Shape Damaged Detection Using Edge Matching

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ABSTRACT

In this paper, a method of detecting Shape based on image edge morphologic analysis and Hue Matching Method was proposed. The Noise filter, enhancement and Edge Contours were adopted to pre-process the image and a novel image coding method based on relative direction coding was presented as well. Furthermore, an improved method based on image edge morphologic analysis was proposed, which can analyze the image edge with large quantities. The experimental results show that the approach to detecting Shape is effective and practical.

Keyword : *Shape Detection, Morphology, Hue Edge Matching Algorithm.*

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1. Introduction

Edge detection is a process of locating an edge of an image. Detection of edges in an image is a very important step towards understanding image features. Edges consist of meaningful features and contain significant information. It significantly reduces the image size and filters out information that may be regarded as less relevant, thus preserving the important structural properties of an image. Most images contain some amount of redundancies that can sometimes be removed when edges are detected and replaced during reconstruction. This is where edge detection comes into play. Also, edge detection is one of the ways of making images not take up too much space in the computer memory. Since edges often occur at image locations representing object boundaries, edge detection is extensively used in image segmentation when images are divided into areas corresponding to different objects [1].

II. Method Description

The methodology for this study consists of two major stages. The stages are pre-processing, Detection and matching process. The pre-processing stages includes the processing of image which is captured by using digital camera until obtaining specific part of an image. Next step is the Detection where the Image is detecting shape based on edge Matching using the contour tracking method. Finally matching process is applied to Detecting the Image from the `extracted image with real Image. The basic process of image processing technique is depicted by block diagram in Fig 1.

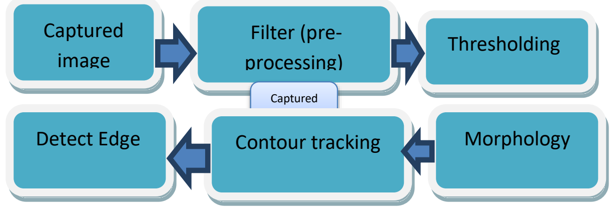

Fig.1 Edge Detection Work With Opencv

A. Collection of image

In this study, samples of image captured using digital camera will be created and checked for the quality of the samples such as clear image, less disturbance and good view of image. If the image is accepted, the image will be analysed in OPENCV by applying image processing technique. If the image is rejected, a new image will be taken. The process will be continuous until obtaining a good image before proceeding to the next steps. In order to process image**,** image processing toolbox will be used for pre-processing and filtering image.

B. Image Pre-Processing

1. Image-Filter

The original images usually contain some kinds of noises. These noises would bring with many side-effects for precise recognition. We need the filter to de-noise the original images. We here adopted Threshold Switching Median Filter (TSMF) to filter bearing's image [2] [3]. The filtered image is shown in the Figure 2. Image edge enhancement is essentially a kind of filtering method. The purpose of it is to highlight the component edge and flaw area, and help locate the bearing area and enhance the optical characteristic. We finally effectively enhance image edge with Sobel algorithm [4][5].

2. Thresholding

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images.

The simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity $I_{i,j}$ is less than some fixed constant T (that is, $I_{i,j} < T$), or a white pixel if the image intensity is greater than that constant.But it may not be good in all the conditions where image has different lighting conditions in different areas.

In this study, we are used adaptive thresholding method.In this, the algorithm calculates the threshold for small regions of the image. So we get different thresholds for different regions of the same image and it gives us better results for images with varying illumination. In Gaussian adaptive threshold method, threshold value is the weighted sum of neighborhood values where weights are a Gaussian window.

C. Mathematical Morphology

Mathematical morphology (**MM**) is a theory and technique for the analysis and processing of geometrical structures, based on set theory, lattice theory, topology, and random functions. MM is most commonly applied to digital images, but it can be employed as well on graphs, surface, solids, meshes and many other spatial structures.

Fig 2: Original image.

Topological and geometrical continuous-space concepts such as size,shape, convexity, connectivity, and geodesic distance, were introduced by MM on both continuous and discrete spaces. MM is also the foundation of morphological image processing, which consists of a set of operators that transform images according to the above characterizations.

MM was originally developed for binary images, and was later extended to grayscale functions and images.

D. Contour tracking

Contour tracing is one of many preprocessing techniques performed on digital images in order to extract information about their general shape. Once the contour of a given pattern is extracted, it's different characteristics will be examined and used as features which will later on be used in pattern classification. Therefore, correct extraction of the contour will produce more accurate features which will increase the chances of correctly classifying a given pattern.

The contour pixels are generally a small subset of the total number of pixels representing a pattern. Therefore, the amount of computation is greatly reduced when we run **feature extracting algorithms** on the contour instead of on the whole pattern. Since the contour shares a lot of features with the original pattern, the feature extraction process becomes much more efficient when performed on the contour rather on the original pattern.

E.Feature Extraction

Feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction.

When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a feature vector). Determining a subset of the initial features is called *feature selection*. The selected features are expected to contain the relevant information from the input data, so that the desired task can be performed by using this reduced representation instead of the complete initial data.

Fig.3 Flow Diagram of our Detection Steps

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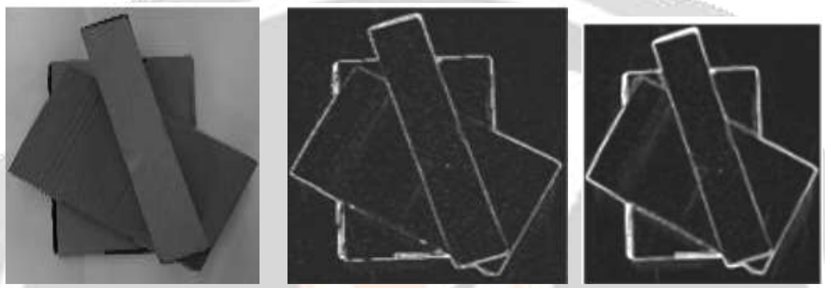
F.Shape Detection

Shape Detection using Histogram Equalization Algorithm. Histogram equalization is a point process that redistributes the image's intensity distributions in order to obtain a uniform histogram for the image. Histogram equalization can be done in three steps:

Step-1:-Compute the histogram of the image
Step-2:-Calculate the normalized sum of histogram
Step-3:-Transform the input image to an output image.



Original Image **I**mproved morphology The Proposed Method

Fig.4 Results of Proposed Method

III. Conclusion &future work

In this dissertation focus on the Detection of Shape using edge matching Moments and Contours Compare with any 360D angle Rotation. The final accuracy reaches as high as 90%.

In Future, detect the Multiple Shape in same time using scaling Variants

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