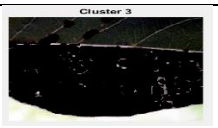
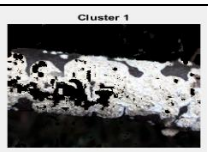
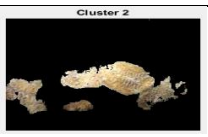
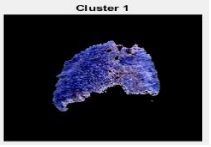
After submitting the cluster number system extract feature from the selected part. And should press the “show result” button to see the disease name. Then it will be shown the diseases name of the jackfruit diseases and it will be Rhizopus Fruit Rot diseases.

5.3. Descriptive Analysis

In this step it display the formulation how to schema to determine the jackfruit captures. The image are taken through the ordinal camera in RGB (Red, Green Bleu) format. Those images are cropped into smaller image. By using MATLAB imresize function convert the image to display in the GUI. Stepwise images and its outstanding performance including output is given here some sample (all about is like that):

Table 5.1: Stepwise Image Including Output.

Image Names	Input Image	Resize	Contrast Enhance	Segmentation	Output
Diseases Free		[300,400]			Diseases Free
Diseases Free		[300,400]			Diseases Free
Jackfruit Pest and diseases		[300,400]			Pest and diseases
Jackfruit Pest and diseases		[300,400]			Pest and diseases
Leaf Spot of Jackfruit		[300,400]			Leaf Spot

Leaf Spot of Jackfruit		[300,400]			Rhizopus Fruit Rot
Leaf Spot of Jackfruit		[300,400]			Rhizopus Fruit Rot
Pink Diseases		[300,400]			Pink Diseases
Pink Diseases		[300,400]			Rhizopus Fruit Rot
Rhizopus Fruit Rot		[300,400]			Rhizopus Fruit Rot
Rhizopus Fruit Rot		[300,400]			Rhizopus Fruit Rot

5.4. Image Segmentation

First of all we have to full fill the predefined procedure like resize & remove noise and also should segment at first the image to goes to the further or coming stage [12].

Here we use k-means clustering segmentation. In segmentation part their shows a dialog box which is entry the number of cluster similarity basis. Then it goes the next part of the proposed system [13].

The algorithm for K – means segmentation:

- Pick center of K cluster, either randomly or based on some heuristic.
- Assign each pixel in the image to the cluster that minimizes the distance between the pixel and the cluster center.

- Again, compute the cluster centers by averaging all of the pixels in the cluster. Repeat steps 2 and 3 until convergence is attained [13].

5.5. Extracted Set of Features

A possibly appropriate set of features are selected for classifying the defects. The features are encountered from different points of view. So, the features are namely Gray-Level Co-occurrence Matrix (GLCM) features and statistical features [14].

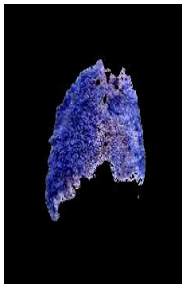
In GLCM features it is included contrast, correlation, energy and homogeneity for calculation part. And in statistical feature it is included mean, standard deviation, entropy, variance, Kurtosis, Skewness for calculation part [15].

In our dataset, there is a set of labels which represent different type of diseases. When we give an input in the system on the basic of different features multi class support vector machine in the dataset and which class give the highest probability select that class and produce result. Table “5.2” shows ten trial image to take out of all directed standards from ten defected Jackfruit image, in where five is actually predicted & another five cannot actually predicted.

Table 5.2: Take out of all directed standards from ten defected Jackfruit image, in where five is actually predicted & another five cannot actually predicted.

(a) Real Diseases	(b) Take an image	(c) Later portion of k-means segment	(d) Take out feature direction (Contrast, Correlation, Energy, Homogeneity, Mean, Standard Deviation, Entropy, RMS, Variance, Smoothness, Kurtosis, Skewness, IDM, Total Accuracy)	(e) Recognized Disease
Diseases Free			(1.6813, 9.5582, 6.6770, 9.6892, 1.8475, 4.8874, 1.8565, 4.1107, 1.3635, 9.9999, 7.4470, 2.4654, 255, 85.33%)	Diseases Free

Diseases Free			(1.6813, 9.5582, 6.6770, 9.6892, 1.8475, 4.8874, 1.8565, 4.1107, 1.3635, 9.9999, 7.4470, 2.4654, 255, 85.33%)	Rhizopus Fruit Rot
Pest and diseases			(6.9938, 9.3710, 2.2147, 8.7449, 7.4094, 8.0191, 6.1060, 1.1942, 4.8059, 9.9999, 2.1578, 2.1578, 255, 85.28%)	Pest and diseases
Pest and diseases			(1.1384, 8.3005, 1.9778, 8.6742, 6.0205, 6.2433, 5.1622, 1.1852, 3.6916, 9.9999, 2.0311, 5.3375, 255, 85.04%)	Pink Diseases
Leaf Spot			(2.0174, 9.2584, 2.7815, 9.3469, 3.5660, 4.0772, 4.7268, 1.0985, 1.3636, 9.9999, 3.5641, 9.8373, 255, 85.37%)	Leaf Spot
Leaf Spot			(6.6116, 7.3693, 7.2201, 9.5378, 1.2783, 3.8870, 2.3488, 6.9561, 1.5004, 9.9999, 2.4472, 4.4866, 255, 85.42%)	Rhizopus Fruit Rot
Pink Diseases			(1.1769, 9.2674, 3.3730, 8.9560, 7.6015, 9.5930, 5.7074, 1.1713, 8.9126, 9.9999, 1.9003, 8.0941, 255, 84.92%)	Pink Diseases

Pink Diseases			(3.7820, 9.4228 6.7377, 9.5477, 2.6434, 6.1531, 1.9754, 6.0195, 3.5290, 9.9999, 6.2877, 2.1613, 255, 84.81%)	Rhizopus Fruit Rot
Rhizopus Fruit Rot			(4.1075, 8.2707, 6.8995, 9.3373, 1.8640, 4.7758, 1.9200, 4.7235, 1.8551, 9.9999, 9.4593, 2.6828, 255, 84.96%)	Rhizopus Fruit Rot
Rhizopus Fruit Rot			(6.2798, 9.0759, 4.2590, 9.5717, 3.6781, 6.0780, 3.6145, 9.2034, 3.3619, 9.9999, 4.6336, 1.6027, 255, 85.09%)	Leaf Spot

Here now I shown the confusion matrix as a perspective of my work. Table 5.3 shows the confusion matrix which is say how many we can predict from actual. And in Table 5.4 shows binary confusion matrices:

Table 5.3: Confusion Matrix.

		Prediction					
Actual		***Diseases Free Jackfruit***	***Rhizopus Fruit Rot***	***Jackfruit Pest and diseases***	***Leaf spot of jackfruit***	***Pink Diseases***	***Total***
	Diseases Free Jackfruit	31	4	1	2	0	38
	Rhizopus Fruit Rot	1	31	1	1	0	34
	Jackfruit Pest and diseases	1	2	7	1	1	12
	Leaf spot of Jackfruit	1	2	1	12	2	18
	Pink Diseases	1	3	1	2	11	18
	Total	35	42	11	18	14	= 120

Here shows the total accuracy of our project as a perspective of confusion matrix. We know,

Accuracy = (TP + TN) / total element * 100%

= (TP+TN) / (TP+TN+FP+FN)

So, total accuracy = (31+31+7+12+11) / 120 * 100%

= 76.67 %

Table 5.4: Confusion matrix in binary for every disease.

Disease Class	Matrix				Disease Class	Matrix			
Diseases Free			Predict Class		Rhizopus Fruit Rot			Predict Class	
			+	-				+	-
	Actual Class	+	31	78		Actual Class	+	31	75
		-	4	7			-	11	3
Disease Class	Matrix				Disease Class	Matrix			
Pest and diseases			Predict Class		Leaf spot			Predict Class	
			+	-				+	-
	Actual Class	+	7	104		Actual Class	+	12	96
		-	4	5			-	6	6

Disease Class	Matrix			
Pink Diseases			Predict Class	
			+	-
	Actual Class	+	11	99
		-	3	7

Table 5.5: Matrix based contribution result of the Support Vector Machine distribute.

Matrix	Assessment
Avg. accuracy	91.48%
Avg. sensitivity	71.77%
Avg. specificity	94.67%
Avg. precision	74.25%
Avg. false positive (FP) rate	5.33%
Avg. false negative (FN) rate	28.23%

Table 5.6: Total accuracy for every types of diseases.

Diseases Class	Value
Diseases Free	91.60%
Rhizopus Fruit Rot	89.55%
Pest and diseases	93.02%
Leaf spot	90.91%
Pink Diseases	92.31%

Now here shows the line chart of this confusion matrix. That is the calculation based formation to represent the actual to predictive result.

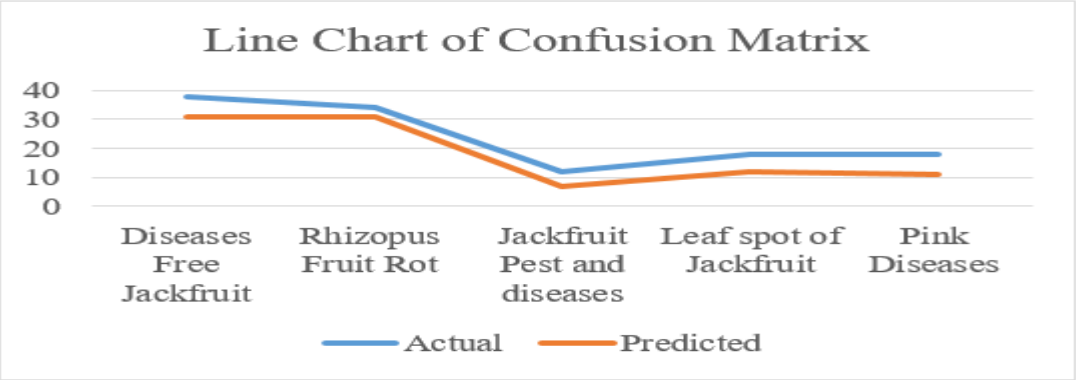


Figure 5.2: Line chart of confusion matrix.

5.6. Image Classification

Based on above training and testing of support vector machine (SVM), the image will be classifying weather it is Rhizopus Fruit Rot, Jackfruit Pest and diseases, Leaf spot of jackfruit and Pink Diseases etc. Including Diseases free jackfruit.

5.7. Summary

The motive of the lesson is to discuss about the implementation of the proposed develop project. Here we used 120 example dataset image of jackfruit to experiment the result. First take an image as input then resize the image then segment the image using k-means segmentation algorithm, based on segmented we extract different features than using multiclass support vector machine complete image classification and detect the disease [16].

CHAPTER 6
CONCLUSION

6.1. Conclusion

The project is implemented to reduce the waste of time & save money that would be helpful to general people. Since electricity is the essential part of our daily life. So we will try to implement such a project that will be helpful to the country as well as customer. We want to maintain the unreasonable situation related to electric bill. Because there can be consequential human fault to disturbed consumers who are not fulfilled about the service on electric bill. So we do not want anything unexpected, which will cause us to suffer. We can say that, overall people can easily solve the entire problem. Because it our work is easy to access and reliable.

So to reduce the harassment & time of consumers as well as overall people, it is the best way to give the electricity bill by online payment system. There is no need to go the place for give & taken bill. For this purpose we implement this project.

6.2. Future Scope

In future we will try to implement it for android phone as well as smart phone. So that farmer as well as general people get the more and more benefit through it. And so that it is easy to use and more reliable.

APPENDIX

Appendix A: Research Reflection

Having completed this venture, I have found out the way to higher argue a factor in a paper using statistics and examples, my arguments turn out to be that plenty higher. A reader takes my arguments more critically whilst I have records to lower back them up, specifically information researched from credible sources. Getting a majority of these statistics from specific views helped to form my personal points. When I use these facts, the paper itself changes absolutely. They were nevertheless my arguments but they had been subsidized through credible resources.

Appendix B: Research Reflection

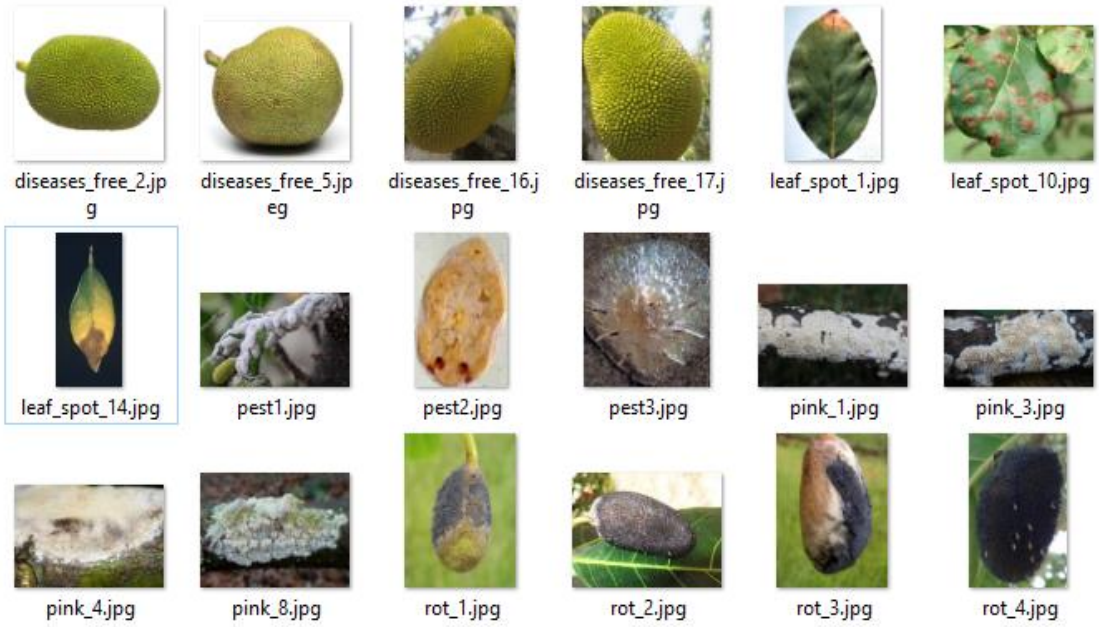


Figure B1: Image in Dataset (Actually Predicted in background)

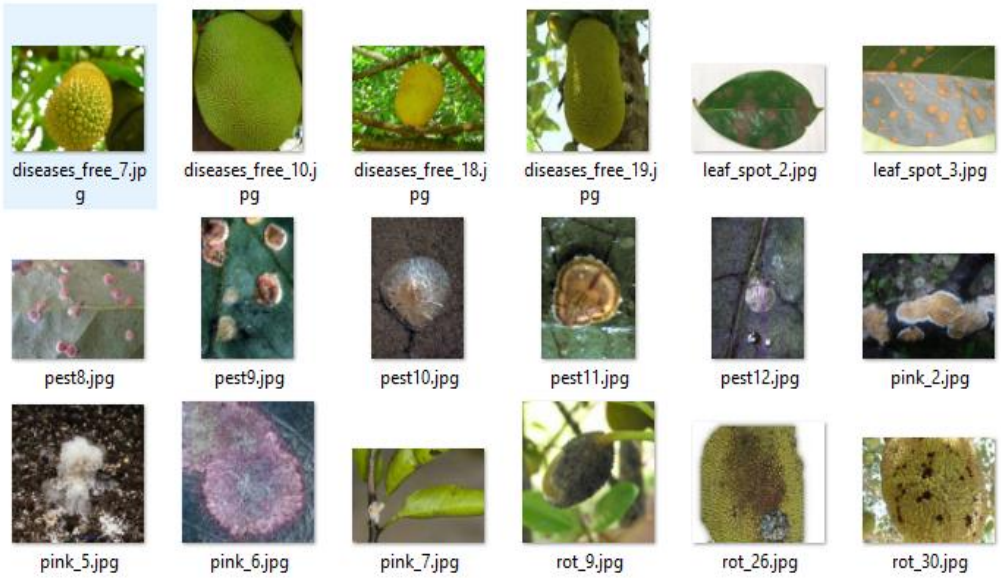


Figure B2: Image in Dataset (Can't Actually Predicted in background)

Appendix C: Related Issues

SVM: Support Vector Machine

GLCM: Gray Level Co-occurrence Matrix

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