IMAGE PROCESSING BASED GRAIN SORTING SYSTEM USING RASPBERRY-PI

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ABSTRACT

In India, agriculture production is important for income of people because more than 50% population depend on agriculture field. When peoples are export or buying their production then grains value depend on its quality. If quality is increases, automatically value is increases. Quality control is very important in agriculture production because after harvesting, based on quality parameters grains product are classified and graded into different grades. .Grain quality evaluation by human eye is not accurate and time consuming, may be varying results and costly. To overcome these limitations, we implement this paper using image processing technique with embedded solution for grain quality wise sorting system. An automated system is introduced which is used for analysis of rice quality and grade (i.e. grade A, grade B, and grade C) using Probabilistic Distribution. The testing parameter of rice is size, shape and physical defects etc.

Keywords: Blob analysis, Image Processing, Matplotlib, Raspberry PI

I. INTRODUCTION

A. Motivation

The agriculture in the country like India is vast there is grain are produce like rice, Bajara, Sugar, etc. so we have to control their quality for the packaging section in according to their size, color, weight. So for that we have developed the embedded solution with the help of image processing. Here we can estimate their quality using the simultaneously taking frame and applying the image processing algorithm for that frame and get result as the quality of the grains.

However, we can implement the same process for the all type of the grain only considering parameter are going to change so we can have the mode selection for the different type the grain. We can have the better result than the ordinary human eye. This work is going to be Product implement for the different packaging industries or quality testing department for the market Yard. Grain quality evaluation is done manually but it is relative, time consuming, may be varying results and costly. To overcome these limitations and shortcoming image processing techniques is the alternative solution can be used for grain quality analysis.

B. Objectives

In our project, we are going to research on the future requirement of the agricultural product quality of the grain for different purposes like export and quality assurance and as raw material of agricultural goods. Proposed

system is designed to show all related aspect of the quality testing of the rice with respect to its size, whiteness, defect in physical and color. Show the graph of all parameter which mention earlier.

II. PROPOSED METHODOLOGY

System Initialization:

At this step, the entire component will be start. System will check the entire component for its status. If any component fails, then system correct that error or notify the user about component failure. If there is no such failure, then system goes online and starts working. Operation like following takes place in this stage Conveyor start running in forward motion. GUI application on monitor will display. Camera takes the number of snapshot per second and send it to system. Sorting Mechanism at the initial Position.

Capture Frame:

At this stage Camera Takes the Snapshot of the Conveyor with the Grains which moving with the Conveyor. Camera takes the Snapshot and transmit it to the System to process using Raspberry with OpenCV Software. Then OpenCV package based Python scripting changes the image to matrix using simple commands and function.
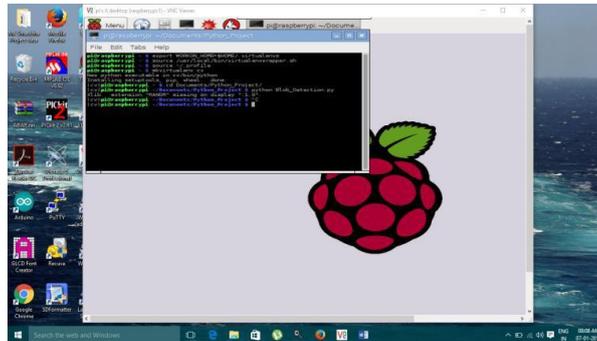

Fig1.Operation GUI Of proposed project

Perform Preprocessing:

Image we got from the last stage does not have that many details in the captured frame so we have to perform preprocessing operation on the captured frame so that we get some details about the grains. At this stage we perform following operation on the captured frame, to get detail output like Contrast Stretching, Segmentation, Detect Grains:

After preprocessing detail in the frame enhance to the greater extent, no we have to find out if how many grains are detected on frame. For that purpose, we use the High Pass Filtering Method. It is technique to find out there is grains in the frame or not.
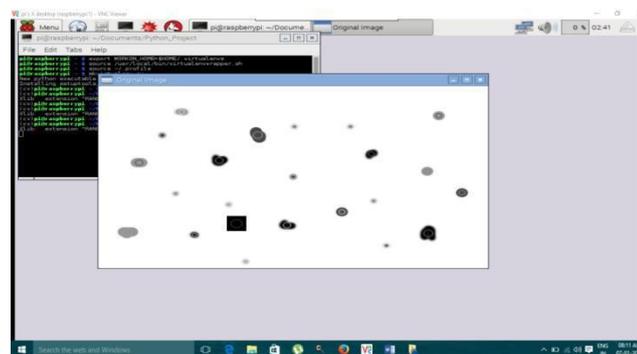

Fig2.Sample Fame Provided to camera

After the grains detection:

After previous stage if there is no sign of Grains detection then camera initialize itself for new frame take the new snapshot from the Model Environment, If We get the sign of Grains detection then we proceed to next Stage of finding estimation of sampled Grain Frame.

Perform Display analysis:

After getting the Result of detected grain we have display information about which grain quality measurement, then this interrupt should be generated through this swapping Card, so that we get maximum output efficiency from the proposed system. E.g. Suppose frame Has 100 grains on the conveyor then GUI of result should be graph of mean value and the sample data from frame of the Display. And then output of the OS as the GUI of Menu system will be Displayed on the LCD Monitor.
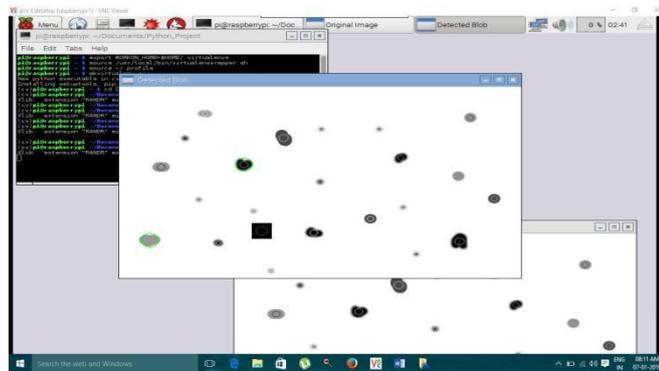

Fig3.Detected blob in Sample image

Sorting:

Initialize Sorting Mechanism using the Raspberry PI. after executing interrupt service routine program as per the grain Sort System should give the satisfied output at the Sorting Section and So that the interaction of USER should be real time or say fast. It gives the highest interacting System using above proposed Methodology.

After above process once again camera takes the image and the algorithm also start once again to sort the rice grain to specified range of bucket like small grain bucket, good grain bucket, average grain bucket and defected grain bucket.

Fig4.Part of sorting assembly of proposed system

III. SYSTEM DESIGN

Here going to see about various type of methods of system architectures and Algorithm to achieve this project's specification. we are going to discuss proposed system architecture it's Benefit and Algorithm for grain sort implementation

A. Algorithm

1. Start

2. Initialize the System on PI system.

3. Start the Conversion and Convertor.

4. Take the Snapshot of the Conveyor

5. Receive the Image to memory

6. Perform Image Preprocessing

7. Perform Thresholding

8. Perform Blob Analysis

9. Show Graph On the Monitor

10. Find the Category of Grain

11. Show the result

12. Update the Graph Screen

13. Actuate the Mechanism according to Result

14. If Filler empty then stop

15. Or go to the Step to 3

B.Flowchart
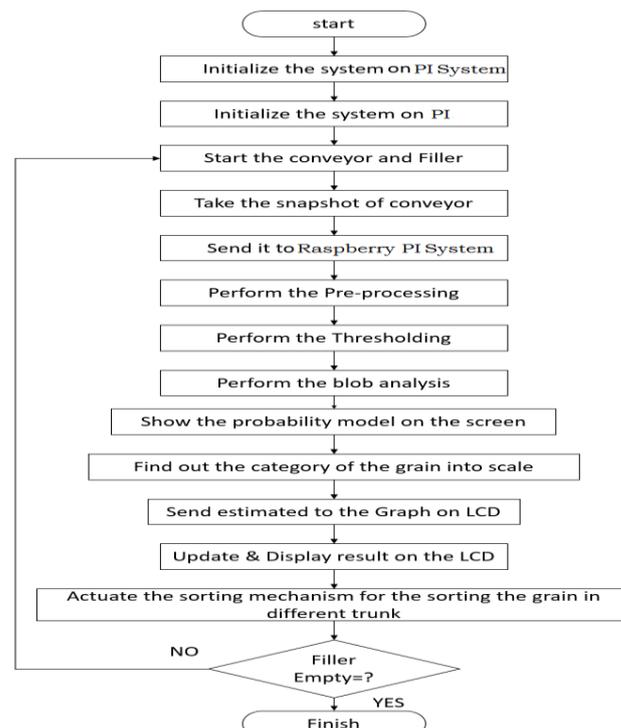
C.Block Diagram

The following diagram shows the block diagram of Raspberry PI Based Grain quality check with sorting mechanism Using OpenCV.
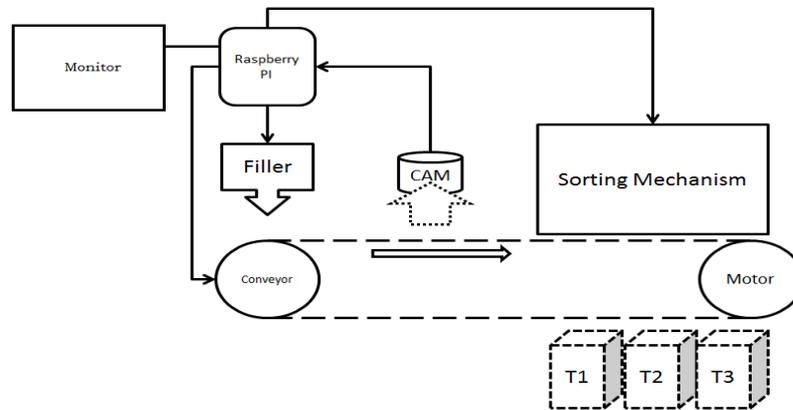
The above block diagram shows how this sorting system works and how data and interrupt controls passes though system.

D.Block Diagram Description

- Hardware Description

A conveyor belt:

Conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium the conveyor belt that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport large volumes of resources and agricultural materials, such as grain, salt, coal, overburden and more. Today there are different types of conveyor belts that have been created for conveying different kinds of material available in PVC and rubber materials.

Raspberry PI 3:

Raspberry Pi is a credit-card sized computer manufactured and designed in the United Kingdom by the Raspberry Pi foundation with the intention of teaching basic computer science to school students and every other person interested in computer hardware, programming and DIY-Do-it Yourself projects.

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU and was originally shipped with 512 megabytes of RAM, later upgraded (Model B) to 1GB.

PI Camera:

Camera act as input sensor which takes continuous input from the physical world. It takes the number of snapshot per second and transfer image data toward image processing section

- Processing Description

OpenCV Package:

This software act as environment to implement the image processing algorithm in very simple manner. It supports many image formats and also support real-time image processing in this environment. It has many inbuilt function which helps in reduction in programming difficulties and program length.

Image Processing Algorithm:

This block consists of different type algorithmic function to detect the Grain Size, Shape, Color, Defect in in continuous frame. Good algorithm gives the effective program runs and reduction in program length

GUI Update window:

After detecting update in the grain estimation after each frame result Raspberry PI update the whole GUI window with respect to the System estimation.

Interrupts:

After detecting which grade is selected the whole mechanical structure motor is controlled through the GPIO pin. In which case it has the 40 pin GPIO Connections to control the Real Physical Motor Attached to the sorting system.

IV. CONCLUSION

In this way, we are developing a system model for grain condition monitoring and controlling based on 3 parameters size, defects, chalkiness by using Raspberry Pi development board and Python platform using openCV image processing package. For better quality analysis of grains more parameters are to be considered. The product is energy efficient and provides a greener ethical alternative to small businesses. This small credit card sized product makes it easy to recycle. The Raspberry Pi is perfect for adaptive technology. This product makes it possible to build complex and effective products at a cheaper price. Application of the same algorithm for different types of grains. The grain quality management system can be used in following places in export quality checking of grains, Used in automation industries, For food grain storage systems

V. ACKNOWLEDGEMENTS

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