

Analysis of Geometric Distorted Shape for Retrieval From Database

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Abstract—in this paper we provide analysis for shape retrieval using Feature point extraction. It provides detail analysis of how system works for shape retrieval from the databases of countable number of shapes. The human visual system retrieves distorted shapes from complete database in the real world, and it has inspired a lot of computational methods of retrieving shapes. To match retrieve shapes from the observed shapes are decided to be alike or unlike remembered shapes in memory. To compare the observed and remembered shapes, they must be appropriately represented so that matching can be done appropriately. For this reason, the shape retrieval process needs a appropriate shape representation as well as shape mapping methods. Moreover, the shape representations should be normalized before the mapping process. Correction process for representations under unpredictable conditions has not yet been established. In this paper, we propose a shape retrieval method that enables us to retrieve shapes under unpredictable conditions with a suitable process. Using curvature partition and angle-length profile, our shape retrieval method normalizes the shape representation. As a result, unlike the previously proposed methods, geometric distortion, and differences in image resolution occur simultaneously.

Keywords—*Shape matching, Feature Point, scaling factor, geometric distortion, shape recognition etc.*

I. INTRODUCTION

The real world is an unpredictably and dynamically changing environment. The human visual system always encounters unpredictable shape, since most visual shapes are incomplete. This incompleteness concerning visual shapes derives from (1) geometric distortion, and (2) differences in the resolution of images. However, even if occlusions and distortions such as changes occur in shapes with low resolution, humans can still predict the original shapes by using their knowledge as well as memory. With the ability to predict complete shapes with the incomplete information, we detect and classify objects such as animals, plants, and landmarks [1]–[3]. Complete shapes must be retrieved from incompletely described shapes affected by occlusion, also by

geometric distortion, and differences in image resolution. Such a retrieval will be successful if the shape representations describe the incompletely observed shapes and if the observed shapes are appropriately mapped to shapes in memory the point correspondences are appropriately solved. Thereby, the incompletely observed shapes can be appropriately matched to shapes in memory and it can be decided if they are same or not. For this reason, the task of shape retrieval will require appropriate shape-representation and shape-mapping methods. the shape retrieval methods should appropriately normalize the shape representations in the system on completely described whole shapes. In such situations, there are normalizations taken place using geometric transformations based on the centroid [4]–[8] or the whole contour of the shape [9]–[10]. Here, completely observed shapes are described with closed contours, whereas shapes affected geometric distortion, and differences in image resolution are shown as roughly described open contours. The previous methodologies have tried to reconstruct whole shapes from incompletely described ones. For example, some methods use T-shaped intersections, as “cues” for reconstructing shapes. Although these completion mechanisms are used for human visual system, they are still sometimes inadequate for representations of incompletely described shapes always have enough capability for our visual system to reconstruct complete shapes. Moreover, a normalization for representations of incomplete shapes observed under unpredictable conditions such as geometric distortion, and differences in resolution of images occur simultaneously has not yet been established. retrieval have been proposed based on hierarchical neural network models. These models rely on the fact that the shape representation is formed through a visual that hierarchically integrates the stimuli caught by the retinal cells by using cortical cells which have receptive fields of different sizes. These neural network models, however, do not accomplish suitable normalizations for the constructed shape. Fukushima’s model and Poggio’s model, for example, reconstruct the neuron’s hierarchical receptive fields [1], [2], [3], [4]. Using these neurons, they hierarchically integrate the pixels of input images, and to recognize the pattern of the

images with the neurons of the deepest layer. Although these models reconstruct the pattern of the neural network well, they do not include any normalization process for the shape representations.

normalization since locally described structures can be normalized with local information however, the geometric relationships of the integrated features and they do not have normalizations for the shape representations as the result of a geometric transformation. there are many computational shape retrieval methods . These can roughly be classified into two feilds, one of which uses shortest path searches for finding the correspondences between a series of points on the contours of incomplete shapes and those of the whole shape [1], [2] the other of which uses for finding the correspondences between feature points on the partial shapes and those of the whole shape Using the order of the points or the geometric relationship among the feature points, these methods excel in finding the point correspondences between two shapes. However, the previous studies only focused on identification of unknown shapes the normalization for the shape representation. Unless the features of the shapes are compared properly, the similarity of the corresponding points cannot be determined even if the shortest path is found. of the shapes are well extracted, the geometric relationship between two shapes would be differnt even if they are geometrically look same. For example, the curvature representation is noramally used to describe a series of contours on shapes [7] Curvature itself, however. It is true that the curvature representation can be normalized if the whole shape is completely observed.

II. EARLIER WORK AND OUR APPROACH

If one wants to derive descriptions of undistorted curves such that properties of the type mentioned above are explicitly represented, description of overall shape. Hence some modifications and smoothing for shape must take place. This goal is important for recognition and for finding proper structure. Secondly, there is a need for high precision detection of certain characteristics. Earlier we mentioned straight line segments, comers, angles, parallelism, and symmetry and their projections from 3- to 2-D. Recent survey on shape structures has been addressing these problems by investigating multiscale representations. Based on proposed work introduced the notion of different representation. In this approach one assumes a one-parameter family of representations of a shape, ihe parameter being scale. Witkin suggests that one first smoothes the signal with a mask of variable size and then looks for structures which are stable over scale. In this approach one considers a one-parameter family of representations of a shape, the parameter being scale. the signal with a mask of variable size and then looks for structures which are stable . Particular emphasis is given the problem of tracking the structures as the scale varies from coarse to fine. Then this problem has been given more precise solutions for image contours . Witkin [11]looked at waveform but the approach applies to planar contours in general. Mokhtarian and Mackworth , apply Gaussian smoothing in this case. However, they smoothed the coordinate functions separately, which led to some unreasonable effect. In they are tried to avoid these by renormalizing the curvature. However, the Gaussian smoothing has the effects of shrinking closed

convex curve. Lowe [16] suggested a compensational mechanism for this problem.

We will illustrate the algorithm in detail .First of all, when our so-called curve should be separated. The two end points of a curve are both corner points. We connect these two points with a straight line and calculate the maximum distance from the curve to the line. If the length of the curve is larger than a given tolerance Tol1 and the maximum distance over the length is larger than another given tolerance Tol2 then the curve needs to be separated. Also, our separating technique is a so-called "incremental and detrimental distances evaluation". If the curve is to be separated, then we apply the technique. The incremental and decremental distance evaluation technique calculates the vertical distances from all the significant points in the curve to the line. We sequentially compare the differences of adjacent pairs of these distances and recorded the number of increases and decreases. A boundary point p is said to be at a "local maximum or minimum" if there are sufficient number of increases (decreases) before p and enough decreases (increases) after these local minima and maxima are the second kind of feature points. After performing the separating process, all this possible feature points will be found. In Fig. 3.2, point a and point b are the starting point and ending points of the curve {a, b} respectively. We will find the possible feature point's c and d sequentially by using the separating technique

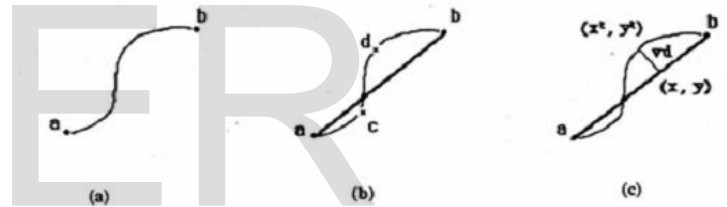


Fig. 2.the feature points of the second form.

- (a) Points a and b are feature points and two end points in curve (a, b).
- (b) Points c and d are the feature points we want to find.

(c) The vertical distance between the point in the curve and the straight line is vd.

Suppose (x₁, y_a) and (X_b, y_b) are the coordinates of a and b respectively. The slopes of the line is (ya-yb)/(xa-xb). Now we want to show how to calculate the vertical distance from the point in the curve to the line. Let (xt,yt) be the coordinate of the point on the curve and (x, y) be the point on the straight line such that the distance between (xt, yt)and (x, y) is the minimal distance from (xt, yt) to the line. Coordinate (x, y) & the vertical distance vd from (xt, yt) to (x,y) are computed as follows :

$$y = (ya + slope * (x^t + y^t * slope - xa)) / (1 + slope * slope)$$

$$x = x^t + y^t * slope - y * slope$$

$$vd = \sqrt{(X - \dots)}$$

The above formula has been simplified and it is very easy so we won't discuss it here. 253.2 Shape representation From the discussion in Subsection 3.1, we obtain feature points stored sequentially in an array. The centroid (Xc, Yc) [8].

III. PROPOSED METHOD FOR SHAPE RETRIEVAL

Our shape based image retrieval system consists of database construction part and image retrieval. The database construction part is done to ensure proper retrieval efficiency by extracting a feature set for each of the images and storing the feature set along with its consider image from the database. To access the database, the user initiates the shape retrieval and then the system starts with extracting the features from the query shape as shown in Fig.3. Afterwards, the system measures the similarity between the feature set of the query shape those of the shapes stored in the database through BiSimilarity measure process. Finally, the system the results to betterment of the user.

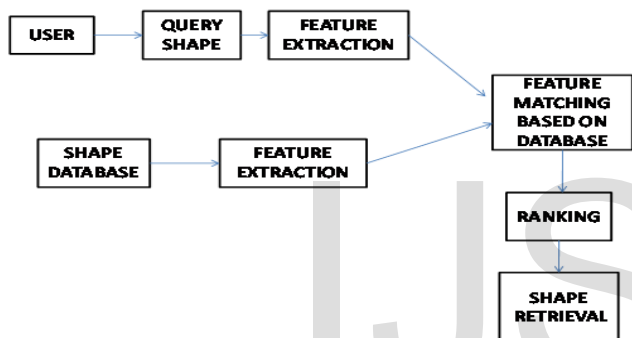


Fig 3. Basic Block Diagram of Shape Retrieval

FEATURE POINT EXTRACTION

This section explains how feature points are extracted on the contours of shapes. Let us suppose that shape A, a complete shape in memory, is matched to shape B, an incompletely observed shape. Shape A can be described with a closed contour (the whole shape), whereas shape B can be described with an open contour (a partial shape), as shown in Figs. 1(a-1) and 1(b-1). We use both the zero-crossing points on lines of curvature z and the curvature peak points p on contours on multiple scales for smoothing the feature points. The feature point extraction consists of two steps.

- 1) Construction of smoothed contours on multiple scales

- 2) Extraction of feature points on multiple scales
The smoothed contours are constructed on multiple scales on the basis of the idea of curvature partitions.

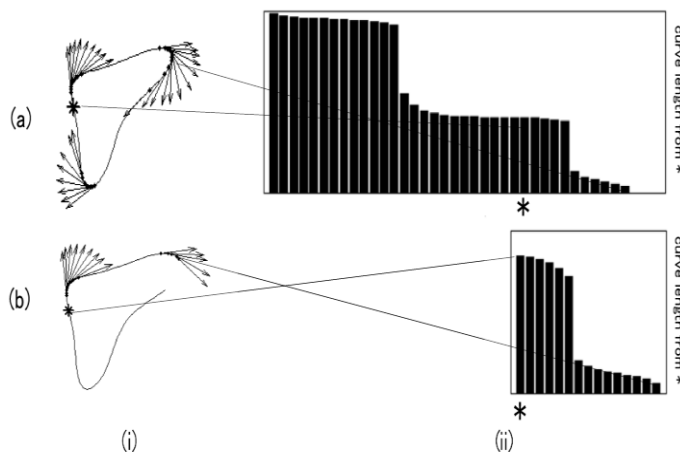


Fig 3:- Comparison of closed and open contours

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