

City University
Khagan, Savar, Dhaka

(Thesis Proposal)

Application form for the Approval of B.Sc. Thesis Proposal

1. Name of the Student : (1) Md. Emran Hasan Date:26/05/2019
(2) Saiful Islam Sajon
2. Student ID : (1) 152392002 Semester: Spring 2019
(2) 152392317
3. Name of the Department : Dept. of Computer Science & Engineering
4. Program : B.Sc. in Computer Science & Engineering (Day)
5. Date of Enrolment in the program: 12 January, 2019
6. Name of the Supervisor : Sadia Jahan
7. Tentative Title of the Thesis : **Damage Detection & Classification of Fruit Using Image Processing Technique.**

Abstract:

The food processing industry have been working with different kind of fruits. Most of the industries who are classifying the classes and the damages of fruit by manual. As a result of manual classification it will become a challenging task for human being. So, in this research work we are going to develop a model for automatic fruit identification and damage detection based on Machine learning and Image processing technique.

Introduction:

Progressively, the world agriculture is going so far, because the huge contribution of modern technology. Though, a lot of industries/farmers they have been monitoring their fruit to classify the good fruit from bad by manual. The lack of better observation a number of fruit destroyed in a garden or in an industry every year. So in this study, will developed a model to identify the fruit and the damage of the fruit to increase agricultural yield. For this purpose, we can apply numerous machine learning (ML) and image processing techniques.

We will use a high-quality, dataset of images containing fruits. The dataset was named Fruits-360 and can be downloaded from the addresses pointed by references [4] and [5]. This dataset containing 55244 images of 81 fruits.

Then we will perform different machine learning algorithm like Support Vector Machine (SVM for short), K-nearest Neighbors, KNN for short, Randomforest, RF for short, Decision Tree, Naive Bayes Classifier, NB for short, Linear discriminant Analysis, LDA for short and Logistic Regression for LR. We will combine all these algorithms together. For is purpose we will use the most popular python library which is Scikit-learn.

Related Work:

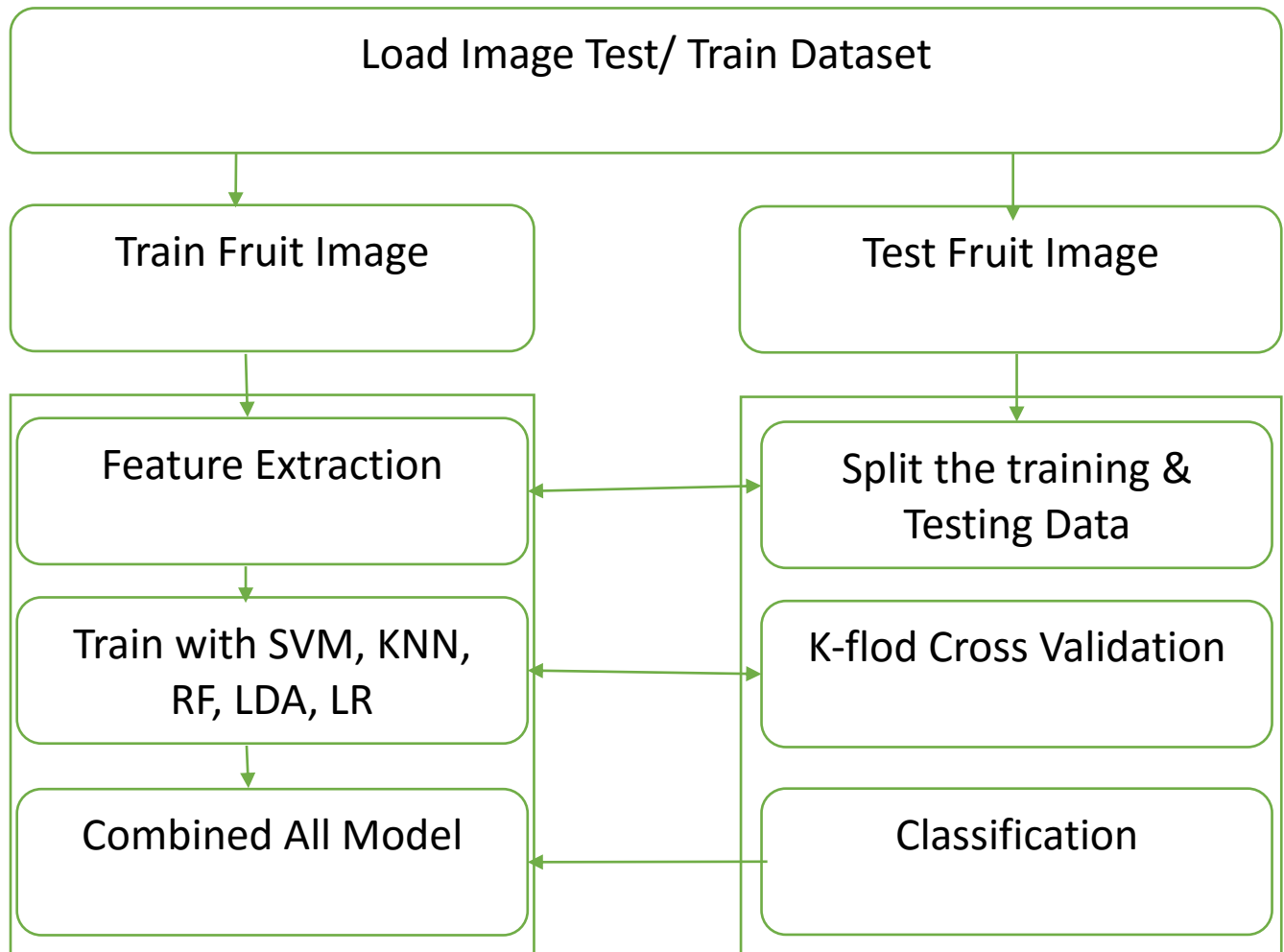
Mureşan, Horea, and Mihai Oltean et al.[1] have introduced a new, high-quality, dataset [4] and [5] of images containing fruits that is essential for obtaining a good classifier. A method for identifying fruits. They have trained a deep neural network (DNN) which is an artificial neural network with different layers. A convolutional neural network is used for classifying the images. The training and validation data used in this paper consists of 55244 images including test and training images over 81 fruits. For the purpose of implementing, training and testing by CNN they used TensorFlow library [6]. They have trained dataset with a different scenario in terms of image format like grayscale, RGB, HSV, HSV, and grayscale combination and also HSV, Grayscale, hue/saturation change with flips. According to the trained neural network with the different conversion of image, they obtained an average 94.66% of accuracy to identify the fruit.

Bhange, Manisha, and H. A. Hingoliwala et al.[2] proposed a web-based tool that helps farmers for identifying fruit disease by uploading a fruit image to the system. The proposed system used already a trained dataset for the pomegranate fruit. They resized the images and then the features are extracted based on the different parameters such as color, morphology, and CCV. According to these features, morphology gave them the best result. Here, they have used k-means algorithm for clustering the dataset. And then, they have used a most popular and more useful machine learning algorithm SVM is for classifying the images in terms of infected or non-infected image. The proposed system gives 82% of accuracy for identifying pomegranate disease. From now on, they will work with increasing the performance of the proposed system for reaching a good result.

Awate et al.[3] introduced a technique which will diagnose and classify external disease of fruit. In this research work, they worked with three fruits such as grape, apple, and pomegranate for the purpose of detecting the disease of this fruit. The proposed system uses two image dataset one for testing and another one for training purpose. The images are classified and mapped to their respective disease categories on the basis of four feature vectors such as color, morphology, texture, and structure of hole on the fruit. In this proposed system they have used different types of algorithm for different purposes. The image segmentation is done by using K-Means clustering methodology. SURF (Speed up Robust Feature) algorithm is applied for extracting the features. For the purpose of testing and training of the fruit dataset, an Artificial Neural Network is used to identify the disease of fruit. The overall implementation is done by using OpenCV library and the proposed is able to identify the disease with 90% of accuracy.

In the above literature, numerous method have applied to classify fruit and detect fruit damage such as Affective Neural Network, Support Vector Machine, Deep Neural Network, k-means clustering, . SURF (Speed up Robust Feature) etc. Though these methods are familiar to detect damage and classify fruit but there are many methods those have not been implemented yet. Machine learning and image processing techniques will be used for the identification and damage detection of fruit and it will contribute to get a better performance, we believe that.

Proposed Method:



Methodology:

1. Load fruit image dataset
2. Extract the feature form the images
3. Apply Image Descriptor
4. Store the feature vector
5. Apply different classifier
6. Combine all classifier
7. Train the model
8. Text the model

Conclusion:

Our system will help farmers to increase their productivity and yield with the help of automating tasks in garden/farm. From our point of view one of the main objectives for the future is to improve the accuracy of the Image processing technique and Machine learning. Another objective is to expand the data set to include more fruits. Machine learning and image processing techniques will be very effective to classify and detect of fruit damage. The more using of a large dataset will give better accuracy.

References:

1. Mureşan, Horea, and Mihai Oltean. "Fruit recognition from images using deep learning." *Acta Universitatis Sapientiae, Informatica* 10, no. 1 (2018): 26-42.
2. Bhangé, Manisha, and H. A. Hingoliwala. "Smart farming: Pomegranate disease detection using image processing." *Procedia Computer Science* 58 (2015): 280-288.
3. Awate, Ashwini, Damini Deshmankar, Gayatri Amrutkar, Utkarsha Bagul, and Samadhan Sonavane. "Fruit disease detection using color, texture analysis and ANN." In *2015 International Conference on Green Computing and Internet of Things (ICGCIoT)*, pp. 970-975. IEEE, 2015.
4. Fruits 360 Dataset on GitHub. <https://github.com/Horea94/Fruit-Images-Dataset>. last visited on 23.04.2019 => 1, 10
5. Fruits 360 Dataset on Kaggle. <https://www.kaggle.com/moltean/fruits>. last visited on 23.04.2019 => 1, 10
6. TensorFlow. <https://www.tensorflow.org>. last visited on 10.05.2019

Approximate Time Schedule

SI No.	Task	Expected Time
01	Study on different types of existing algorithms	1 Week
02	Design Algorithm and analysis	1 Week
03	Implementation of algorithm and writing code of that specific algorithm and comparative analysis	4 Weeks
04	Writing thesis book and paper	3 Weeks
05	Preparing for the presentation	1 Weeks
	Total	10 Weeks

Signature of the student

Signature of the supervisor

Signature of the head of the department