SMART SEED QUALITY ANALYZER USING IMAGE PROCESSING

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Abstract

India is agricultural country and production of crop is extremely giant. Agriculture production is very important for individuals as a result of over fifty % population depends on agriculture field. Thus it's necessary to manage their quality for packaging section. Internal control is extremely necessary in business as a result of supported quality merchandise area unit classified and stratified into completely different grades. Seed quality analysis by human eye isn't correct and time overwhelming, results might vary, and labour value will increase. To beat these limitations and defect image process techniques is that the different answer which will be used for seed quality analysis. Here projected a straightforward technique supported image process exploitation Raspberry Pi for grading of peanuts. Here grading are going to be performed with relevance physical parameters of peanut. Result are going to be displayed on alphanumeric display whether or not seeds area unit rejected or accepted for packaging.

1. Introduction

In the field of agriculture each farmers are taken such a large amount of efforts honestly and doing exertions for obtaining quality of grain or outcome. However in keeping with space wise climate, form of soil, seed and fertilizers the standard of the crop are categorised manually by ancient technique. Within the ancient technique specialists area unit characteristic the standard of seed by handpicking. Likewise the scrutiny of the standard of various forms of seeds manually is important and time overwhelming. therefore to switch this terribly tedious and time overwhelming method of characteristic the nice qualities seed manually we tend to area unit attending to introduced a sensible processed system that is, \ sensible Seed Quality analyser victimisation Image Processing". Here, approach used relies on image process technology victimisation raspberry pi, the detection of quality of seeds area unit Performed during this paper. Taking peanut as associate degree example, the color detection and outline technique of comparable spherical objects are often studied.

The quality classification of seeds, from the character of their texture, shape, and color essence, its tedious work victimisation image process however we tend to area unit creating use of OPENCV code. Within the gift grain-handling scenario, seed type and quality area unit recognized physically by visual examination that is repetitive what is additional, not precise. There's demand for the event of fast, precise and target framework for quality determination of seeds.

The image process could be a variety of signal process wherever the input is a picture, sort of a photograph or video frame, the output of a picture process is also either a picture or a video frame or a group of characteristics or parameters associated with the image. This image process ideas area unit enforced in Raspberry pi.

The Raspberry Pi could be a basic embedded system having a credit card-sized single board computers developed within the kingdom by the Raspberry Pi Foundation.

Persistent storage. The system provides Noobs UNIX package Raspbian image for transfer. Python is employed as main programing language for raspberry pi.

2. Literature Survey

The position wherever the influence of the strain seems initial was a flower. Form changes into the flower that receives the strain. Therefore, it absolutely was assumed that the strain condition of the plant are often diagnosed from the morphological characteristics like a form of the flower. The substantial modification seems within the variety of sheets of the flower petal, the amount of stigma, and therefore the size of the flower. a picture diagnosing system for police investigation the strength of the strain occurred within the plant was developed mistreatment a synthetic neural networks [1].

A time period, image-based wheat quality examination machine that may replace tedious visual inspections for purity, colour, and size characteristics of grains. It additionally has the potential for measurement the vitreous solid ground of macaroni wheat. Totally different neural network standardization models were developed to classify vitreous and non-vitreous kernels and evaluated mistreatment samples from GIPSA and from fields in American state. Model fungibility between totally different inspections machines was additionally tested [2].

In terms of total production tonnages used for food, India is presently second to wheat because the main human food crop and before maize. Determinant the standard of wheat is essential. Specifying the standard of wheat manually needs Associate in nursing professional judgment and is time overwhelming. Typically the variability of wheat appearance therefore similar that differentiating them becomes a awfully tedious task once applied manually. To beat this downside, Image process are often accustomed classify wheat per its quality. This examination approach supported image analysis and process has found a spread of various applications within the food trade. Significant analysis has highlighted its potential for the examination and grading of wheat. Image process has been with success adopted for the standard analysis of rice, cereal grains, fruits and vegetables. Likewise wheat grain quality and characteristic s are examined by this system. This paper presents the numerous parts of the image process technique plus a review on the analysis work applied by numerous researchers within the field of quality info of wheat varieties [3].

Quality of grains is a vital demand to shield shoppers from sub-standard merchandise. Sensory pleasure, healthy feeding, price and convenience the patron trends area unit driving the food trade nowadays. Rice delivers on all of those. Rice is that the primary dietary staple for over 0.5 the world's population. It’s the foremost widespread grain globally, provision energy, carbohydrates, protein, fibre, essential vitamins and minerals and helpful antioxidants. Within the last thirty years, rice consumption everywhere the planet has over doubled. Projected system helps to spot the kind of rice grain being provided [4].

3. Working Principle of Project

1) According to our proposed method, we first place seeds on seed tray then image of peanuts is captured with a colour Pi Camera, Here the peanuts are dispersed on white background so that the image of grains can be separated from the background.

Figure1: Seeds

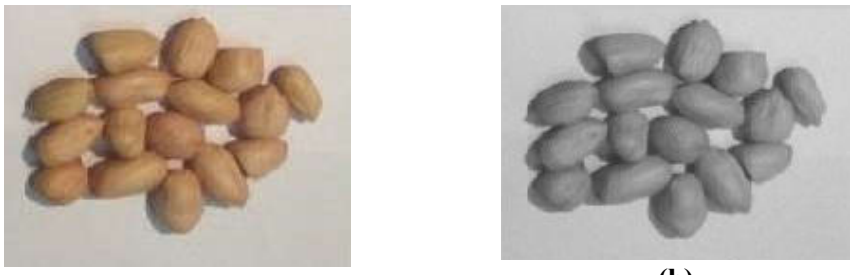
2) Captured images are stored in PNG format. In OPENCV, captured image is read. The noise will be removed from the input image and make it proper by adjusting necessary parameter. Sometimes in image there is a problem of brightness, contrast due to light effect .So under the pre-processing of image these types of problems will be minimizes by adjusting its grey level and threshold level of image.
3) By determining the exact quality of the input image by extracting the important features from the input image and finally on the basis of the important features of the input image, system will decide or identify the quality of the peanuts.
4) In the starting of the process first requirement is to capture input image of peanuts. The required image will be capture by the system and also stored in raspberry.

Figure2: Mix Quality Seeds

5) In the second stage of pre-processing the images acquired are colour images, so it is converted into grey scale image. The colour information is not necessary for further processing as it does not carry any useful information. Function in open CV converts the color image to gray scale image by eliminating the hue and saturation information while retaining the luminance. The grayscale image is obtained from the RGB image by combining 30 percent of RED, 60 percent of GREEN and 11 percent of BLUE. This gives the brightness information of the image. The resulting image will be two dimensional. The value 0 represents black and the value 255 represents white.

The range will be between black and white values.

Formula: 0.2989 * R + 0.5870 * G + 0.1140 * B

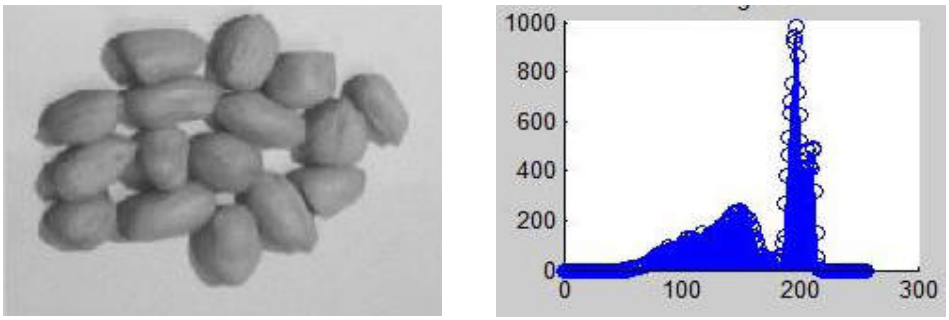


(a) (b)

Figure 3: (a) RGB Image (b) Gray Image

6) Then under the third stage of pre-processing, histogram of the image is taken an image histogram is a chart that shows the distribution of intensities in an indexed or grayscale image. The image histogram function creates a histogram plot by defining n equally spaced bins, each representing a range of data values, and then calculating the number of pixels within each range. You can use the information in a histogram to choose an appropriate enhancement operation. The histogram of a digital image is a distribution of its discrete intensity levels in the range [0, L-1]. The distribution is a discrete function h associating to each intensity level: rk the number of pixel with this intensity: nk.
7) In the fourth stage of pre-processing histogram equalization is done. Histogram equalization is a method to process images in order to adjust the contrast of an image by modifying the intensity distribution of the histogram. The objective of this technique is to give a linear trend to the cumulative probability function associated to the image. The processing of histogram equalization relies on the use of the cumulative probability function. The CDF is a cumulative sum of all the probabilities lying in its domain and defined by:

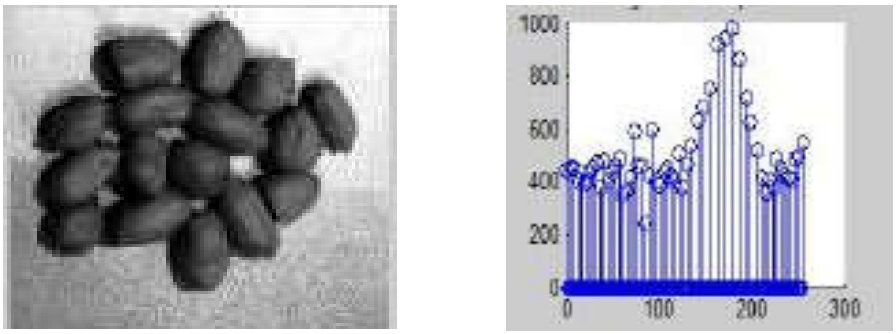
$$cdf(x) = \sum_{k=-\infty}^{x} P(k)$$



(a) (b)

Figure 4: (a) Gray Image (b) Histogram

The idea of this processing is to give to the resulting image a linear cumulative distribution function. Indeed, a linear CDF is associated to the uniform histogram that we want the resulting image to have. Figure below shows Histogram after Equalization



(a) (b)

Figure 5: (a) Histogram Equalization (b) Histogram after Equalization

8) After this in the fifth stage thresholding is done on gray image. The gray levels of pixels of the object is different from the gray levels of the pixels belonging to the background. Thresholding becomes a simple but effective tool to separate those foreground objects from the background. We can divide the pixels in the image into two major groups, according to their gray-level. This technique can be expressed as:

$$T = T[x, y, P(x, y), f(x, y)]$$

Where T is the threshold value. x, y are the coordinates of the threshold value point. p(x,y) , f(x,y) are points the gray level image pixels . Threshold image g(x,y) can be define

$$g(x,y) = \begin{cases} 1 & \text{if } f(x,y)geq1 \\ 0 & \text{if } F(x,y) <= 0 \end{cases}$$

9) In the sixth stage binarization is performed. Binarization is the basis of segmentation. The Binarization Method converts the gray scale image (0 up to 256 gray levels) in to black and white image (0 or 1). The high quality binarized image can give more accuracy as compared original image because noise is present in the original image. Global thresholding method is better approach for calculate the threshold values of a grey scale images

10) The result analysis will be generating by comparing its quality with data which stored in database of the system.

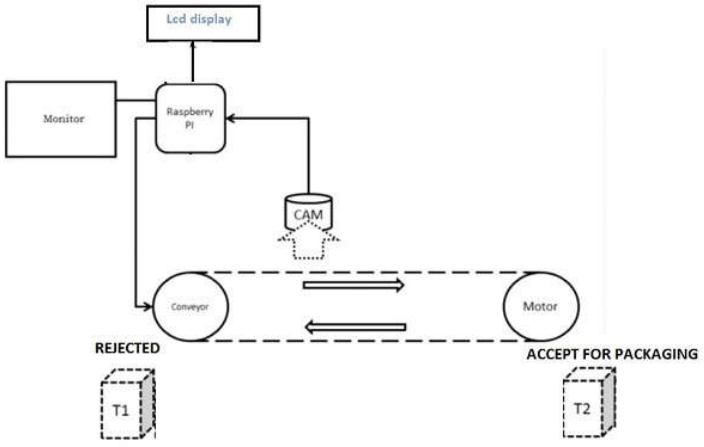
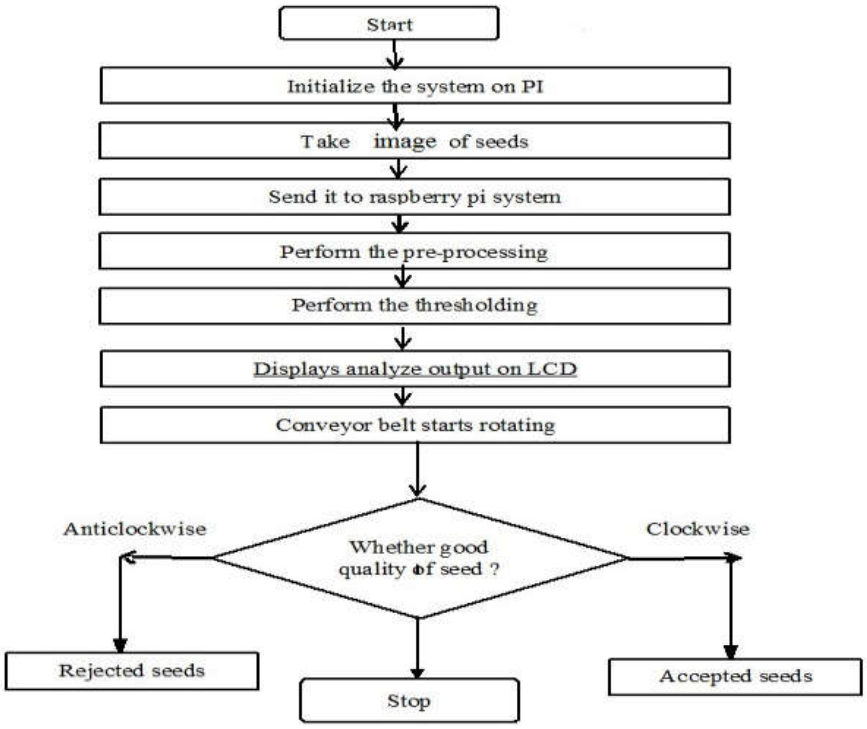


Figure 6: Pictorial View of System

Figure 7: Real View of System

4. Design Flow Chart



5. Results

After pre-processing done by raspberry pi based on the threshold values result is displayed on LCD and conveyor belt rotates either in clockwise or anticlockwise direction.

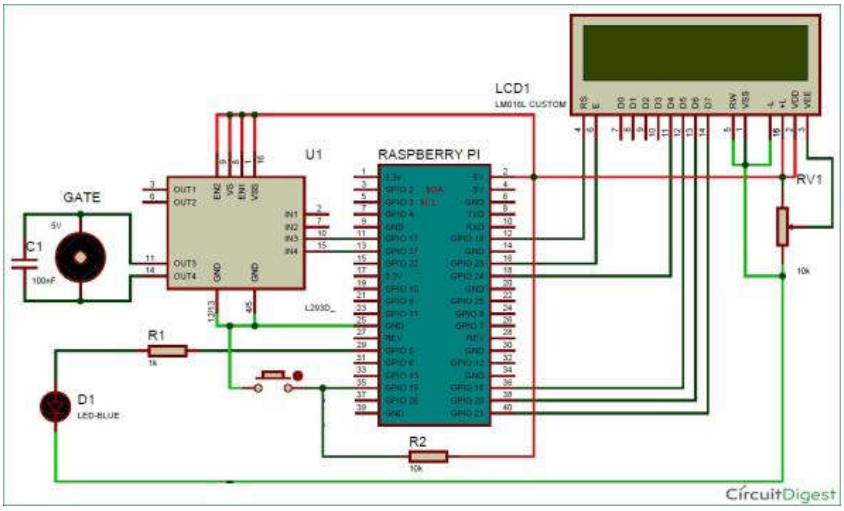


Figure 8: Circuit Diagram of Project

6. Features

1. The main signal processing chip unit used in Raspberry Pi system is a Broadcom 2835 having 1.2GHz processor in which CPU core is a 32 bit ARM1176JZF-S RISC processor designed by Advanced RISC Machines.
2. 5 MP pi camera is used which delivers clear 5MP resolution image, or 1080p HD video recording at 30fps.
3. Raspberry pi using open CV package is used

7. Limitation

1. Large quantity of seeds are difficult to detect
2. Setup must not be present in dark room i.e. if light intensity is not sufficient result may be inappropriate

8. Future scope

1. Improvising this idea, it can be used further in industrial applications.
2. We can design this system using IOT.
3. We can design it for different type of grains using size, color and weight of grains.
4. In future we can attach at time more than one camera to the system.

9. Conclusions

Now day's customers area unit terribly quality acutely aware concerning the food grains or seed they get and consume. During this paper a shot is formed to grading of peanuts supported varied techniques victimization image process with facilitate of raspberry pi. The image is at the start subjected to pre-processing and also the individual seeds area unit metameric by victimization totally different image process techniques. The geometric options of the seed like space, size, shape, colour, axis length, axis length etc. area unit subjected to classification the result area unit found to be encouraging and correct.

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