

Content Based Image Retrieval - COMPARATIVE ANALYSIS OF GABOR FEARURE AND HISTORGRAM ORIENTED GRADIENT USING TEXTURE FEATURES FOR CONTENT BASED IMAGE RETRIEVAL

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ABSTRACT

Content-based image retrieval is one amongst the difficult problems for obtaining the connected image from a pool of info with giant image databases turning into a reality each in scientific and medical domain and within the large advertising/marketing domain, strategies for organizing a info of pictures and for economical retrieval became vital. An image shape is characterized through features of comprehensive shape, color and texture. Content-based image retrieval (CBIR), additionally referred to as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is that the application of computer vision techniques to the image retrieval issues, that is, the matter of finding out digital pictures in massive databases. The components are being utilized to retrieve image and cataloging the systems. This paper contrasts two strategies established on image retrieval such as Gabor filter and Histogram Oriented Gradient (HOG). These patterns are differentiated via their correctness and accuracy. The results of experiment show that Gabor filter is not more accurate and efficient than HOG.

Keyword: - Image Retrieval systems, Histogram oriented Gradient, Gabor Feature and Grayscale image.

1. INTRODUCTION

Images play a vital role in giving rich information about any concept compared to words. Images can describe anything very clearly and descriptively. Enormous numbers of images are accessible for use over the web. The good quality retrieval systems always remain the need of time for obtaining useful information. The feature extraction methods can be broadly classified as colour, texture and shape. In our work, we have used texture based methods. In every database or web based search engines the data retrieval is a challenging issue and the accurate data retrieval is challenging for the researchers. To increase the data retrieval accuracy, images can be used for the data mining and discovering many things that we want to focus. Images are used in different studies and fields with different aspects. Images are used in Criminalization, Astronomy, Health, History, Business, Climatology, and agricultural studies, Scientific Studies, Geology and Robotics [1]. They are also used for the Real-time management of traffic, Tracking of Eye and Head, Film and Video: Sports analysis, Gesture Recognition and Safety monitoring [2]. Efficient systems have been designed to retrieve data by using the feature extraction of the images. Gabor Texture,

Ranklet Transform, Histogram Oriented Gradient and Tamura Texture are just anticipated features extractors based on textures. [3,17] The comparisons of two retrieval strategies based on image are mentioned in this paper which is Gabor filter and HOG. Section II discusses about some of the retrieval systems based on content of an image. Section III focuses on the methodology of both methods.

Section IV represents the comparative results. Lastly, V section states conclusion. Ease of use.

2. LITERATURE REVIEW

Afffi and Ashour [4,23] proposed a retrieval system based on content of an image. Colour and texture topographies of an image along with rank let transform are selected in this work. The rank let image is generated from the original image. In [9,16] another retrieval system using contents of image such as colour histogram RGB [10,19,20], Tamura texture and Gabor features is applied and tested on the basis of three parameters: correctness, value and accuracy rate is evaluated in study. In work presented in [5,18]; application of Gabor texture descriptors that are implemented by assigning weights to every individual feature correspondingly and determine the likeness with joint feature of colour and texture representation to Euclidean distance in standardized form. The motive in study [6] is the availability of RGB or coloured to grayscale converted images. The grayscale images are used here to diminish the computations and raise level of efficacy. The grayscale images are subdivided into blocks of several dimensions. Mining of texture statistical features is done according to the possibility sharing of concentration intensities in all blocks. Authors of study [7,22] are concerned with key technologies and advantages of retrieval systems based on contents of image. by the Examination of the features that best specifies characteristics are utilized within the system that are traditional in nature, a technique that combines color, composition and shape to picture recovery with preferences and advantages is discussed in the paper.

Moctezuma et al. [8] humans require surveillance which is hysterical in the environment. HOG method was deployed with possibilities of results for comparison of algorithm related to human sensor. Visual features including characteristics are (alternately shape and color) in [5, 25], which features are ordered and under over legal grounds. Features conceptually are very important and they also presented to accessible systems for correct utilization of primitive characteristics. The description of primitive characteristics is quite important so majority data lost due to these appropriate changes of an image. Sematic gape [7, 26] not absolute adequate of an image with lost data due to these situations. Hence different techniques for digital image recovery utilization with purpose of the sematic gap. Client's problem cases favorable for system to understand these circumstances by technology. They methods and technics are in favor and profitable for clients' problems. A system for image retrieval requisition from any general or specific field of life. These gaps can be minimized finer by learning algorithm and then apply it to problem area. Sensory gap of illustration concerning for indicating different problems; Genuine structure for the data lost in advanced organization or format of an image. Shape characteristics are comprised of places, nature, landmarks. Dataset and Query image for classification by processing on different stages are barely utilized by RGB. Affected part cannot seen by naked eye and as it is unable for visualization, so captured image can show these minor things by using Content based Image retrieval system. Computer Vision can be helpful for comparative analysis of different algorithm of Hue Saturation value. CBIR system can be done by using Computer Software with expertise of human.

Besides, spaces by Luv. [15, 24, 27, 28, 29], Alternative circumstances for considerable measurement of extended area to utilization for the constructing spaces of color with majority positive position, shades or seeing position outcomes which are not variable [30,31,39]. Computation color histogram grounded with color features for image retrieval that allows identifying shades in different conditions data is affected from original color and shades. Portrays has distributed color histogram and these images can be saved in dataset. When image searched while surfing and resultant distinguish white 20% and yellow 80% ratio proportion. Researcher Swain and Ballard worked on algorithm named as "Histogram Joint Intersection". In [38,40] method used for surfing the Query Image, which composed of different color proportions. The retrieval of images based on distance vector sizes and at the end remote measurement coordinates.

Texture base features are broadly variation methods computation of the variety than a color characteristic. Gabor filter [24, 34, 35] and Wavelets [32, 33], Texture images utilization computational methods for Image retrieval. Gabor filters is improved result, the for-shape detection characteristics detection "Human Visual Cortex" [36, 37]. The techniques for concerned mechanisms with different the retrieval of image Variation levels or specific track. Similar Images texture extracted with most widely the utilization for affected region. Modifications in context of

shifts, scale changes or rotations of image, may be brought into feature space, although knowledge within the texture method may be lost [11, 12, 24]. Additional descriptors for textures are acknowledged. It shows appearances subjected to the dynamics of Fourier transform. Global Features as well as resultant characteristics from co-existence matrices. Global Features that aimed at global level or for common image level. Segmented image parts color and texture characteristics both it might be adeptly being used technique, so simply for obtaining native properties is to use limited dimension of blocks along with position. It used for functioning with local characteristics called as partitioning of image. [7, 24] Histogram Oriented Gradient algorithm used for feature extraction of local levels using different edge detection techniques that take more facts rendering to the objects, image or constructions and consideration. The comparison of HOG and Gabor Filter was tested on different dataset which based upon different distance of image features. Visual object recognition used for identification different things identification that is known as Support Vector Machine (SVM). Histogram Oriented Gradient (HOG) descriptor essentially characteristics arrays for identification of Human. Algorithms used adopting linearity demonstrated tentatively by reviewing existing edge further characteristics. In article [21, 46], The Researcher had accumulated system unsolved the portions of image is used for automation partitions, image retrieval automatic for features extraction segmentation. Texture possession and source of color is process of separation which is proficient according to article. [45] Dissimilar image collection is gathered by chromatistics, Hence it used for image extraction and it is also very important technique and gaining fruitful segmentation of images using not similar images. Shape gained by the process of segmentation. Visual features in comparison to texture features are as to high level to low level of an image and not resemblances of the objects. Semantic structure concepts are discussed in article [51, 52] to users' requirements as per scenarios and there are no resemblances between different objects, so "Semantic and Cognitive" provided followed by retrieval of image and later visual characteristics. In 1996 researcher initially recommended characteristics low to high level of data extraction from any dataset. [53, 54].

3. METHODOLOGY

3.1 Data Set

The dataset was acquired by authorization of an agreement with Dr. Thomas Deserno (née Lehmann) in [41,42], of Medical Informatics Department University of Aachen Technology Germany.

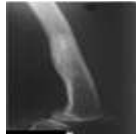
- One of the key points here is the extraction of dissimilar structures for designing a reliable and functional retrieval system for images.
- The classification of images is mainly dependent on the global shape features for example texture, shape, colour features.
- All images are resized in 112 x 92 bounding box in the
- Dataset to fit and to maintain the original aspect ratio. The classification of all images is according to the IRMA code.
- 193 categories were defined which are based on this code.
- These categories are provided for 3088 images,
- 772 remaining images are used for the testing purpose.
- We have used texture features based on Gabor filter and Histogram Oriented Gradient features.
- Support vector machines (SVM) is used to order the images for that SVM. For multi class SVM Classify command is used. One-versus-one classifiers (popularly called as "one-versus-one" classification)

3.2 Gabor Texture

- The key characteristic of Gabor filter are Texture division and Texture Feature extraction hence this is commonly used in most of the applications based on image processing. Gabor filters are operational in lessening image idleness and robust to noise.

Gabor Filters have a chance to be possibly connected on a limited positions alternately convolved for the entire image. Those possibilities for existence of gradient orientation for local image portions are carried out by HOG procedure. Over image transforming provisions the Gabor space is very handy and it is used in optical character identification, iris identification and thumbprint identification.

a) Query Image



b) Output Image.

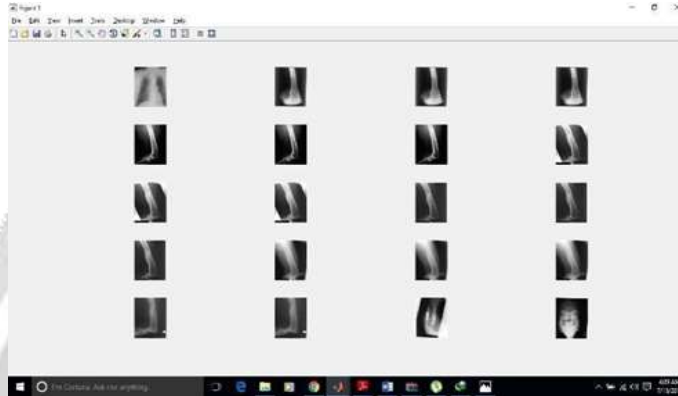


Fig -1 Gabor filter images a) query image b) Output images

3.3 Histogram Oriented Gradient

Histogram Oriented Gradients can be used in object finding in an image [47, 48].

- Split the image into trivial linked small blocks, and for every block calculate a histogram of gradient directions or edge alignments of the picture elements inside small blocks.
- Each small block is discretized into angular bins rendering to the gradient alignment [49, 50].
- Every small block of pixel adds weighted gradient to its equivalent angular boxes
- Normalized group of histograms characterizes the histogram of a block. And collection of those block histograms characterizes the descriptor.
- A training of a bunch of twenty images from every class was made using SVM of that specific category. Now we have collection of $20 \times 193 = 3860$ trained models [13,43]. The identical marks were then calculated along with different trained models for each test image. The twenty nearest matched results are calculated then, and number of distance closer to a particular category is attained. The examined image is then saved in the corresponding folder of image class. The accuracy percentage is later achieved by quantity of accurate matches in a particular category [14,44].

a) Query Image



b) Output Images

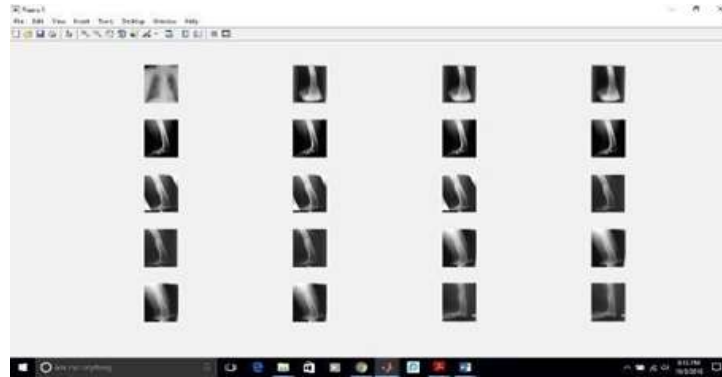


Fig -2 Histogram oriented gradient images a) Query image b) Output images.

In figure 1 are the retrieval results of the Gabor filtered images for the query image which shows the results in which 2 images are dissimilar images and the remaining 18 images are the similar to the class of query image which define the accuracy of the Gabor filter. In figure 2 are the retrieval results for Histogram oriented gradient in which there are 19 images are related to the query image and 1 image show the dissimilarity from the class of query images. Figure 3 shows the accuracy graph for Gabor and histogram Oriented Gradient which is obtained by calculating the number of retrieved images matching with query image. Figure 4 shows the categories of different X- ray images in their respective directory arranged in the dataset.

Figure 5 shows the images of the knee and ankle and figure 6 also shows the images of cranium and neuro- cranium where there is high overlapping of images. Figure 7 shows the correctly classified chest x-rays images in the category 1 of the dataset.

4. RESULTS AND DISCUSSION

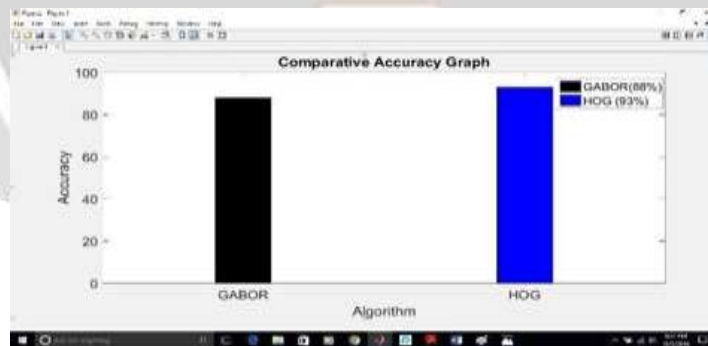


Fig -2 Accuracy of HOG and Gabor filter

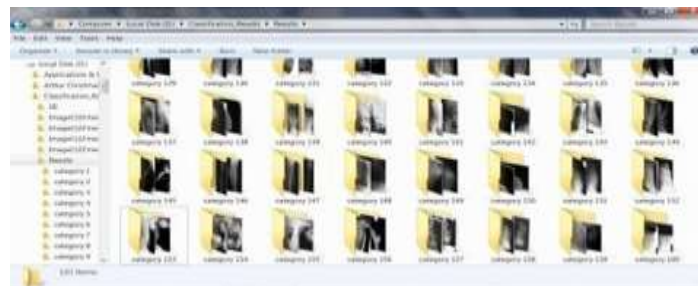


Fig -4 Different categories of x-ray images are shown in their corresponding directories.

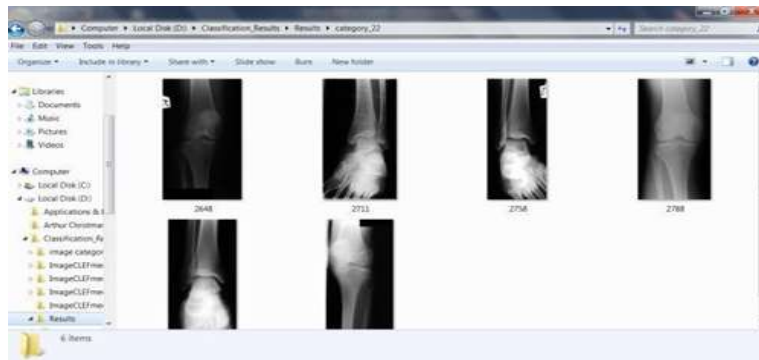


Fig -5 Representation of high overlapping between cranium and neuro-cranium



Fig -6 Representation of high overlapping between knee and ankle joint

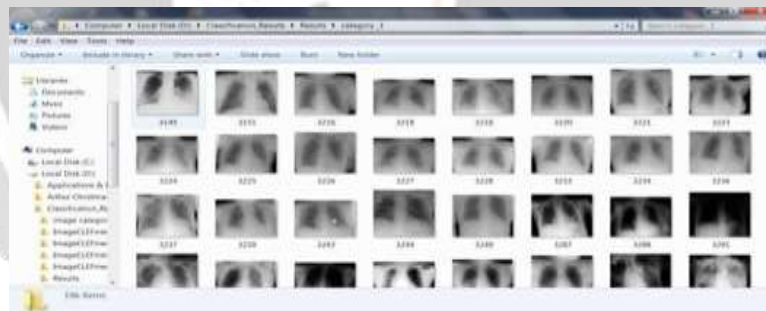


Fig -7 Representation of correctly classified images

5. Conclusion

In comparative Analysis of texture based mostly content based image in Figure three retrieval of Gabor filter and histogram oriented gradient, it has been determined that the no of matches of retrieval of each the filters dissent in range that show the accuracy of both the filter. The Histogram Oriented Gradient is 93% accurate and the accuracy of Gabor filter is 88%. The nearest distance image with a particular ordering is kept in that particular category. Accuracy level is found by quantity of correct equals in every precise class. In this way HOG proved more efficient than Gabor Filter. Any pixel of image is not removed by HOG through making changes on it and HOG becomes more accurate by this feature and normalizing the histogram. HOG does not remove any pixel of image while applying variations on it and this make HOG more correct. Overlapping has been observed at some regions in the images therefore once the images are retrieved from the dataset for testing the number of alike image identical with output image.

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