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Image Analysis and Classification of Flower Using Machine Learning Algorithm for Creating Organic Color

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Abstract- This paper presents a mechanism for flower species identification using machine learning's regression algorithm. The main objective behind this proposed approach is to utilize flowers and garlands contributing towards the waste management of temples in rural as well as urban areas. The proposed approach provides both social and environmental aspect as the waste flowers can be used for vermicomposting to improve the quality of soil as well as the other types of flowers and can be used for creating organic colour and dyes.

Keywords- Flower Species Identification, Machine Learning Algorithm, Regression Algorithm.

I. INTRODUCTION

In rural and urban cities, increase in the number of auspicious and inauspicious functions have led to the increase of flower waste. The waste generated at temples is presently piled at one place and then thrown on a land. so it is very harmful to the environment such as flowers are thrown to the river, land, etc. so this garbage can be utilized for creating an organic color and dye that is the best way to avoid the pollution, also that garbage can be used as a vermicomposting that can be utilized for the agriculture. the quality of soil is useful for farmers & employment can be used in rural areas.

Sorting of objects is necessary in industries where products are manufactured on large scale. This process is simplified by automation. The proposed color detection system, which is using the concepts of image processing implants by machine learning techniques. Objects are classified based on different characteristics like shape, color.

The main aim of this project is to classify objects based on their colour. Color based sorting is used in many industries like crayon color factory, agricultural machineries like rice sorter, beans sorter, peanut sorter etc.

II. RELATED WORK

Identification of objects moving on conveyor belt is performed in industries especially in production line, are sorted based on their size small (S) or medium (M). [4] Similarly, in this project flower identification is done using camera and HSV (hue saturation value) technique. Even a flower waste management system is implemented which helps in separating the flowers which are the waste product and further utilizing it in vermicomposting and for making organic color. [5] These waste products of flowers are also used for making dyes which are used in various materials such as candles, fabrics and in textile industry.

The above-mentioned method of identification of flower is done by implementing an arm for pick and place application Intelligent object sorting insolent system (IOSIS) uses regression algorithm and it updates database over internet for monitoring of operation in all these existing systems color detections is performed using based on RGB color model. [6] RGB colour model represents colour in red (R), green (G) and blue (B) components. The main mini CPU that is used for controlling all the actions is Raspberry Pi, which after the detection of the objects sends the data to the computer. It also controls the conveyor belt which further distributes the flowers according to their respective colors.

III. METHODOLOGY

The pick and place arm is a mechatronics system that detects the flower on the conveyor belt, picks that flower from source location and places at different location. For detection of flower, infrared sensors are used which detect presence of flower as the transmitter to receiver path for infrared sensor is interrupted by placed flower. As soon as pick and place arm receive the signal from the Raspberry Pi, picks it with arm and places it on the respective destination depending on the respective color of the flower that is red, orange and blue. The system uses Raspberry Pi as its controller for performing different operations by the arm. [1]

IV. LITERATURE SURVEY

To diminish human endeavors on mechanical distinctive kinds of pick and spot arms are being created. These arms are excessively expensive and complex because of the multifaceted nature and the manufacture procedure. The vast majority of the arms are utilized for pick and spot of the article. In electronic structure the particular of the engines, sensors, control components are to be considered.

Pick and spot arm which is utilized to play out all the fundamental exercises like grabbing objects and setting them. The arm cooperate with its by methods for arm and holding module however there is no sensors. Camera is accessible as an embellishment and there is no basic sensor which is joined to it however we have appended IR sensor for identify the item. [2]

V. EXISTING SYSTEM

Shading is the most well-known component to recognize protests by arranging, perceiving and following. This innovation can be utilized in material dealing with in coordinations and bundling industry where the articles traveling through a transport line can be isolated utilizing a shading distinguishing robot. Another framework isolates the article from a set, in light of their shading. It points in characterizing the article by shading, estimate, which are set on the transport line by picking and setting the items in the ideal spot human accomplishing exactness and speed in the work. Shading arranging frameworks in isolating pastels, utilizes visual shading coordinating or shading arranging systems. [3]

VI. PROBLEM FORMULATION

In object sorting systems color detection is based on RGB colour model. RGB color model is a three channel model in which combination of red, green and blue defines a specific shade. These values changes with illumination resulting in erroneous operation.

VII. PROPOSED SYSTEM

This system which uses low cost and open source software for achieving the goal of sorting objects. Proposed system uses Raspberry Pi using Raspbian operating system, low cost USB camera and Open CV for sorting. Open CV is a software library for real-time computer vision. Open CV helps to analyze image and video efficiently. Initially color detection was based on RGB color model but it is not efficient as RGB color density varies drastically for different colors. The proposed system uses HSV color model for color detection of objects. With the images captured from USB camera, colors of objects are identified using machine learning's regression algorithm. This detected color is used as object sorting parameter by Raspberry Pi. This paper analyzes image processing algorithm for color detection using HSV model. HSV indicates Hue (H) Saturation (S) and Value (V) of color. [7]

OBJECTIVE

1. To make the way toward arranging the material, this pick and spot arm is being planned.
2. In some of businesses use labour to exchange the material structure one spot to other by rehashing this for a timeframe it will make wounds an administrator.
3. The utilization of this robot make the work straightforward for the administrator, and never again to twist and lifts up the materials, this lessen the reason for wounds to the administrator and expanding the work productivity.

COLOR DETECTION TECHNIQUE

Color offers leading information about objects. Several color models are available such as RGB color model, CMYK color model in RGB model uses primary colors. CMYK represents secondary colors Cyan(C), Magenta (M), Yellow (Y) and Black (K). In proposed method color image is analyzed in HSV model point of view. HSV model are explained as follows:

HSV COLOR MODEL

The HSV colour space has the following three Components-

H – Hue (Dominant Wavelength).
S – Saturation (Purity / shades of the colour).
V – Value (Intensity).

Hue (H) defines the colour itself. Saturation (S) is the amount of gray from zero percent to 100 percent in the colour. The value (V) Component captures the amount of light falling on it thus it changes due to illumination changes. HSV uses only one channel to describe colour, making it very intuitive to specify colour as shown in figure 1. [8]

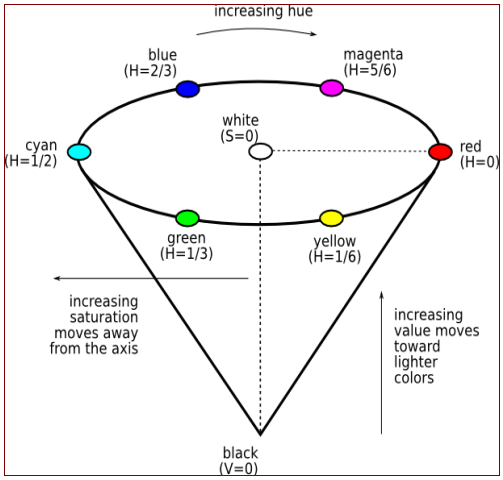


Figure 1. HSV colour space

PROPOSED SYSTEM AND WORKING

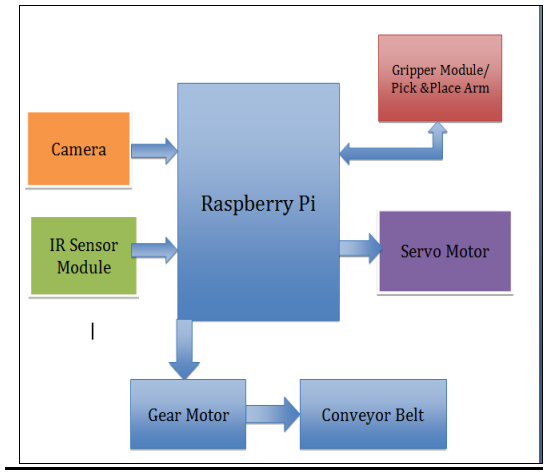


Figure 2. Architecture of Proposed System

Figure 3. Working System Model

- As show in the above figure 2 and 3, USB Camera is connected to the Raspberry Pi.
- USB camera will act as the computer vision for object sorting based on color.
- Pick and Place Arm is connected to the raspberry pi, which will help in picking and placing and sorting the flowers.
- Connect power supply for Raspberry pi.
- Plug the HDMI cable in Raspberry pi from the monitor using VGA to HDMI converter cable.
- Connect USB Mouse and USB keyboard to the Raspberry Pi.

HARDWARE

Hardware Requirement

Hardware used for project are as follows-

- Raspberry Pi
- USB Camera
- Conveyor Belt
- Servomotor
- IR Sensors Module
- Gripper Module

RASPBERRY PI

The Raspberry Pi is a series of credit card–sized single-board computers developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with Newark element14 (Premier Farnell), RS Components.

Figure 3. Raspberry Pi

USB CAMERA

USB camera or imaging camera that use USB 2.0 or 3.0 technology to transfer image data. This camera are designed to easily interface with dedicated computer systems by using same USB technology that is found on most computers. USB camera used in this project is B31508 shown in figure which supports USB2.0 technology, image resolution upto 20 Mega pixels and frame rate upto 30 fps (frames per second).

Figure 4. USB camera

CONVEYOR BELT

A transport line is the conveying vehicle of a belt transport framework (regularly abbreviated to belt transport). A belt transport framework is one of numerous kinds of transport frameworks. A belt transport framework comprises of at least two pulleys (now and then alluded to as drums), with an interminable circle of conveying medium—the transport line that pivots about them. Either of the pulleys are fuelled, moving the belt and the material on the belt forward

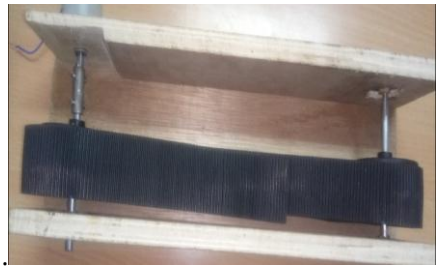


Figure 5. conveyor belt

SERVOMOTOR

A servomotor is a rotational actuator or straight actuator that takes into consideration exact control of precise or direct position, speed and quickening. It comprises of a reasonable engine coupled to a sensor for position input. It likewise requires a generally refined controller, regularly a devoted module planned explicitly for use with servomotors. Servomotors are not a particular class of engine despite the fact that the term servomotor is frequently used to allude to an engine appropriate for use in a shut circle control framework. Servomotors are utilized in applications, for example, mechanical autonomy, CNC machine.

Figure 6. Servomotor

IR SENSOR MODULE

These IR sensors are used to detect the presence of objects on conveyor belt in this project. The basic concept of an Infrared sensor which is used as obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

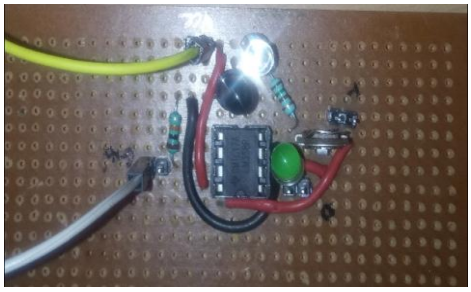


Figure 7. IR Sensor Module

GRIPPER MODULE

A gripper is a gadget which empowers the holding of an item to be controlled. The simpler method to portray a gripper is to think about the human hand. Much the same as a hand, a gripper empowers holding, fixing, dealing with and discharging of an item. A gripper is only one part of a mechanized framework.

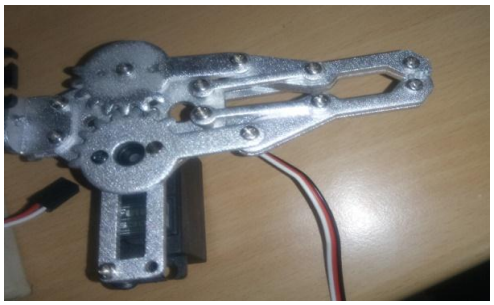


Figure 8. A Gripper Module

SOFTWARE REQUIREMENTS

PYTHON

Python is an interpreter, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object oriented, imperative, functional and procedural, and has a large and comprehensive standard library.

LIBRARIES

1. OpenCV

OpenCV (Open Source Computer Vision Library) is discharged under a BSD permit and thus it's free for both scholastic and business use. It has C++, Python and Java interfaces and supports Windows, Linux, Mac OS, iOS and Android. OpenCV was intended for computational productivity and with a solid spotlight on ongoing applications. Written in improved C/C++, the library can exploit multi-center handling. Empowered with OpenCL, it can exploit the equipment speeding up of the hidden heterogeneous figure stage.

Embraced all around the globe, Open CV has in excess of 47 thousand individuals of client network and evaluated number of downloads surpassing 14 million. Utilization ranges from intuitive workmanship, to mines assessment, sewing maps on the web or through cutting edge mechanical autonomy.

2. NumPy

NumPy is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays.

It is the fundamental package for scientific computing with Python. It contains various features including these important ones:

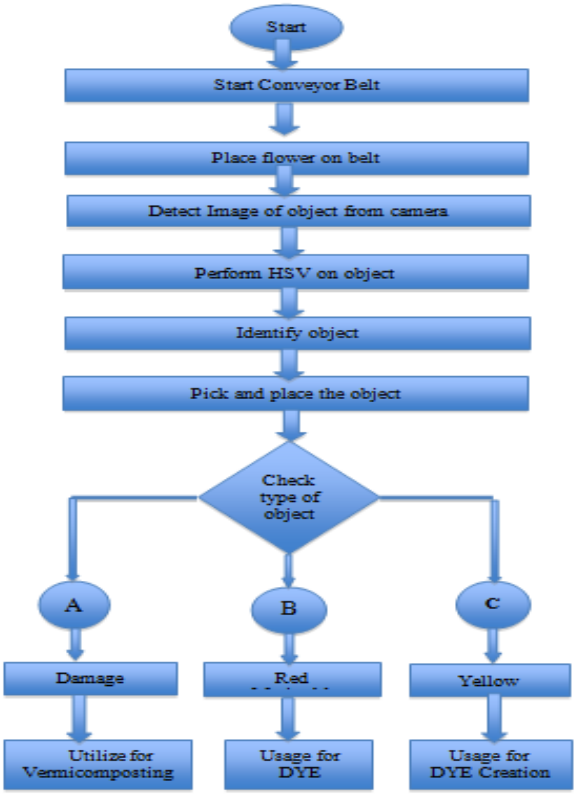
- A powerful N-dimensional array object
- Sophisticated (broadcasting) functions

- Tools for integrating C/C++ and Fortran code
- Useful linear algebra, Fourier transform, and random number capabilities

3. RPiGPIO

This library is basically used to interface the external components (like dc motor IR module) to the raspberry pi.

FLOWCHART



A. **To create database of object to be sorted**

1. USB camera connected to Raspberry Pi captures images of object.
2. The image is converted from BGR to HSV.
3. Hue component of some pixels are extracted from converted HSV image.
4. Average hue value is compared with lower and upper ranges of each colour.
5. Colour of object and its corresponding range is stored in database.

B. **To detect and sort the object**

1. Continuous images are captured using USB camera.
2. Hue component is extracted from image.
3. Hue component is compared with the database and colour of object is identified.
4. Control signal is generated to perform sorting operation.

ADVANTAGES

1) Less human interference
- Fast
- Accurate
- Good recurrence

2) Fully automatic operation

APPLICATION

- In nourishment industry to distinguish spoiled foods grown from the ground, in minor scale and enormous scale preparations, to sort the items built up on the few components.
- underway units to examine and recognize the deformities in crude materials.
- In leafy foods cultivating zones (provincial regions) where establishment of costly sorters is troublesome.
- In shopping centers (to isolate and isolate distinctive garments, toys, packs and so forth.) and in little shop.Sorting of the products according to their color.
- Counting of the number of objects passed and differentiated according to their color.
- Used in laboratories and workshops.
- Used in airports, museums and malls.

LIMITATION

- Only three coloured (red, orange and blue) objects were able to detect.
- The speed of the conveyor belt was not set according to its timings leading to slippage of the belt.
- The movement of the robotic arm was restricted to some extent only.

VIII. RESULT

We can clasiified the flower based on their colours if yellow flower detected by the camera then this flower we classified in 180 degree. if red flower detected by the camera then this flower we classified in 90 degree. if blue flower detected by the camera then this flower we classified in 135 degree.

IX. CONCLUSION

The objects are sorted out based upon the calculated color characteristics. We have used a Linux based board called Raspberry Pi, interfaced with USB camera to capture the images of the objects and store them. The stored images will be processed for calculating their color characteristics by using fundamental digital image processing techniques. The results will the pre-known values in the case of it's use in any industrial processes.

REFERENCES

[1] Rattan S.S. "Thoery of Machines", 3rd Edition, Mc Graw Hill pp.234-238, 2009.

[2] Goldy Katal, Saahil Gupta, Shitij Kakkar, "Design And Operation Of Synchronized Robotic Arm", International Journal of Research in Engineering and Technology, Volume: 02 Issue: 08, Aug-2013.

[3] Szabo R.; Lie I. "Automated colored object sorting application for robotic arms" Electronics and Telecommunications (ISETC) 2012 10th International Symposium on vol. no. pp.95 98 15-16 Nov. 2012.

[4] T. P. Tho, N. T. Thinh and N. H. Bich, "Design and Development of the Vision Sorting System", International Conference on Green Technology and Sustainable Development (GTSD), Kaohsiung. 2016.

[5] Yeow Khang Yung, ″Color Sorting System with Robot Arm'' Faculty of Electronic and Computer Engineering University Technical Malaysia Melaka, (2011).

6] P. P. Chavan, S. M. Kale, P. P. Gaikwad and S. M. Ghadge, "Intelligent Object Sorting Insolent System". International Conference on Pervasive Computing (ICPC), Pune. 2015.

[7] V. Pereira, V. A. Fernandes and J. Sequeira, "Low cost object sorting robotic arm using Raspberry Pi". IEEE Global Humanitarian Technology Conference - South Asia Satellite (GHTC-SAS), Trivandrum. 2014.

[8] Rafael C. Gonzalez and Richard E. Woos, "Digital Image Processing", third edition vol.3. 2003

