Machine Vision Based Automated Object Sorter Using Digital Image Processing MATLAB

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***Abstract*— Automation is need of future. Machines are replacing humans everywhere as they are fast and efficient than humans. Many industries lack in skilled labour and because this their efficiency also hampers. Sorting of object is one the basic work done in almost every kind of industry. Physical sorting depends upon colour, shape and other physical attributes of the object. This work represents the machine vision based object sorter. A Camera is used to give machine vision to the project. Camera takes the picture of the object on conveyer belt and passes this image to PC for the further processing using MATLAB. MATLAB does the required Colour Processing of the received image using Digital Image Processing tool box. Colour is most important feature of an object. Color of a living thing holds vital information about quality of object. Here Digital Image Processing is used to get colour related information of the object. Object sorting and the grading of the object is done on the basis of its colour. MATLAB used for colour processing of the image. RGB and HSI colour models along with histogram plotting used for plotting and analyzing the colour of the image.**

Keywords— Digital Image Processing, Colour Processing, RGB, HIS

I. INTRODUCTION

Digital image processing has a history going back over 35 years and colour has been part of that history for at least 25 years. In Digital image processing images are captured, transmitted, and processed in digital form. Digital image processing is one of division in electronic area where image being modified to pixels, stored in a digital storage and processed by computer. In effect, it reduces cost increasing computational speed, and flexibility. The core task of digital image processing is storing images and enhances them to the new information structures, so as to provide a better basis for obtaining and analysis of related activities. In addition, digital image processing leads to enhancement of image features‟ interest and therefore useful information about the scene from enhanced image could be computed. Digital image processing, extract information of an image for processing and analysis task. After taking the digital image from the digital camera, the system transferred to a computer for processing and storage by using different processes such as image capturing, image digitization, noise filtering and feature identification. Now a day, Digital Image processing has been applied to medical diagnosis, weather forecasting, food quality control and galaxy monitoring. Among the famous technology that applies image processing technique is Face Recognition.

II. COLOR PROCESSING

Colour of an organic material gives vital information about that material. Colour Features Colour analysis in this project is based on the RGB Colour Space and HSI colour spaces.

a) RGB Colour Space:

This colour space is commonly used and human eye can also perceive it. The colour of any object is made from three primary colours these are Red, Green and Blue. Other colours are made from primary colours that is, the mixture of 2 or more primary colour gives the full colour spectrum. RGB colour space based on the primary spectral components of red (R), green (G) and blue (B).

b) HSI Colour Space:

HSI that is hue (H), saturation (S) and intensity (I)gives the colour description in terms that are practical for human interpretation. Hue, Saturation and Intensity of the colour objects are perceived and described by human eye. Hue gives the measure of distinct colour of the spectrum such as red, green, yellow etc. Saturation is a measure of the degree to which pure colour is diluted by white light that is richness of pure colour. Intensity is the brightness subjective descriptor and impossible to measure. The Intensity of HSI model decouples the intensity component from the colour carrying information (hue and saturation) in a colour image. HSI is the gives the best results and compared to RGB colour system because in RGB colour system provide three separate coordinates RED, GREEN and BLUE which is not efficient for colour perception and image processing than compared to HSI mode.Whereas in HIS modal only hue (h) can give the colour perception. As a result HIS

model is known as the most ideal tool for developing image processing algorithms. Hence it is proved that HSI is efficient in examining of organic products and other coloured objects because

- HIS models can separate intensity from the colour information which gives chromatic purity of the coloured object
- Hue and Saturation components are intimately related to the way in which human being perceive colour.
- Hue of the colour does not depends upon the light intensity.

III. FEATURE EXTRACTION AND FORMULA USED FOR CALCULATIONS

Here we are extracting the Red, Green and Blue colour from the OBJECT DATA image and predicting the age of OBJECT DATA. As mentioned above the percentage of green colour in the OBJECT DATA vanishes with its age. Firstly, we are calculating the percentage of green colour in the image of OBJECT DATA. After calculating the percentage of green colour present in the image in RGB colour system, we are converting the RGB colour system into HSI that is, Hue, and Saturation and Intensity foe better prediction. RGB data is first converted into HSI data. With image representation in the HSI domain, the colour analysis was based on primarily the Hue value. Hue is a colour attribute that describes a pure colour, whereas saturation gives a measure of the degree to which a pure colour is diluted by white light and finally intensity gives the effectiveness of the colour. The three Dimensional RGB space is reduced to a one-dimensional „H" Space for colour analysis. For a Digitized colour image, the Hue histogram represented the colour components and the amount of that Hue in the image. In this paper we are taking three images (Image1, Image2, Image3) or OBJECT DATA at different instances of time. The Image1 is taken after 6 weak of sowing OBJECT. Image2 is taken after 14 months of sowing and the Image3 is taken after 18months older. The OBJECT DATA requirement changes with the time and at the age 6, 14 and 18 weeks the DATA show maximum transition in the requirement. So, by knowing this development phase of OBJECT DATA farmer can cultivate better yield.

Mean of Red, Green and Blue colour components obtained by using Digital image processing in MATLAB. Mean of Red, Mean of Green and Mean of Blue colour components is represented as R, G and B respectively. This computation helps to comprehend the most dominant primary colour of the image

Formula used for calculations

Percentage of red colour in RGB modal

R=R*100 /G+B+R

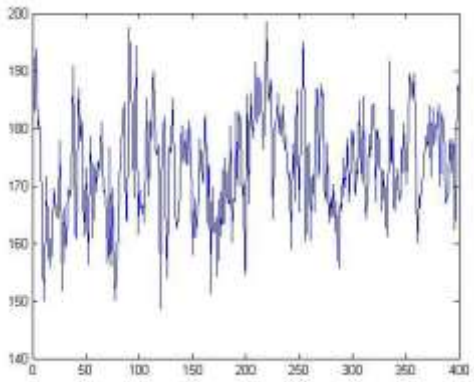
Hue,H

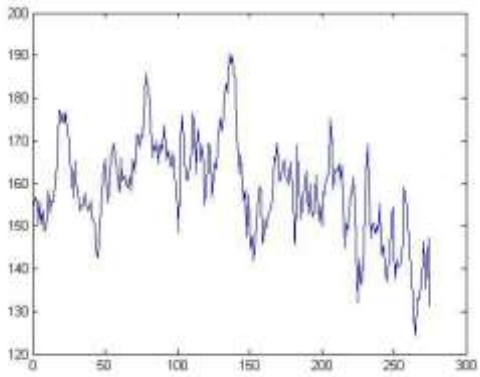
Tan H=3(R-B)/2G-R-B

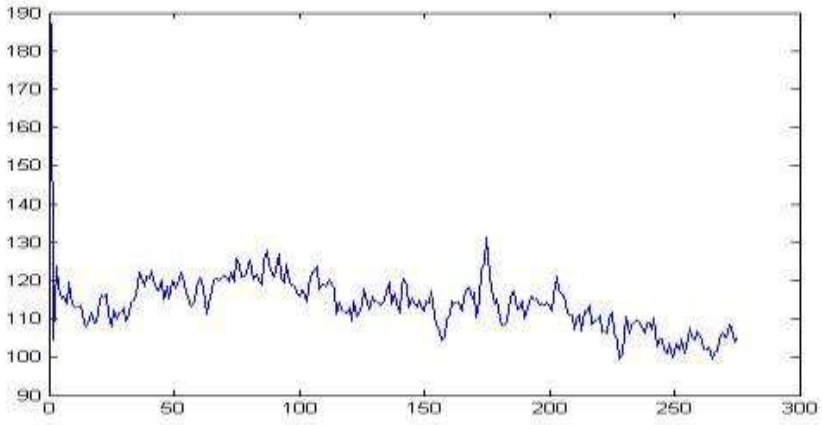
S,=1-3/R+G+B[min(R,B,G)]
I=1\3(R+G+B)

IV. RESULT AND DISCUSSION

The red colour present in the three images of object data is separated using Digital image processing following images show the content of red colour present in images object.







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VI. CONCLUSION

Good yield of a DATA species is dependent upon critical growth stages so that the plant can capitalize on favourable weather periods during the growing season. An understanding of how DATAs respond to environmental stresses at different stages of growth can assist in the assessment of DATA condition and production potential throughout the clutivating season. In this paper we have taken three different image of object DATA during different intervals. Certainly images were taken when the DATA‟s nutrition demand changes that is, Demand of fertilizer and other nutrients changes with growth of DATA. Supply of fertilizers and nutrients on the basis of DATA age can lead higher yield. Using Colour processing of Digital image processing the age of object DATA is found and necessary action can be taken according to age of DATA. Judging the maturity of object DATA can be done.

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