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COMPARATIVE ANALYSIS OF VARIOUS TECHNIQUES IN SHAPE DETECTION

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Abstract

Shape recognition is an important aspect in Computer Vision. From the point of view of different object recognition problem has been solved and some of the modifications in the method of recognition is still ongoing. This is the main reason that the identification form used in applications with a large number of major challenges, including sound, degradations. In this paper a number of forms of identification methods have been defined from which researchers can get an idea for an efficient technique modified.

Keywords: Shape detection; computer vision

1.0 INTRODUCTION

The identification form has played an important role in machine vision applications. The characteristic shape of the object is the classic and effective object which has a significant role in object recognition. There are a number of aspects of visual information and recognition of these objections would have developed various types of applications in robotics, fingerprint analysis, mapping handwriting, facial recognition, and remote sensors and so on. Various methods of representation and recognition of 2D shapes have been reported. Efficient recognition algorithms have been easier and more accurate. Curvature scale space (CSS), dynamic programming, context shapes, Fourier descriptor, and small waves parser is an example of such an approach [6]. Shape descriptors should be strong enough to guarantee each other density-class and between classes are separated by the presence of noise. An objection is a group of pixels which refers to an image. Forming detection methods, analyze objects in various ways based on features, colors and textures. A method of producing procedure descriptions shaped vector shape descriptor of the given form and parser which will help to find the object recognition rate. To design a robust recognition system, careful attention to the class definition patterns, patterns of representation, environmental sensing, feature extraction and selection, cluster analysis, design and classifier learning, training and testing samples selection and performance evaluation is inevitable.

2.0 LITERATURE REVIEW

Doing image processing and especially blob analysis it is often required to check some objects' shape and depending on it perform further processing of a particular object or not. For example, some applications may require finding only circles from all the detected objects, or quadrilaterals, rectangles, etc. [Kirillov, 2010].

Human vision seems to make use of many sources of information to detect and recognize an object in a scene. At the lowest level of object recognition, researchers agree that edge and region information are utilized to extract a "perceptual unit" in the scene. Some of the possible invariant features are recognized and additional signal properties (texture or appearance) are sent to help in making the decision as to whether a point belongs to an object or not.

In many cases, boundary shape information, such as the rectangular shapes of vehicles in aerial imagery, seems to play a crucial role. Local features such as the eyes in a human face are sometimes useful. These features provide strong clues for recognition, and often they are invariant to many scene variables [Moon, 2002].

The study of shapes is a recurring theme in computer vision. For example, shape is one of the main sources of information that can be used for object recognition. In medical image analysis, geometrical models of anatomical structures play an important role in automatic tissue segmentation. The shape of an organ can also be used to diagnose diseases. In a completely different setting, shape plays an important role in the perception of optical illusions (we tend to see particular shapes) and this can be used to explain how our visual system interpret the ambiguous and incomplete information available in an image.

Content based image retrieval is one of the topics of interest in the computer vision field which nowadays is at its very peak, due to the growth in the last years of the amount of stored graphical information. For this kind of data, underlying analysis processes mainly lie on graphics recognition, allowing then classification of the images, typically in terms of available symbols. From a general viewpoint, several kinds of recognition approaches can be involved, according to data representation.

Bitmap images are usually analyzed with statistical methods, which are time-consuming and quite accurate, but can also be analyzed with structural methods, faster but requiring a pre vectorization step. In the context of content based image retrieval, the last approach is usually preferred, as the amount of considered data implies the use of efficient processes. One of the most important visual features when classifying images is shape of the represented objects and subsequently a lot of literature deal with object recognition by shape

3.0 RELATED WORKS

In this section, there are presenting the research work of some prominent authors in the same field and explaining a short description of various techniques used for shape recognition.

A. REN Hong, "OBJECT RECOGNITION ALGORITHM RESEARCH BASED ON VARIABLE ILLUMINATION",2009 [5] , proposed an algorithms which implements image segmentations using color information in the HVS color space obtain the pixel of the object, and use this pixel implement edge detection to recognize the object. Experiments show that this algorithm can recognize the object exactly in the different illumination conditions, satisfy the requirement of the competition.

B. Suhas G. Salve, "SHAPE MATCHING AND OBJECT RECOGNITION USING SHAPE CONTEXTS", 2010 [15] proposed shape detection method using a feature called shape context. Shape context describes all boundary points of a shape with respect to any single boundary point. Thus it is descriptive of the shape of the object. Object recognition can be achieved by matching this feature with a priori knowledge of the shape context of the boundary points of the object.

C. Rong Wang,"TOE SHAPE RECOGNITION ALGORITHM BASED ON FUZZY NEURAL NETWORKS", 2007 [3] proposed a toe shape description method based on geometric characteristics values of toe images. Corner detection is carried out on the region, and the characteristic points which can describe the toe shape are confirmed by the edge of toe image. Through finding characteristic points whose distances to the center are stable and which can distinguish different toe shapes and the correlation among them.

D. Ehsan Moomivand, "A MODIFIED STRUCTURAL METHOD FOR SHAPE RECOGNITION", 2011 [7] proposed a method in which the main property of shape (centroid) is considered as a basic point for recognition. Then, two structural properties such as distance and angles between the centroid and shape contour are calculated. Finally, by combining these two structural features, a new Feature-Space is constructed. The proposed shape descriptor can measure periodical, smoothness and symmetry of shapes and can be used as a modified method for shape recognition.

E. Jon Almaz´an, "A NON-RIGID FEATURE EXTRACTION METHOD FOR SHAPE RECOGNITION", 2011 [4] proposed a novel feature extraction technique, which uses a non-rigid representation adaptable to the shape. His technique employs a deformable grid based on the computation of geometrical centroids that follows a region partitioning algorithm. The result is a shape

descriptor that adapts its representation to the given shape and encodes the pixel density distribution.

F. Ruixia Song, "THE METHOD OF SHAPE RECOGNITION BASED ON V-SYSTEM", 2010 [1] proposed a novel boundary based shape recognition method. First the contour of an object is regarded as a geometric graph, and the graph is expanded in a V-series, which transform the graph to the spectrum space and quantify overall feature of the object. Further a shape similarity measure algorithm based on normalized V-descriptor is presented.

G. S. Thilagamani, "A NOVEL RECURSIVE CLUSTERING ALGORITHM FOR IMAGE", 2011 [2] proposed a method involving two separate processes. The first process deals with detecting object parts of an image and integration of detected parts into several clusters and second process deals with over segmenting the image into super pixels using Novel Recursive Clustering Algorithm.

H. Yang Mingqiang, "SHAPE MATCHING AND OBJECT RECOGNITION USING CHORD CONTEXTS", 2008 [14] proposed a new effective shape descriptor, chord context, for shape description image retrieval. For a shape, the chord context describes a frequency distribution of chord lengths with different orientations and this method is unaffected by translation, rotation and scaling.

I. Donggang Yu, "SHAPE ANALYSIS AND RECOGNITION BASED ON SKELETON AND MORPHOLOGICAL STRUCTURE", 2010 [11] presents a novel and effective method of shape analysis and recognition based on skeleton and morphological structure. A series of preprocessing algorithms, smooth following and liberalization are introduced, and series of morphological structural points of image contour are extracted and merged.

J. Tiago B. A. de Carvalho, "NEIGHBORHOOD CODING FOR BILEVEL IMAGE COMPRESSION AND SHAPE RECOGNITION", 2010 [8] proposed a coding scheme presents good results in the problem of handwritten character recognition. An algorithm to reduce the number of codes needed to reconstruct the image without loss of information is presented. Using the exactly same set of reduced codes, a lossless compression method and a shape recognition system are proposed.

K. Weiqi Yuan, "HAND-SHAPE FEATURE SELECTION AND RECOGNITION PERFORMANCE ANALYSIS", 2011 [9] proposed hand shape recognition algorithm which defines that the main hand-shape features which used for identification are more than 10 kinds. The effects of the recognition performance are different for each feature. When few features with better specificity were selected for identification, the recognition accuracy could be close to that used all of the features. The specificity of each feature should be analyzed independently, in order to achieve a certain recognition rate using fewer features.

L. B.Sathya Bama, "CONTENT BASED LEAF IMAGE RETRIEVAL (CBLIR) USING SHAPE, COLOR AND TEXTURE FEATURES", 2011 [15] Propose an efficient computer-aided Plant Image Retrieval method based on plant leaf images using Shape, Color and Texture features intended mainly for medical industry, botanical gardening and cosmetic industry. They use HSV color space to extract the various features of leaves. Log-Gabor wavelet is applied to the input image for texture feature extraction. The Scale Invariant Feature Transform (SIFT) is incorporated to extract the feature points of the leaf image. The performance of the proposed method is proved to be more efficient than the existing algorithms by providing classification accuracy. Combining different color, shape and texture features extracted from the images enhance the accuracy of the system.

M. Zhenhai Wang, Kicheon Hong, "A NOVEL APPROACH FOR TRADEMARK IMAGE RETRIEVAL BY COMBINING GLOBAL FEATURES AND LOCAL FEATURES", 2012 [17] proposes a trademark retrieval algorithm combining the image global features and Local features. Experimental results show that this method not only keeps high precision- recall of SIFT features are superior than the method based on the single Zernike moments feature, but also improves effective retrieval speed compared to the single SIFT features.

N. Vikram Srivastava and Prashant Goyal, "AN EFFICIENT IMAGE IDENTIFICATION ALGORITHM USING SCALE INVARIANT FEATURE DETECTION", 2007 [18] propose an algorithm based on MATLAB based on Lowe's approach to extract image feature using scale invariant feature transform method.. The cost of extracting these features is minimized by taking a cascading

approach in which computationally intensive operations are applied only to set of sample points which pass an initial test.

O. A. Kadir ,L.E. Nugroho, A.Susanto and P.I. Santosa, " A COMPARATIVE EXPERIMENT OF SEVERAL SHAPE METHODS IN RECOGNIZING PLANTS",2011 [19] propose a combination of geometric features such as aspect ratio, compactness, moment invariant , Zernike moments and polar Fourier transform(PFT). Based on performance of several methods in the experiment, PFT outperform among others.

P. Mutasem Khalil Alsmadi, Khairuddin Bin Omar, Shahrul Azman Noah and Ibrahim Almarashdeh, "FISH RECOGNITIONBASED ON ROBUST FEATURES EXTRACTION FROM SIZE AND SHAPE MEASUREMENTS USING NEURAL NETWORK", 2010 [20] propose a classifier for fish recognition using neural network and ANN. The classifier is able to categorize the given fish into its cluster and categorize the clustered fish into its poison or non-poison fish and categorizes the poison and no poison fish into its family.

4.0 CONCLUSION

This paper presents a short description of various shape recognition techniques in order to make familiar with the object recognition in image processing. These techniques are based on a number of shape descriptors and can be used to evolve out a modified method of shape recognition.

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