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ASSESSMENT OF QUALITY OF IMAGES BASED ON GLCM HOMOGENEITY BY EXTRACTING FEATURES

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***Abstract*— Now days images are used in many other fields. Image processing is a method to convert an image into digital form and perform some operations on it and extract some useful information from image. Quality of an image plays fundamental role to take important decision and therefore, its assessment is essential prior to application. The objective approaches of image quality assessment play an important role for the development of compression standards and various multimedia applications. The Gray Level Co-occurrence Matrix method represents a highly efficient technique of extracting second order statistical texture features and to extract the textural features of an image. GLCM method is proposed to extract the textural features of an image. SSIM combines the image gray intensity with textural features to measure the image structural information. These methods are used to predict the visual quality by comparing a distorted image against a reference image. In this paper we are study the homogeneity approach of image quality assessment.**

Keywords*— *Image Quality Assessment, Textural Feature, Grey Level Coocrance Matrix, SIFT Feature, Fuzzy set.

1. INTRODUCTION

The quality of the image is reduced due to the distortions and which type of distortions occurred during the transmission, storing or sharing of images between the devices. Quality measuring is needed for many applications, for example if the designer of a medical device want to decide from which device get the better results so he want to measure the quality of the images from those devices. The blur image can be easily identified by the human eye but it is difficult for the computer. To achieve the quality assessment of any image we used different texture feature of image. The Gray Level Co-occurrence Matrix is adopted to extract the textural features of image [2].There are various method to quantify the visibility of differences between a distorted image and a reference image. Here introduce different complementary framework for quality assessment based on the degradation of structural information [3].

(a) Original Image (b) Distorted Image

Figure 1: Example of quality of image

The paper starts on discussion in Section I related work has been shown in section II. A discussion on GLCM feature homogeneity is presented in section IV. Finally, this papers ends with result and conclusion.

2. LITERATURE REVIEW

In this paper, a new Full-Reference (FR) 3D image quality assessment method to measure the distortions between the original and distorted images. The metric has taken into account some properties such as depth component, structure component and gradient component. The performance of the proposed metric is compared with other objective image quality assessment metrics. As a result an efficient 3D image metric that combines the depth information and structure information of images. The algorithm is evaluated on the popular Live Database and is shown to perform extremely well in terms of correlation with human perception [1]. In this paper, presents an application of gray level co-occurrence matrix to extract second order statistical texture features for motion estimation of images. The Four features namely, Angular Second Moment, Correlation, Inverse Difference Moment, and Entropy. Extracting the features of an image by GLCM approach, the image compression time can be greatly reduced in the process of converting RGB to Gray level image when compared to other DWT Techniques, but however DWT is versatile method of compressing video as a whole. These features are useful in motion estimation of videos and in real time pattern recognition applications like Military & Medical Applications [4].In this paper, the textural properties of images provide beneficial information for discrimination purposes, it is appropriate to employ texture based algorithms for feature extraction. The Gray Level Co-occurrence Matrix (GLCM) method represents an extremely efficient technique of extracting second order statistical texture features. This algorithm has been validated using high resolution images and its performance is found to be adequate [5]. In this paper, the patronage of background textural details is especially crucial as they help to define the image structure. By using the GLCM model to extract second-order statistical features for the origination of an image textural measure. Results coincide that our proposed method is feasible and meaningful [6]. In this paper, a novel two stage framework for distortion-accomplished blind image quality assessment based on natural scene statistics. The proposed framework is modular in that it can be extended above the distortion-pool considered here, and each module introduced can be replaced by better-performing in the future. Here describe a 4-distortion demonstration of the proposed framework and show that it performs ambitious with the full-reference peak-signal-to-noise-ratio on the IQA database [7]. In this paper, a new two-step skeleton for no-reference image quality assessment based on natural scene statistics. Once trained, the skeleton does not require any knowledge of the distorting process and the framework is modular in that it can be extended to any number of distortions. Here depict the framework for blind image quality assessment and a version of this framework; the blind image quality index is evaluated on the image quality assessment database. In this paper, we discussed DIS and demonstrated that each distortion has a unique signature which can be characterized by the use of DIS and used this signature to categorized images into distortion categories. We also described how distortion-aware IQA may be undertaken using DIS [9]. In this paper, presents two feature extraction methods and two decision methods to retrieve images having some segment in them that is like the user input image. The features used are (dispute) variances of gray level co-occurrences and line angle- ratio statistics constituted by a 2-D histogram of angles between two intersecting lines and ratio of mean gray levels inside and outside the (domain expanded) region spanned to automatically construct ground truth image pairs for the relevance and irrelevance classes [10]. In this paper, image mining in the domain such as breast mammograms to categorized and detects the cancerous cells. Mammogram image can be categorized into normal, begin and damning class and to explore the feasibility of data mining approach. The image mining technique with the extraction of implicit knowledge and image with data relationship. The main goals of this method are to apply image mining in the domain such as breast mammograms to categorized and detect the cancerous tissues. Total of 24 features including histogram intensity features and GLCM features are extracted from mammogram image. In this paper, could assist the medical staff and improve the accuracy of detection. The extracted features from trace functional coupled with the GLCM classifier yielded the absolute accuracy of 95% compared to the other classifiers [12]. In this paper, a fuzzy based no-reference image quality assessment system by applying human perception and entropy of images. The proposed approach selects important features to reduce complexity of the system and based on entropy of feature vector the images are split into different clusters. To assign soft class labels to different images, continuous weights are estimated using entropy of mean opinion score (MOS) unlike the previous works where crisp weights were used. The concept of fuzzy relational classifier has been utilized in the paper to develop a no-reference image quality assessment technique of distorted and decompressed images [13].

3. PROBLEM IDENTIFICATION

In the Pixel based digital image quality assessment techniques and detecting quality of images in Duplicated region Using key point matching algorithm cannot detect very small copied regions.

Probably the main drawback of image quality assessment by using entropy methods is highly limited usability and reliability.

As the size of digital information rises exponentially, huge volumes of raw data need to be extracted. Nowadays, there are a number of approaches to customize and manipulate data according to our needs. The most common method is to use image Mining. Image Mining has been used for extracting implicit, legal and potentially useful knowledge from large volumes of raw data .The extracted knowledge must be accurate, readable, perspicuous, and ease of understanding. Image mining has been used in most new inter-disciplinary area such as database, artificial intelligence statistics, visualization, parallel computing and other fields. However, with the emergence of massive image databases, the traditional manual and image based search suffers from the following limitations:

Time complexity:

Manual remarks require too much time and are expensive to implement. As the number of images in a database grows, the difficulty in finding desired images increases. It is not feasible to manually annotate all attributes of the image content for large number of images.

Discrepancy of subjective perception:

Manual remarks fail to deal with the discrepancy of subjective realization. The phrase, “an image says more than a thousand words,” implies a Content-Based Approach to Image Database Retrieval that the textual characterization is not sufficient for depicting subjective perception. Typically, an image usually contains several objects, which convey specific information. To capture all knowledge, ideas, opinions, and feelings for the content of any images is almost impossible.

Image collection:

There might be some problem in the image collection. If the fluorescence condition for each image is given, color balancing may be performed in the pre-processing step, in order to reduce the impact of mismatched color balance between the Test and Train Database images.

Feature extraction:

Its deal with the problem that it has only some descriptive parameters were chosen to characterize the homogeneity property of images. In the future, many other parameters of expositive statistics can be used. Along with this we can apply dimension reduction on extracted features to compensate the retrieval time as the size of the database is increased.

At last, if the feature identification and extraction can be associated with some knowledge of those retrieve image as a semantic feature, it could significantly improve the precision and recall of the images.

4. PROPOSED METHODOLOGY

In this section we will describe the method that we will use to extract the aspects of the object image for quality assessment.

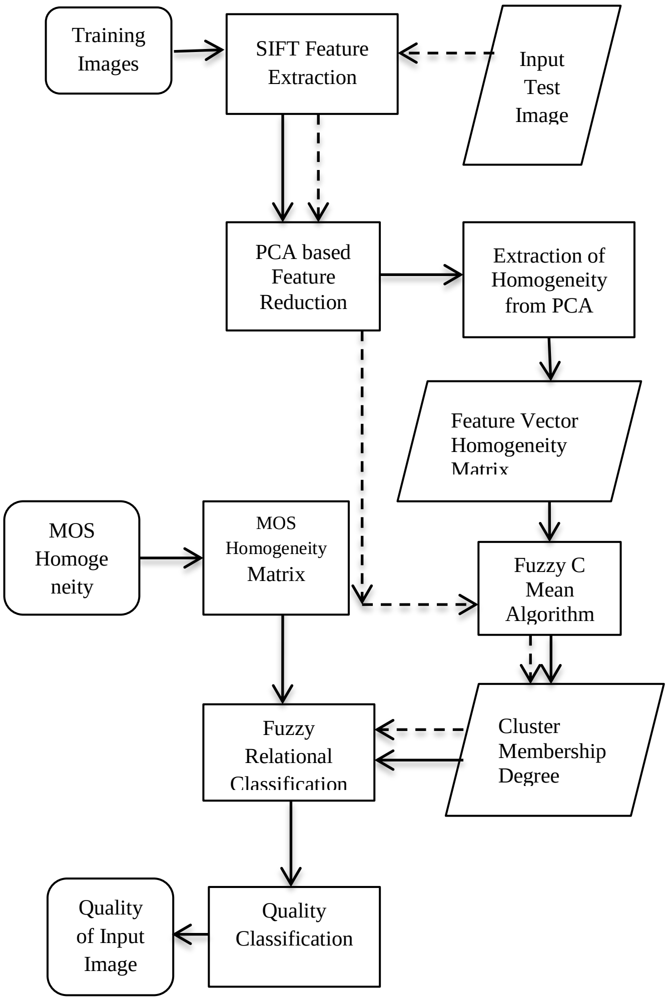

Figure 1: Process of our Image Quality Assessment

Methodology of the image quality assessment technique is categorized in to number of steps which are as follows:

(a) Input image and Apply Preprocessing
(b) Extract SIFT feature of images
(c) Apply PCA for feature extraction
(d) Extraction of homogeneity
(e) Apply Fuzzy C Mean Algorithm
(f) Apply MOS Homogeneity
(g) Apply Fuzzy Relational Classification
(h) Analysis of Image Quality Classification

(a) Input image and apply preprocessing

The image for this study is taken from image analysis society as quality of images are difficult to read, preprocessing is essential to improve the quality of image and create the feature extraction stage as an easier and reliable one.

Figure 2: Distorted Image after preprocessing image

(b) Extract SIFT feature of images

Scale Invariant Feature Transform (SIFT) is an essential method for detecting and extracting local feature descriptors, sensibly invariant to modifications in illumination, rotation, noise, scaling and minor changes in viewpoint. So, different scale invariant resident image features are extracted from gray level training images of IMAGE database all extracted features are not equally vital and unusable, so might not play a valuable role to assessing quality of images.

(c) Apply PCA for feature extraction

After extraction of SIFT feature of an image altered scale invariant local features are extracted and after removing redundancy significant features are carefully chosen using principal component analysis (PCA) algorithm. To remove uncertainty in assigning images into different class labels. Important features are selected by applying Principal Component Analysis (PCA) algorithm that efficiently decreases dimension of SIFT feature vector equivalent to each training images. Near about 20,000 features have been reduced to 128 only considering IMAGE database.

(d) Extraction of homogeneity

After PCA feature extraction homogeneity features are calculated by creating a feature matrix with number of rows corresponds to number of training images and number of columns expressive the dimension of each feature vector.

(e) Apply Fuzzy C Mean Algorithm

Fuzzy C Mean algorithm is applied to remove uncertainty in assigning images into different class labels; it is applied using homogeneity of features.

(f) Apply MOS Homogeneity

Mean Opinion Score of Homogeneity is used for the human perception about the visual quality of the image (weighted MOS matrix) using φ-composition and conjunctive combination approaches. Quality of test images are assessed or expected in terms of degree of membership of the pattern in the given classes by applying fuzzy relational operator

Table 1: Training image features extracted from IMAGE database with varies level of distortion

Image Name	Distortion Type	Distortion Level	MOS Value
Image 1	Sharp	1	3.2697
Image 2	Smooth	2	3.2542
Image 3	Smooth noise	3	3.2409
Image 4	Smooth smooth noise	4	3.2056
Image 5	Smooth noise	3	3.2409

(g) Apply Fuzzy Relational Classification

Fuzzy relational classification establishes correspondence among structures in feature vector of the training images and the class labels. By using fuzzy logic in classification, one avoids the ambiguity of hard labeling the prototypes and simply captures the fractional sharing of structures among several classes of image. In the training phase, two phases are executed to build the proposed classifier: (1) exploratory data analysis using unsupervised fuzzy clustering and (2) forming a logical relation between the structures of the feature space and the class labels using fuzzy MOS based weight matrix.

(h) Analysis of image quality classification

After applying Fuzzy relational classification (FRC) is to get classify image, to check whether quality of image is good or average or poor.

5. EXPERIMENTAL RESULT

To build the MOS matrix, Mean Opinion scores of 5 training images are used as given in Table 2.

Table 2: MOS Matrix

Image Name	Distortion Type	MOS
Image 1	Sharp	Good
Image 2	Smooth	Average
Image 3	Smooth noise	Average
Image 4	Smooth smooth noise	Poor
Image 5	Smooth noise	Average

On the basis of Table 2: mean opinion score, we can conclude that we select image-3 as input image from Table 2. Its distortion type is smooth noise & MOS is good so input image distorted.

6. CONCLUSION

Our work will help to provide better image quality assessment technique. It will provide users with more correct and accurate quality of image. The experimental result shows that the homogeneity feature of GLCM is simple and is easy to implement.

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