



DETECTION OF BIODEGRADABLE AND NON-BIODEGRADABLE WASTE BY COLOR IMAGE PROCESSING

Vipin Khanorkar

M-Tech 2ND Year (Communication), YCCE, Nagpur

Corresponding Author's E-mail ID: vipin.khanorkar26@gmail.com

Abstract:

First step of waste management system is mainly the separation of biodegradable and non-biodegradable waste. It has to be done before recycling, reuse and waste disposal. Hence, separation of biodegradable and non-biodegradable waste becomes important task. It should not only be done correctly but also quickly. But, as it is done manually. It is quite time consuming and inefficient sometimes. This paper aims at replacing manual methods of separation of waste with the modern computer vision based technology. Computer vision systems are widely used now a day for various object detection and object tracking methods. One of the methods for separation of biodegradable and non-biodegradable waste is discussed in this paper. This method uses color as parameter for separation for specific non-biodegradable objects from biodegradable objects. It is applied on the image containing biodegradable and non-biodegradable waste. Image results are shown and discussed.

Keywords: *computer-vision, color image processing*

Introduction:

Waste management is becoming more and more crucial day by day. Proper recycling, reuse and disposal of both biodegradable and non-biodegradable waste is important. For any process the first step is mostly separation of biodegradable and non-biodegradable waste. This work is done manually and it is quite time consuming as well as it involves human error and inefficiency. It also affects the health of worker causing severe diseases and disorders. Hence, this work should be done with the help of technology and corresponding system should be used. Computer vision systems can solve this purpose. Computer vision systems have image or video acquisition system as input, which take either continuous images or video of the target. This images or videos are processed with the help and of various image and video processing systems and corresponding output is delivered. This output may be of object tracking, detection of object and else. Such computer vision





based system can be easily used for separation of biodegradable and non-biodegradable waste. General model for such system can be as follows-----

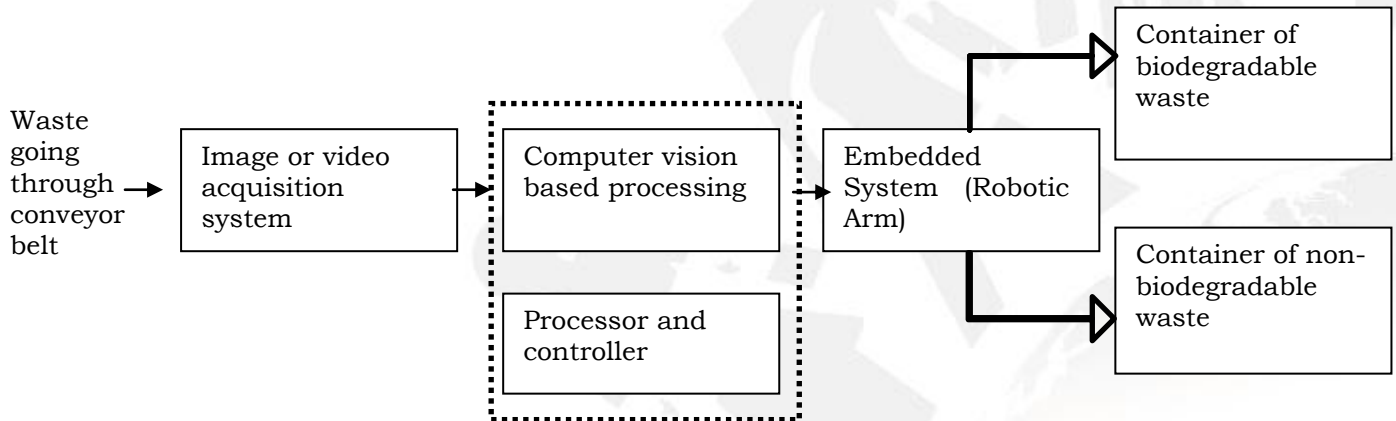


Fig. Computer vision and embedded system model for waste separation

In such computer vision based system, waste will go through conveyor belt. Images or continuous video if that waste is taken. By the application of computer vision based algorithms and real time processing robotic arm will separate the biodegradable and non-biodegradable waste. This system is comparatively faster than manual method of separation of waste. One of the methods for separation can be color based method. Suppose the waste material contain white color plastic glasses, spoons etc. then this can be separated with color image processing technique. Another separation method can be texture based where biodegradable and non-biodegradable objects have different texture. Hence, classification algorithms can be based on color, texture, size, shape etc. In this paper color based algorithm for separation of biodegradable and non-biodegradable waste is discussed. This paper focuses on computer vision based processing block of above mentioned model.

Problem Definition:

Image containing biodegradable and non-biodegradable waste is taken. Aim is to detect biodegradable as well as non-biodegradable objects in the image with the help of color image segmentation method.

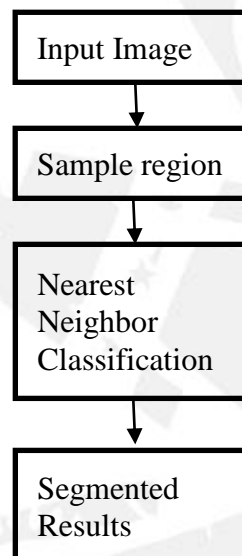
Methodology:

Algorithm is based on color based segmentation and classification of pixel on nearest neighbor rule. This is executed in MATLAB and input





images as well as results are shown. Analysis of results obtained is done in conclusion section. Following is the algorithm for color based segmentation applied on the image.



Sample color spaces are calculated first and pixels are classified according to nearest neighbor classification method.

Applications:

With the help of this technique biodegradable and non-biodegradable objects can be separated by proper programming of embedded system and computer vision system. This method can also be used for calculating percentage of presence of biodegradable and non-biodegradable waste in given sample approximately. This model is useful for quick and efficient sorting of waste.

Conclusion and Future Scope:

Results obtained after segmentation of image can be further improved by using color markers and various region merging techniques. Texture, size and shape based methods can be implemented assuming that biodegradable objects and non-biodegradable objects present in given sample of waste has different color, texture, size and shape.

References:

- en.wikipedia.org/wiki/Wastemanagement
- Digital Image Processing-Gonzalez,Woods,
- <https://www.wm.com>
- Matlab (Image Processing Toolbox Demos)

