

Project Proposal

Group No: Foxtrot

Section: A

Group Members:

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|-------------|---------------------|
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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Computer Science and Engineering

Project Proposal of IDP

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This is an application form for the approval of Idea proposal of IDP by the Course Teachers. All the criteria which are applicable from the following list must be mentioned and filled in properly.

Date:9/6/2020

1. Group Name: Foxtrot

2. Section: A

Session: 2017-18

3. Program: CSE-18

4. Tentative Title: FRESHNESS AND DEFECT DETECTOR OF FRUITS AND VEGETABLES FOR INDUSTRIAL USE.

5. Background and Present State of the Problem:

The human eye perceives the colour of light in three wavelength bands — red, green, and blue. Hyperspectral cameras cover a much wider spectrum to see beyond what is visible to humans.

Agricultural side of our country are still dependant on human eyes in terms of grading raw fruit and vegetables. Usage of computer science in terms of grading raw materials in our country is still not that popular in both industrial level.

6. Objectives with Specific Aims and Possible Outcome:

Objectives and Outcomes:

- To create a detector of freshness and defection for grading general raw fruits/vegetables for industrial use
- Usage of advanced Computer science domains to make every day work more convenient
- Introduction of Image recognition system and Computer vision to make fruit/vegetable grading for viable and fast.
- It decreases human dependency in industrial level food grading and replace it with machine dependency for better output of quality grading.

7. Outline of Methodology/Experimental Design:

1. Base Structure : The Base structure of our system will consist of two raspberry pi's consisting of usb web cameras and pi cameras and also a conveyer belt. The belt will be used to deliver the fruits and vegetables in a single column from where the cameras will be able to take readings for object detection and freshness detection. A servo motor will also be used with the alignment of conveyer belt to take out any fruits and vegetables from the belt which doesn't meet the desired freshness value.
2. Database: Database will be used to store reference images that will be compared with input image
3. Object detection: Saliency map and VGG model will be used to identify images with the help of database images.
4. Freshness metre: Freshness will be measured using a CNN model with the help of present images of various stages (under-ripe , ripe, over-ripe) of a single fruit/vegetable stored in the database
5. Defect detection: Hyperspectral imaging will be used to detect internal defect of fruits and vegetables. Using python and openCV by measuring the object fruit the defection will be determined.

8. Please select the covered domain of your project (At least 04 or you can add any other domain(s) that is not included in the following list)

<input type="checkbox"/> Theoretical CS and Algorithms	<input type="checkbox"/> Information Security
<input type="checkbox"/> Networking	<input checked="" type="checkbox"/> Computer Vision
<input checked="" type="checkbox"/> Database and Data Mining	<input type="checkbox"/> Pattern Recognition
<input type="checkbox"/> Cloud Computing and Big Data	<input type="checkbox"/> Internet of Things (IoT)
<input type="checkbox"/> AI and Robotics	<input type="checkbox"/> Human Computer Interactions (HCI)
<input checked="" type="checkbox"/> Digital Image Processing	<input checked="" type="checkbox"/> Artificial Neural Networking
<input type="checkbox"/> Android Application	

9. References:

1. [A. Bhargava and A. Bansal, "Fruits and vegetables quality evaluation using computer vision: A review," 05-Jun-2018. \[Online\]. Available: https://www.sciencedirect.com/science/article/pii/S131915781830209X?fbclid=IwAR1egn1Axdez8ruhxNBuMnUVrr3DYE1GnzgVPfBP_9KU2gh399G8Lwyvdrs.](https://www.sciencedirect.com/science/article/pii/S131915781830209X?fbclid=IwAR1egn1Axdez8ruhxNBuMnUVrr3DYE1GnzgVPfBP_9KU2gh399G8Lwyvdrs)
2. ["Fruit and vegetables classification system using image saliency and convolutional neural network," Fruit and vegetables classification system using image saliency and convolutional neural network - IEEE Conference Publication. \[Online\]. Available: https://ieeexplore.ieee.org/abstract/document/8122370/.](https://ieeexplore.ieee.org/abstract/document/8122370/)
3. <https://irjmets.com/rootaccess/forms/uploads/fruit-freshness-detection-using-cnn-approach.pdf>

4. I. B. Mustaffa and S. F. B. M. Khairul, "Identification of fruit size and maturity through fruit images using OpenCV-Python and Raspberry Pi," 2017 International Conference on Robotics, Automation and Sciences (ICORAS), Melaka, 2017, pp. 1-3, doi: 10.1109/ICORAS.2017.8308068.

10. **Cost Estimate:** (Breakdown can be provided in separate sheet if necessary)

Ser No	Items	Cost (Taka)
1	Raspberry pi 4 model B 4GB x 2	13000
2	Raspberry pi camera module x 2	1500
3	Web Camera x2	5000
4	Small accessories (wires,boards etc)	1000
5	Field works (if applicable)	0
6	Conveyance / Data Collection (food items for testing)	400
Total Amount		20900

11. **Market Analysis:** (Following is the mapping for market analysis between proposed project and other existing projects.)

Existing Projects Vs. Our Project	Features						
	Belt conveyors to transport products in a straight line	Machine learning to teach the CNN and deep learning algorithms	OpenCV-Python (for measuring the detection)	Database (for storing thousands of sample data)	Gas sensor (for detecting freshness of food)	Algorithm (compares all the measurements to hundreds of thousands of existing samples)	CNN model (for detecting present images of various stages of a sample stored in the database)
eFresh – a Device to Detect Food Freshness	X	√	√	√	X	X	X

Identification of Fruit Size and Maturity Through Fruit Images Using OpenCV-Python and Raspberry Pi	X	X	√	√	X	√	X
Machine Vision Based Automatic Fruit Grading System using Fuzzy Algorithm	√	√	√	X	X	√	X
ClariFruit	X	X	√	√	X	√	X
Automatic fruit sorting system using raspberry-pi	√	X	X	√	X	√	X
Image processing based method to assess fish quality and freshness	X	X	√	√	√	√	X
Our Project	√	√	√	√	√	√	√

Signature of the group members:

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Signature of the Course Teachers