Subject Review: The Applications Based on Shape Feature Extraction Techniques

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Abstract— The primary aim of this research study is to appearance a significant review of existing research on an applications based on shape feature extraction (SFE) techniques above the last 10 years. Attention and study activities in shape feature extraction (SFE) techniques have arisen fundamentally above the preceding few years, mainly with the need to build some application that depend on object's shape. Survey and evaluation becomes necessary, as the number of recommended methods increases. In this study we will show survey focus on various papers applied their applications shape feature extraction (SFE) techniques. We also show a comparison between of these applications.

Keywords— Shape Feature Extraction (SFE), Neural Network, SVM, Fuzzy controller (NFC), Propagation multi-layered perceptron (MLP), CML, RNASeq clusters, Hybrid CNN

I. INTRODUCTION

Feature extraction approaches have developed a seeming essential in various procedures which have greatly to do by image processing, object location and detection, computer vision, retrieval of image retrieval, data mining, recognition of speech, machine learning and bioinformatics, pattern recognition. These applications are utilized to extract the maximum discrete features existing in a dataset (e.g. text, image, speech) which are employed to characterize and define the data [1, 2].

Shape feature extraction is one of the important of Feature extraction (FE) techniques to extract shape features that are necessary step in many applications. There are many system focus on shape in its work such as biometric applications (e.g. hand, palm, tooth, eye, etc.), medical diseases classification (such as tumors) face recognition, character recognition, hand written recognition, signature recognition and so on . For this reason make many researchers to build a system based on shape feature extraction(SFE). Although there are many challenges, including is the system accuracy.

Shape is besides as a significant low-level (LL) characteristic as it is useful in actual world objects and shapes identification. In [3] the authors offered a completed survey of the methods of shape feature extraction system (SFE) in the image representation and retrieval of image domain. Contour based and area depend on the main shape features categorizations [4]. Figure 1 shows a simple overview of the shape features classification.
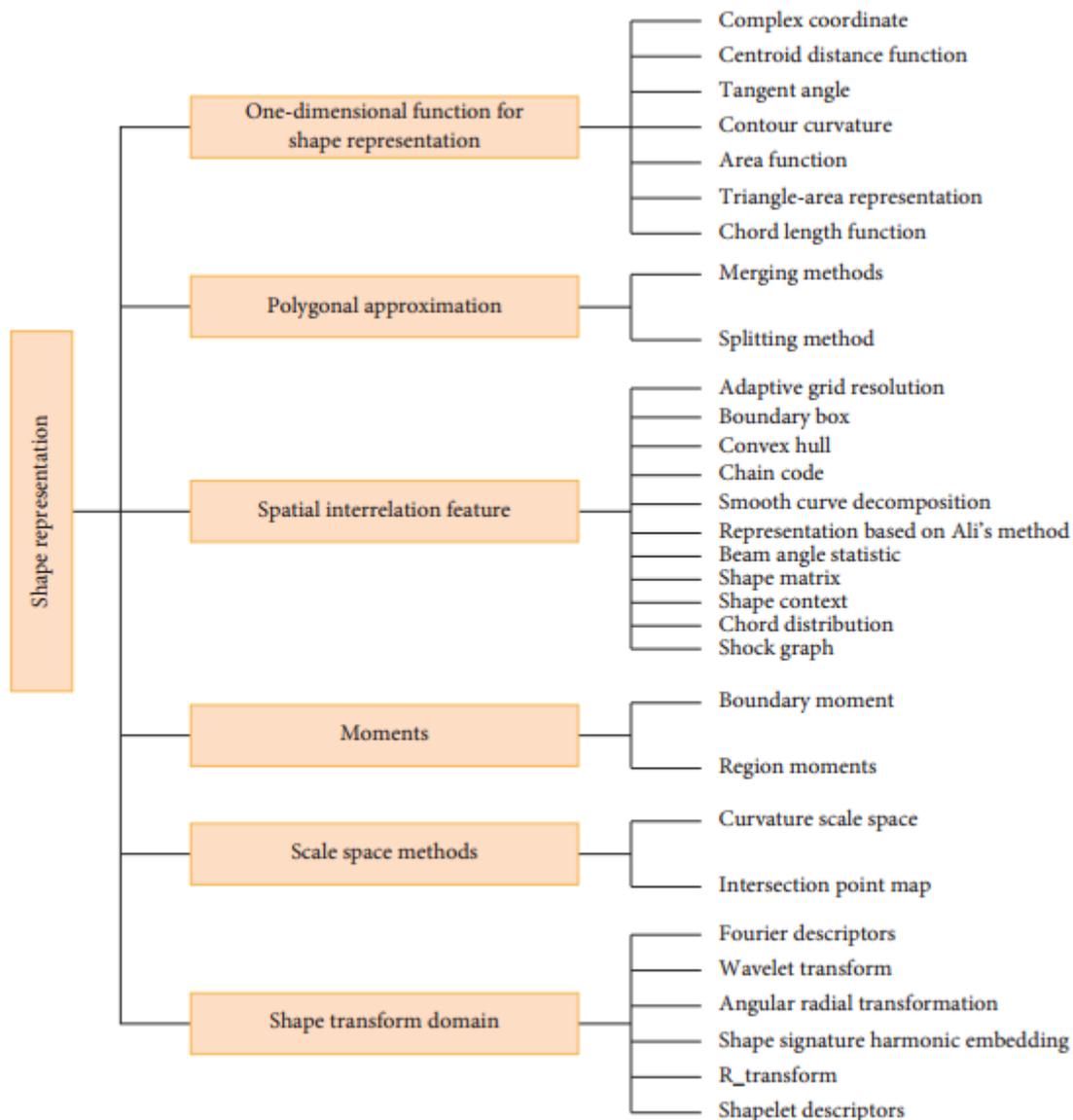
Figure 1. An overview of the methods of shape feature extraction.

Recently, proposed many of applications based shape feature extraction techniques. In this review, we work ways to build many application depend on shape feature extraction (SFE) techniques The remainder of this study paper was structured as follows: The literature survey of various systems in the last years is offered in Section 2. In Section 3 the comparative schemes analyses that debated in section 2. As a final, the Section 4 shows the conclusions.

II. LITERATURE SURVEY

Notes in the last few years, there are various applications in various field employed one of on shape feature extraction (SFE) techniques to have satisfied. In this section we discuss some of these researches. In this paper Dinesh Dileep [5] defined a geometry depended method for characteristic extraction valid word recognition applications based by segmentation. The suggested shape feature extraction system of geometric of the character contour. These features are depending on the types of elementary line which shapes the feature skeleton. The application offers features as vector as its production. The characteristic vectors so made as a training set output, were at that time the application for training for pattern recognition was employed to train

application relies on neural networks in order to benchmark the application. In this research article, Qihui Wang, Lijun Xie , Bo Zhu, Tingjun Yang , and Yao Zheng[6] employed Active shape model (ASM) is a search tool for images that relies on statistical paradigm that is commonly utilized to extraction features. The local profile paradigm and the form paradigm are included in the traditional ASM model. The utilize of statistics to contribute is the key benefit of the ASM paradigm to definite goal image paradigm by presenting previous knowledge about waiting for the object of the extraction goal, restricting the search product in the flexible range. These features create it appropriate for every identical item's feature. Investigational results display that the system can pick facial characteristics quickly and with greater precision Extract the geometric object contours embedded in binary digital images scheme offered by Amal Dev Parakkat, Jiju Peethambaran, Philumon Joseph and Ramanathan Muthuganapathy [7] employed a geometric method to extract digital binary images from contours that are designed to be successful and have the benefit of using the technique in both raster graphics and vector. Contour extraction is based by different pixel, their system construct to pick further smooth and compact contours then is besides accomplished of producing contours for images through huge noise, wherever the typical edge detections methods as Canny and Sobel algorithm of edge fail. Strong to background noise, particularly without executing every handling noise filtering approaches, makes the suggested method distinctive and from here a variety of systems for segmentation of images dealing with binary input images with noise in the background e.g. satellite or MRI scans images would find the approach very attractive and helpful. The ratio of compression accomplished by their algorithm for noisy images is actual great. For biomedical image retrieval and classification, a novel descriptor for shapes is given by Daekeun You, Sameer Antani, Dina Demner-Fushman, George R. Thoma [8] this work improved a feature extraction technique this was done effectively executed for recognition of characters. They practical several image processing approaches for example adaptive morphology and thresholding and taken into consideration different feature terms of extraction. Using preprocessed binary images to extract contours, and then extracted the 4 directional chain code in sub-images is defined by the contours. Via radiology modality classification, they tested the proposed technique and compared with various existing descriptors that pick diverse kinds of info from images (e.g. texture or/and color). Experiment results displayed that the descriptor suggested shape accomplished the maximum 74.1 percent classification accuracy, and the combination of the descriptor with a color based descriptor increased each separate descriptor's accuracy. In this paper Jyotismita Chaki∗, Ranjan Parekh, Samar Bhattacharya [9] suggested a new system of recognizing and characterizing plant leaves employing a gathering shape with characteristics of texture. The leaf texture is displayed employing gray level co-occurrence matrix with Gabor filter while the shape of the leaf is taken employing a combination set of invariant moments and curvelet transforms coefficients. Since these characteristics are common sensitive to the scaling and orientation leaf image, an earlier preprocessing phase for extraction of features is performed to improve various factors of rotation, translation, and scaling. Effectiveness of the suggested approaches is planned by employing 2 neural network classifiers (a feed forward back propagation multilayered perceptron (MLP) and a neuron fuzzy controller (NFC)) to distinguish among 31 leave classes. To analyze how to increase the accuracy of identification, the features have been executed separately as well as in combination. Experimental results show that in data leaves with distinct shape, texture, orientations, and scale, the method given is efficient to a satisfying degree. In this research paper, Himali Vaghela, Hardik Modi, Manoj Pandya and M. B. Potdar [10] recognized various white blood cell forms as lymphocytes, monocyte, neutrophils, basophil, eosinophil etc. used some shape features as perimeter, area, roundness, standard deviation etc. employing image processing methods, outcome can be got within 4- 3 minute. To achieve shape features process, the RGB image discrepancy has to be raised for improved white cells detection. Next identification of each cell category is execute to identify both it is Chronic Lymphocytic leukemia (CLL) and Chronic Myelogenous Leukemia (CML). This scheme gives accuracy of 93.33%. In this research, Ramgopal Segu, K. Suresh [11] offered a new method for detect the text from natural scene image. They used shape feature and SIFT feature examination for text detection.

In this paper, they presented that both text of feature descriptor methods result in higher implementation detect the text when compared with other state of art methods. For analysis the shape, associated component segmentation is used with the assistance curvature based shape feature extraction mode. At the final, SIFT feature extraction and feature matching is executed the final phase of text detection. In this paper, M Iqtait, F S Mohamad, M Mamat [12] suggested a Multi Resolution Active Shape Models ASM technique, that can accurately and efficiently pick definite form. Moreover, such the enhancement of Active Shape Models, AAM is offered to picks both texture and shape of definite item at the same time. The experiment result that is testing their system on one faces dataset. They find that the ASM is faster and that the position of the trait point is more precise than the AAM, yet the AAM facilitates an improved fit to the texture. automatic tumor segmentation system proposed by Mateusz Buda1 , Ashirbani Saha1 , Maciej A. Mazurowsk [13] depend on Automatic segmentations in deep learning, Three characteristics that calculate the three-dimensional and two-dimensional features of the tumor were extracted. Genomic data from previously identified genomic clusters for the studied group of patients depends on gene expression, 1p / 19q co-deletion and IDH mutation, DNA methylation, DNA copy number, and microRNA expression. For each pair of imaging features and genomic sub-type, they demonstrated the exact fishing experiment for ten hypotheses to study the relationship between genomic clusters and imaging features. To create the quantitative image characteristics, they used automated tumor segmentation; their deep learning algorithm achieved an average 82 percent Dice coefficient that is comparable to human achievement. A novel 3D fruit detection technique depend on depth information, shape, color is offered by Guichao Lin, Yunchao Tang, Xiangjun Zou · Juntao Xiong · Yamei Fang [14] Segmenting a red green blue (RGB) image as a binary mask is the first method of image segmentation. It gets a filtered image of depth when multiplied by this mask. Area Growth, a region depend image segmentation technique, is next performed to group the depth image into several clusters. Every cluster is a fruit, branch, or leaf that is converted late into a point cloud. A method of 3D shape detection (SD) then relies on the assent of the sample M-estimator, a model estimator of parameters, to classify possible fruits from every cloud of point. As a final point, a global point cloud descriptor (GPCD) based on color/angle/ shape is used to extract a vector of characteristics for whole point-cloud and to remove false positives. A classifier of the support vector machine (SVM) trained on the characteristics of the GPCD is utilized. In the area, pepper, guava, and eggplant datasets were captured. The accuracy of identification was 0.864, 0.886, and 0.888 for the guava, pepper, and eggplant datasets, and the recall was 0.812, 0.889, and 0.762 respectively. Sketch recognition system proposed by Xingyuan Zhanga , Yaping Huanga, Qi Zoua , Yanting Pei , Runsheng Zhanga , Song Wang [15] in this study, they offered a new architecture called the CNN Hybrid, that is collected of S-Net with A-Net. They define information about shape and information about appearance. Moreover, the CNN Hybrid is entirely tested on various datasets containing TU Berlin, Flickr15k and Sketchy in the sketch retrieval and classification jobs.

III. COMPARATIVE SCHEMES' REVIEW

A comparison between previous systems will be illustrated in Table 1 below.

Table 1. Comparative scheme analysis for some datasets

Ref.	Year	Application's Task	Dataset	Features Extraction	Application Accuracy	Classifier Method
[5]	2012	classification of cursive characters for handwritten word recognition	Created Database	Skeleton	Database of 650 images. The algorithm was tested a gainst a testing set of 130 images and 6 of them were detected erroneously.	Neural Net work
[6]	2013	extract facial	IMM	parametric	rapidly and have higher	

		features		statistical model (searching method based on statistical model)	accuracy	---No Need---
[7]	2014	extract the contour of geometric objects	collected from open source database and some hospitals	traditional contour extraction method	very high	---No Need---
[8]	2014	improve a shape descriptor for biomedical image kind classification	collected radiology images Dataset (e.g., CT, MRI, X-ray, ultrasoundetc.)	contour	74.1%	SVM
[9]	2015	Plant leaf recognition	Created Database	curvelet transform coefficients together with invariant moments	High accuracy	neuro-fuzzy controller (NFC) and a feed-forward back-propagation multi-layered perceptron (MLP)
[10]	2016	Recognize multiple white blood cell types, such as lymphocytes, monocytes, eosinophils, neutrophils, basophils, etc.	Created Database	contrast of RGB	93.33%.	chronic Lymphocytic leukemia(CLL) or Chronic Myelogenous Leukemia(CML)
[11]	2017	text detection	ICDAR 2003, 2013 and 2015.	curvature-based shape analysis model	87.39 %	No Need
[12]	2018	face recognition	LFPW	Active Shape Models (ASM) algorithm and Active Appearance Models algorithm (AAM)	ASM is quicker and gains a more precise position of the trait point than the AAM, but the texture is better suited by the AAM.	No Need
[13]	2019	automatic tumor segmentation	The Cancer Imaging Archive (TCIA) and The Cancer Genome Atlas (TCGA)	Bounding ellipsoid volume ratio (BEVR), Angular standard deviation (ASD), and Margin fluctuation (MF)	82%	RNASeq clusters
[14]	2019	3D fruit detection	Pepper, eggplant, and guava	global point cloud descriptor (GPCD)	97%	SVM
[15]	2020 / 2019	sketch recognition	g TU-Berlin, Sketchy and Flickr15k	CNN (A-Net)	The approach suggested achieves a MAP of 0.2874 and improves the accuracy by 0.02 compared with CPR L CNN + LKS	Hybrid CNN

IV. CONCLUSION

In this review study, we a time-line reviewed a number of applications depend on shape features extraction within the period (2012-2020). The applications which based on shape feature extraction

(SFE) become actual important in many systems especially in these application in image processing and computer vision. These techniques are raising the effectiveness of the classification approaches and to assurance the fast and high accuracy results. Each tool has some of advantages and disadvantages and so novel technologies have been advanced.

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