SEED PURITY TESTING WITH THE HELP OF DIGITAL IMAGE PROCESSING

Mr.B.Thiruvaimalar Nathan*M.E
Mr.B.Revanth reddy #
Mr.Gadiparthi Doondi #
*-Assistant Professor (Senior Grade)-SRM Institute of Science and Technology,Ramapuram,Chennai.
Email: nathanbose@gmail.com

Mr.Chamarthi sudeep kumar#
Mr.Sk.Afzal#
#- Student,Dept. of ECE
SRM Institute of Science and Technology,Ramapuram,Chennai.
sudeepkumar14628@gmail.com
doondig@gmail.com

Abstract—In this paper we used digital image processing techniques for purity test of various seeds. Physical purity analysis tells us the proportion of pure seed component in the seed lot. The computer software which can predict seed image for seed lot by using digital image processing techniques is developed. Due to the advance of camera technology, people can take digital pictures easily in any places and any time by a camera or by a mobile phone device. Moreover, it is easy to transform and process by using a computer system. Thus, this project employs a digital camera to capture the image. This paper studies various digital image processing techniques which reduces the labor input required to evaluate seedling growth rate and increases the accuracy of these measurements.

Keywords—Edge,Corner,Purity test, Digital Image Processing, MATLAB

I. INTRODUCTION

Seed testing is the cornerstone of all other seed technologies. Seed testing is used for control of quality parameters during seed handling, and test results are submitted to customers as documentation on seed quality. It is the means by which the quality of seed can be measured and viability of seed is ensured. Seed testing is determining the standards of a seed lot namely physical purity, moisture, germination, vigor and thereby enabling the farming community to get quality seeds. A weed free seed lot is the most efficient strategy to achieve established market standard. Separation of good quality seeds, if done with right equipment and appropriate methods, can increase purity test. It can also help in discarding Healthy the number of diseased seeds and can improve the visual, commercial and planting quality of seed lot. Seed quality is essential for maintaining the seed viability for extended periods of time. Knowledge of the seed's physical characteristics may offer an insight on germination levels. Physical purity analysis tells us the proportion of pure seed component in the seed lot as well as the proportion of other crop seed, weed seed and inert matter by weight in percentage for which Seed Standards have been prescribed. Thus, it helps in:

a. Improving the plant stand (by increasing the pure seed component).

b. Raising a pure crop (by eliminating other crop seed and weed seeds).

c. Raising a disease free-crop (by eliminating inert matter).

II. EASE OF USE

A. *Problem Definition*

In agriculture, there have been indicative developments as technology grows. Autonomous robots do some complex tasks which are labor-saving. These robots have vision systems that can be specialized for natural images. This work searches for the question whether any captured seed bulk image is defective due to non-ideal storage conditions or it is healthy as expected. Thus, the longtime storage for agricultural stocks can be guaranteed by minimizing the bad conditions in their early phases which is crucial for the yield.

Complexity of the problem directly depends on the morphological properties of the seed type. Changes on the surface depending on the germination and/or bugs differ. In the moist or wet environment, sprouts occur just in several days. On the other side, small bugs can invade seeds and holes on the surface together with powdery texture can be observed because of bugs. This research uses a new texture related operator for feature extraction that easily shows the differences between healthy seed images and defective ones.

B. Literature Check

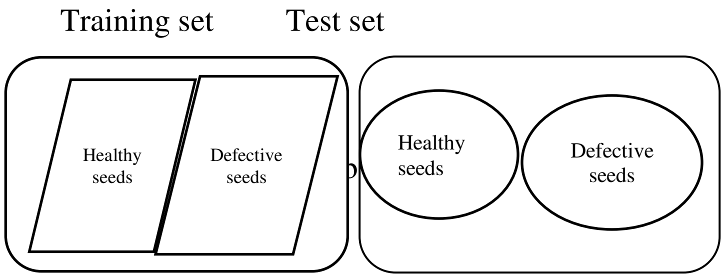
In one study, image processing and computer vision application on rice seed germination is dealt. Lurstwut and Pornpanomchai use rice images which are not bulk to analyze their morphological properties namely Rice Seed Germination Analysis (RSGA). In the other research of Lurstwut and Pornpanomchai, they study for the recognition of plant seeds. Granitto et al. underline 3 basic characteristics to be measured by computer vision: color, texture, and morphology (size). According to Granitto, analysis of color features can be an extra load both for the performance and for the image acquisition such as better control of illumination conditions. Instead, combination of textural and morphological features can provide simplification in system's operationKiratiratanapruk and Sinthupinyo use machine vision for corn seed classification. By using texture and color information, RGB, HSV, gray level co-occurrence matrix (GLCM) and Local Binary Pattern (LBP) outputs are obtained as features. The effects of stink bugs are presented by Corrêa-Ferreira and Azevedo .

III.METHODOLOGY

This section gives all details about the proposed approach tagging the defectiveseed images. Discrimination of the newgerminated or bug infested seed images from healthy ones is the basic aim of this research. Therefore, all database elements are categorized as 4 sets:

i.) Healthy seed images for training
ii.) Healthy seed images for test
iii.) Defective seed images for training
iv.) Defective seed images for test.

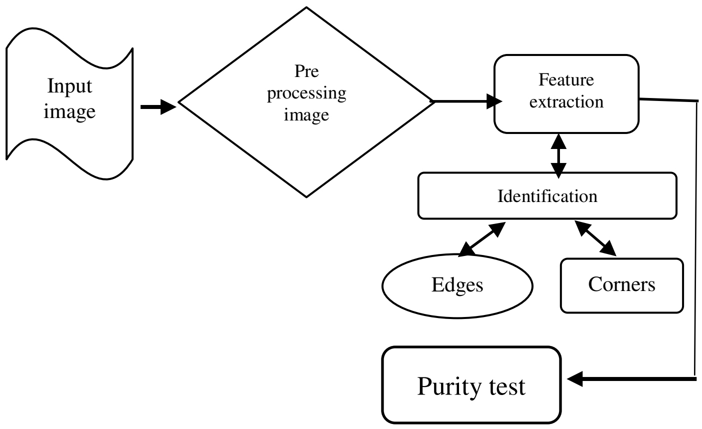
Training images are treated as computer learning inputs to understand the physical non-idealities. Test images are then treated as control inputs to test the proposed algorithm. Both training and test sets include unique healthy and defective image sets as shown in Fig. 1.



IV.THE PROPOSED SCHEME

The whole system can be summarized as in block diagram. There are the sequences of all algorithmic stages. First of all, image is captured in an uncontrolled environment, i.e. there is no professional control such as light, distance between a camera and the scene, blurring control, etc. so random seed bulk image can be captured freehandedly. Then, image is resized into any scale keeping the aspect ratio in mind. Depending on the image set type as training or test, data is tagged teaching it to the system. Color information actually is not included in the textural and morphological analysis. It is just saved during the tagging while the input data is labeled. Color can be used for future study in the decision of seed type classification in a hybrid system. Test images are not treated in the context of color information yet.

Here we are using image processing techniques to find whether the seed is in good or bad condition. For image segmentation Thresholding method is used . For the classification SVM Classifier is used for checking the condition of seeds.



BLOCK DIAGRAM

V . MATERIALS AND TEST RESULTS

This section presents the test results of the proposed scheme together with database details. All the tests were handled in MATLAB R2015a environment. The machine in which code of algorithm runs has 64-bit Windows 8.1 operating system featured with 2.7 GHz processor and 8 GB

RAM. Details related to machine can be meaningful for future performance analyses..

C. *Database*

Different kinds of seeds provided from seedsman were separated into two discrete sets for each: healthy and defective sets. Defects are assumed as non-ideal physical changes on seed structures such as
germination,rottenness, excess moisture on the surface, bug infestation and its damage.
Moreover, database was constructed in an uncontrolled environment. Lighting was ordinary and the image acquisition was handled both in daylight and after the sun down by using florescent light in the laboratory. There were two different types of cameras to capture the seed bulk pictures: SONY DSC-W380 and Samsung Galaxy S8. The first has 14 MP and the second smartphone has 13 MP camera that both give ~4000x3000 resolution. The reason why there were different cameras is to makeproposed algorithm as independent as possible from the devices. Resized images were in 400x300 pixels.

AFFECTED SEEDS

Fig1:Input image –Take the image of the affected seeds

Fig.2: Gray image – Convert image as gray image

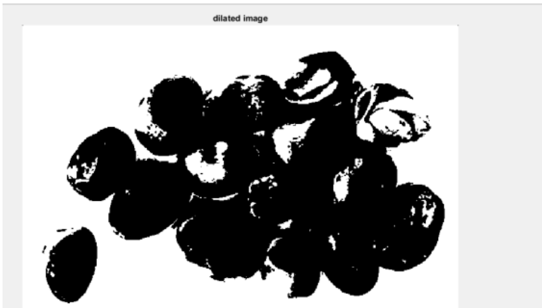


Fig.4:Binary image – Gray level image is converted to binary image

Fig.3:Sharpened image – The gray image must be sharpened for a good vision

Fig.5:Dilated image – Developed binary image

Fig.6:Segmented image – After developing of dilated image we will get the segmented image in which the affected part will be of black color and non -affected part will be of white color

Here there are two sets 1.Training sets
2.Testing sets

1. Training set : In this training set only healthy seeds are used.
2. Testing set: In this training set both affected and healthy seeds are used

A)The code and steps are same in both sets but in training set after all steps like pre –processing,image segmentation, feature extraction the database will be collected or stored.

B)In testing set we will undergo all steps for both affected and healthy seeds but this testing set is used for preprocessing and image segmentation like removing noise and dissimilarities in the image.

C)At last by using matlab we will run the code in that the data stored in the training set and the classification done in the testing set will be compared

And if we give the input it will say whether the seed is affected or healthier.

HEALTHY SEEDS

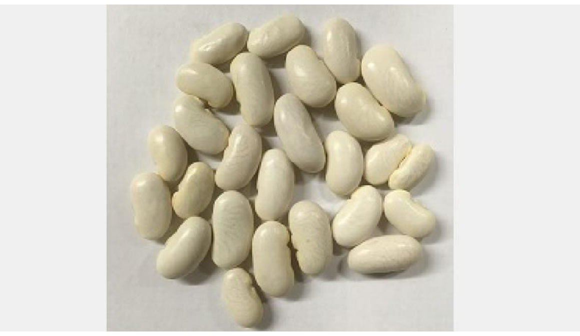


Fig.1;Input image –Take the image of the affected seeds

Fig.2:Gray image – Convert image as gray image

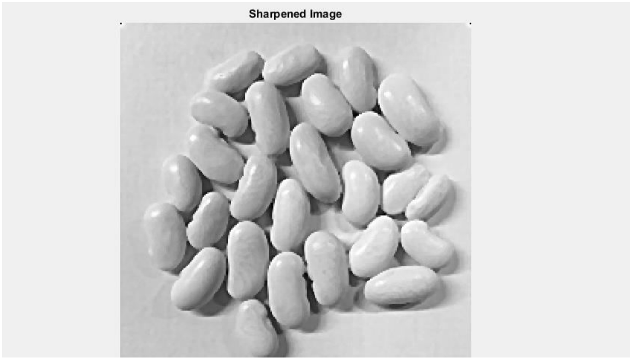


Fig.3:Sharpened image – The gray image must be sharpened for a good vision

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3.FEATURE EXTRACTION :

- After the pre-processing we have feature extraction
- In this feature extraction we have to create greylevel co-matrix
- The output from the image segmentation steps had been taken as a input to the feature extraction step , The features had been extracted like area , perimeter.
- We will caluculate quality and texture value from the segmented image
- This has been stored in a database for further classification of seed.

4.CLASSIFICATION:

1. The features obtained from the above steps are taken into account for the classification of seed.
2. The measures of each seed is taken for the staging process.
3. After all the above steps the quality of seed is determined.

VI. CONCLUSION

Agricultural seeds are important raw material for human nutrition and the continuity of life. Nevertheless, in the not very well cared storage conditions, seed structure can change immediately due to being predisposition towards germination, rottenness, and bug infestations. This research draws a conclusion to discriminate defective seed images from healthy ones or vice versa over 90% accuracy. Even though the pictures in database were captured in an uncontrolled environment with non-professional image acquisition techniques, performance of the proposed scheme was successful. 93.8% of accuracy yielded for inspection of defective seed images in the database was obtained and 90.9% was for healthy seed image determination. Moreover this work has been completed with an importantoutput: the special open access database. For further studies , a new database was presented for the usage of other researches . Especially for germinated and bug infested images, only for these they are going to be save the time and effort because of the cycle of germination and infestation processes.To conclude, obtained accuracy rates are said to be successful for non-professionally captured images without any calibration on light, blur, shadow, distance, and so on. For further researches, color information is to be added to obtain a hybrid approach

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