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TECHNIQUES OF FEATURE EXTRACTION USING LOCAL AND GLOBAL FEATURES: A SURVEY

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ABSTRACT
An image hash is a short code that holds the content of the image. Image authentication using hash code is most commonly used technique. This image hash can be generated using many techniques. The major drawback of image hash is the possibility to have the same hash code for two different images. However, this vulnerability can be greatly reduced by generating hash code that uses both local and global features. In this paper, a survey on some feature extraction technique using local and global features is given. The advantages and disadvantages of each and every system along with future work is also given.

KEYWORDS: Zernike moments, Haralick features, Quaternion Fourier Transform (QFT), orthogonal moments, convexity and texture.

INTRODUCTION
Digital image plays an important role in this communication world. Since digital image can be manipulated easily and to overcome it, image processing allows a much wider range of algorithms to be applied to the input data. Digital image processing finds widespread applications in the following areas,
- Classification
- Feature extraction
- Multi-signal analysis
- Pattern recognition
- Projection
- Image reconstruction
- Image analysis, etc.,

Feature extraction involves reducing the amount of resources required to describe a large set of data. When performing analysis of complex data one of the major problems stems from the number of variables involved for the process of extraction. The methods for feature extraction are transformation coefficient (DFT, DCT, wavelets), saliency map (curvature, gradient, edge deletion), local features (Haralick features, mean, variance, entropies), global features (geometric moments, Zernike moments, etc).

The paper is arranges as follows: Section II describes the few work in the area of feature extraction .Section III describes the conclusion of the paper.

FEW WORK IN THE AREA OF FEATURE EXTRACTION
Localization of Duplicated Image Regions Based on Zernike Moments
The manipulated data uses passive-blind techniques [6] to restore image. Copy-Move (CM) manipulations is used here for local processing of image that are copied and reinserted into the same image. For the reinsertion the basic CM should consider the duplicate parts without any change, it also requires the geometric transformation of the original part.

The advantage is of low cost running detection procedures that support the duplicate region detectors, it provides a high robustness and reduce the error with the help of Zernike moments. The disadvantage may be computational error which ring the false alarms.

A Zernike Moment Phase-Based Descriptor for Local Image

In this paper [9], the local image representation using ZM phase descriptor is more informative for signal reconstruction. The local feature involves three task feature detection, feature description and feature matching. The local feature belong to the interest point (key point).The keypoint detector uses a local elliptical window to search for a possible location of keypoint using Harris corner detector and SIFT detector.

The proposed ZM phase descriptor comes under the region descriptor along with five descriptor techniques SIFT, GLOH, PCA-SIFT, steerable filter,   complex moments. ZM phase descriptor is used to calculate the similarity measures and evaluation of the descriptor performances.

The descriptor depends on the estimation accuracy of the rotation between two matching regions. The feature dimensionality and orthogonally   may also affect the performance. The advantage of ZM phase is more robust and provide a better performance under all the photometric and geometric transformation for all the textual regions.

Design Approach for Integrated Fault Detection and Control

The design approach is implement along with fault detection and control for uncertain systems. The result is obtained through an interactive loop –shaping technique [7]. A fault diagnosis system consist of detection, isolation and evaluation modules. The fault detection module generates signals which are sensitive to the fault. The fault isolation determines the locations, process and provide appropriate fault alarms.

The advantages is the loop-shaping technique, it   provides simple tradeoff between performance metrics. The disadvantage is difficulties in relation to the multiplicative faults detection.

Texture feature extraction and analysis for polyp differentiation

The concept is to measure the cancer polyp [8] which varies in size and intensity. It can be measured by 13-haralick features and also by a new set of 16 haralick features. A polyp can be measured over 13 directions (rotations) with the texture measures. Because of the polyp variations, the texture features can also vary and then it results in variable results. To avoid these issue, the image can analyze and extract the texture features with intensity and curvature of the image with adequate noise control. The new 16 haralick feature extractions are maximum probability, median probability, third quartile probability, deviation of probability, auto correlation cluster average, cluster variance, cluster shade, cluster prominence, dissimilarity, inverse difference, homogeneity II, information measure of correlation 1, information measure of correlation 2, and difference average.

The advantage is the addition of 16 new haralick features for the texture measure is a noticeable gain. The disadvantage is image reconstruction may take some penalties to smooth data noise, results in some loss of textures.

Zernike moment feature extraction for handwritten character

The extraction of features from handwritten[4] complex characters using Zernike moments through support vector machine(SVM) and K-NN(Nearest neighbor).A technically challenge of hand written recognition comes from three sources, SYMBOL- ideal shape and complex form, DEFORMATION-shape variation, DEFECT-flaw in image (print, scan, etc.).

A handwritten can recognizes by online and offline. In online, the data can be recognizes and captures through sensors during written process. At that time of offline the recognition is static and images can be captured or scanned only after the completion of written process. It is complex to analyze than the online recognition. Because, the offline may varies from size, ink width, etc., A handwritten recognition can also extracts features based on curvature and gradient information of an image through Zernike moment. A handwritten datasets can be collected from the database for the recognition.

The advantage is various complex features of compound characters from database has been implemented by Zernike moment feature extraction is successful, for classification and recognition under SVM AND K-NN. The

disadvantage is system handles the problem with structural and statistical features for compound character. This system only handles 45 compound characters that extracts from Zernike moments through SVM and K-NN.

Efficient 3D Geometric and Zernike moments computation
The image can be analyzed by a geometric moment, which can be extendable to any dimension through the Zernike moment. This paper [3] introduces a fast algorithm for exact and a series for an approximation algorithm to computer a 3D geometric moment. The approximation algorithm reduces the complexity. The exact algorithm has two forms to perform volume-like and surface like. Zernike canterakis moments is used to propose the algorithm for computational complexity and accuracy detection.
The advantages is good numerical ability at high orders, complexity decreases, accuracy increases, rotation invariant. The disadvantages is that approximate algorithm are stable upto order 125 and no instability for exact algorithm upto order 150.

Quaternion based image hashing for localization
The image should detect tampering techniques [2] such as color changing, copy-move (CM) forgery, splicing, cloning, etc.., to establish the authenticity of a digital image. Quaternion Fourier Mellin Moments (QFMM) are selected and constructed as geometric hash to eliminate the geometric distortion. Quaternion Fourier Transform (QFT) is selected as image feature hash to detect tampering. In Zernike moment and local feature, the approach can only detect the salient regions and can tolerate only limited attacks.

The advantage is a short image hashing with good performance. The disadvantages is a geometric attacks remains a difficult problem to solve. An authentication accuracy was not high, and it may not be able to complete the authentication without adjusting the parameters for different images.

Automatic Segmentation of Nuclei in Phase-Contrast Images
Phase-contrast Image [5] is used to microscopy cell, for high magnification or far colorless specimen. The proposed framework has three observation nuclei phase contrast image that is it appears as dark region and then the two dimensional microscopic image is nearly convex. Thirdly, the nucleus is different from the dirt, dust, etc. The segmentation uses the intensity and convexity of the image by the first two observation with the help of algorithm top-hat filter, distance transformation, h-maxima transformation and marker-controlled watershed Segmentation. Based on the third observation the texture of the image is develop and used to validate the segmentation, the technique uses six texture measures based on the Gray Scale Co-occurrence Matrix (GLCM) and an AdaBoost algorithm.

The segmentation of nuclei using the transformation may result in false segmentation which can be overcome by haralick features based nuclei texture. The advantages of proposed system is it to provide a high accuracy for the automated segmentation of nuclei in the phase contrast image. The disadvantage is lack of accuracy.

Combined Invariants to Similarity Transformation and to Blur Using Orthogonal Zernike Moments
The object is to find the set of invariants that are affected by the blurring [1]. Blur image can be carried out by deblur the image, then to apply the recognition method. Using orthogonal Zernike moments the features of the blurred image and original image and the PSF (point spread function) has been established. After that the Orthogonal Legendre moments is to derive the set of invariants simultaneously with convolution of PSF (point spread function) in circularly symmetric.

The advantage is simultaneously invariant to similarity transformation and to convolution. The disadvantage is more robust to noise. The disadvantage is complexity.

CONCLUSION
In this paper, the feature extraction of image has been carried out by various methods. The Zernike moment which extract the feature with high robust to content preserving attacks. And the performance of the system can be improved by integrating the fault detection and control in the design approach. Generally, there are 14 haralick features but in the case of texture feature extraction it introduce a 16 new haralick feature which improves the performances. Quaternion Fourier Transform (QFT) uses a short image hashing that improves the performance for localization of image.

TABLE 1:

S.NO.	TITLE	ADVANTAGES	DISADVANTAGES	FUTURE WORK
1	Localization of Duplicated Image Regions Based on Zernike Moments	The advantage are • Low cost running detection procedures • Support the duplicate region detectors provides a highly robust and • Reduce the error with the help of Zernike moments.	• The disadvantage is computational error which ring the false alarms	• The future approach may on the automated decision about the presence of CRM manipulation. • To overcome the errors we may quantifying the semantically impact of manipulations with the detection score.
2	A Zernike Moment Phase-Based Descriptor for Local Image	The advantage of ZM phase are • More robust • Provide a better performance under all the photometric and geometric transformation for all the textual regions .	• The disadvantage is the descriptor cannot be used in various applications.	• The further proposed descriptor into various application and ZM phase can be improved.
3	Design Approach for Integrated Fault Detection and Control	• The advantages is the loop-shaping technique provide to simplify the tradeoff between performance metrics.	• The disadvantage is difficulties in relation to the multiplicative faults detection.	• The running time and performance of system can be improved further.
4	Texture feature extraction and analysis for polyp differentiation	• The advantage is a addition of 16 new haralick features for the texture measure is an noticeable gain.	• The disadvantage is image reconstruction may take some penalties to smooth data noise, results in some loss of textures.	• Exploring other strategies for the spatial variation, texture amplification and extraction of new texture measures.

5	Zernike moment feature extraction for handwritten character	• The advantage is various complex features of compound characters from database has been implemented by Zernike moment feature extraction is successful, for classification and recognition under SVM AND K-NN.	The disadvantages are • System handles the problem with structural and statistical features for compound character. • This system only handles 45 compound characters that extracts from Zernike moments through SVM and K-NN .	• The system can be extended to handle more complex compound characters with other features like orthogonal moments,etc .,
6	Efficient 3D Geometric and Zernike moments computation	The advantages are • Good numerical ability at high orders. • Complexity decreases. • Accuracy increases. • Rotation invariant.	• The disadvantages is for dense meshes, approximate algorithm are stable upto order 125 and no instability for exact algorithm upto order 150.	• The running time and performance of system can be improved further.
7	Quaternion based image hashing for localization	• The advantage is a short image hashing with good performance.	• The disadvantages is a geometric attacks remains a difficult problem to solve. An authentication accuracy was not high and it may not be able to complete the authenticatio	• Integrating other features into the proposed quaternion-based image hashing as the features detected by QFMT and QFT are all global information of the image.

				n without adjusting the parameters for different images.
8	Automatic Segmentation of Nuclei in Phase-Contrast Images Based on Intensity, Convexity and Texture	• The advantages of proposed system is it provides a high accuracy for the automated segmentation of nuclei in the phase contrast image.	• The disadvantage is lack of accuracy.	• The further improvement may done in accuracy on segmentation.
9	Combined Invariants to Similarity Transformation and to Blur Using Orthogonal Zernike Moments	• The advantage is simultaneously invariant to similarity transformation and to convolution.	• The disadvantage is more robust to noise.	• The running time and performance of system can be improved further.

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