A Review: Content Based Image Retrieval Architecture and Technique

Aasia Ali
M.Tech Student DoCSE,SMVDU Katra J&K

Sanjay Sharma
Assistant Professor DoCSE,SMVDU Katra J&K

Abstract: Image retrieval is a very imperative area of digital image processing. Images can be retrieving from a large database on the basis of text, color, structure or content. Content-based image retrieval uses the visual fillings of an image such as texture, color, shape, & spatial layout to represent and index the image. In typical CBIR systems, the visual content of the pictures in the database are extracted & described by multi-dimensional feature vectors. The feature vector of the images in the database forms a feature database. To retrieve the images, users offer the retrieval system with example images. The structure then changes these examples into its internal representation of feature vectors. In this paper we present the review on various content based image retrieval techniques.

Keyword: Content-Based Image Retrieval (CBIR), Bit pattern feature, color co-occurrence feature, content-based image retrieval.

I. INTRODUCTION

Digital Images are used in several field like design, fashion, face recognition, biometrics etc. DIP is a subfield of signals and systems but focus particularly on images. For all these purpose searching &retrieval of images are become very significant.

As the dissemination of video and image data in digital form has enhanced, Content Based Image Retrieval (CBIR) has convert a striking research topic. Thus a significant job that needs to be addressed is instant retrieval of images from large databases. Here Content based signifies that the search look into all the contents of the imageries instead of the metadata such as keywordsor depiction associated with image. The term "content"might refer to colors, shapes, textures or any other information related to image that can be derived from the image itself [1]. This is about CBIR. Since the image searching and retrieval used in many field that is why the output or result should be efficient & less time consuming. The researchers also focus on decreasing the semantic gap. Semantic Gap is basically the gap between the information extractable automatically from the visual data & the representation; a user may have for the similar data. The time consumed in sorting, searching and retrieval of images should be minimum with high level of percentage of similar images in both means in terms of distance & human perception. In short the less time consume and the relevant output is produce. The purpose of CBIR is to leave out the use of textual explanations. So in CBIR, retrieving of image based on a likeness in their substances like textures, colors, shapes etc. Are lower level attribute of image. CBIR is the use of computer vision methods to the image retrieval difficulty, that is, the difficulty of discovery of images from large databases. In Content based image retrieval the search will find out the actual matters of the image rather than the metadata such as keywords, tags, &/ordescriptions associated with the image. In CBIR, retrieval of image is based on similarities in their contents, i.e., textures, shape & colors which areconsidered the low level features of an image. TheMarker of CBIR system is low level feature extraction.Feature extraction may be through with region or anentire image [2]. These formal approaches for imageretrieval are supported on the computation of thesimilarity between the users query and images. In CBIReach individual image is stored in the large database &its features are extracted, matched to the features of thequery image. Thus,

broadly, it involves two procedures,viz, feature extraction and feature matching.

II. RELATED WORK

Dr. M.S. Chavan et.al [3] proposed that the ability to match on texture similarity can often be useful in distinguishing between areas of images with similar color (such as sky and sea, or leaves and grass). **Fazal Malik, et.al [4]** proposed a CBIR method which is based on the performance analysis of various distance metrics using the quantized histogram statistical texture features. The comparison measurement is implemented by using seven distance metrics. The experimental results are analyzed on the basis of seven distance metrics individually using dissimilar quantized histogram bins such that the Euclidean distance has better efficiency in computation and effective retrieval. This distance metric is most commonly used for similarity measurement in image retrieval as of its efficiency &effectiveness. **ManimalaSinghaand et.al [5],** they presented a novel approach for Content Based Image Retrieval by combining the color & texture features so-called Wavelet-Based Color Histogram Image Retrieval (WBCHIR). Similarity between the images is ascertained by means of a distance function. The experimental result shows that the proposed technique outperforms the other retrieval techniques in terms of Average Precision. **Md. Iqbal Hasan Sarkeret.al [6]** proposed that using only a single feature for picture retrieval may be inefficient. They used color moments & texture features and their experiment results demonstrated that the proposed method has higher retrieval accuracy than the other methods based on single feature extraction. **N.R. Janani et.al** suggests [7] a content-based image retrieval method which combines color and texture features in order to develop the discriminating power of color indexing techniques & also a minimal amount of spatial information is encoded in the color index. The motivation behind this paper is a study on the works complete by early researchers in the arena of content based image retrieval based on color and texture features.

III. CBIR FUNDAMENTALS

The basic CBIR fundamentals and are divided into three parts such as feature extraction, multidimensional indexing and Retrieval system architecture. Feature Extraction: Features are divided into 2 categories respectively text based &visual based. Textual features are keywords, tags, annotations etc. Visual features are color, space and texture etc. Visual features are the significant features of an image for arrangement recognition [8].

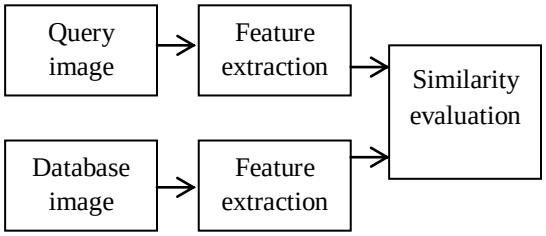

Fig 1: Block Diagram of CBIR

i. Color: This is one of the most important features of CBIR. Histogram, Block based, Color histogram moments are particular examples where colortypes are used to retrieve images. It is widely used for image representation and independent of size of an image. Color feature extraction usages color space, color quantization & similarity measurement key components. RGB and HSV are two color based and hardware based color models used for feature extraction.

ii. Texture: Texture defines visual pattern and it contains imperative information about structural arrangement of the surface including cloud, trees, bricks, hair and fabric and its relationship to the surrounding environment [9]. Some methods of classifying texture include:
   a) Color Co-Occurrence Matrix
   b) Low Texture Energy.
   c) Wavelet Transform.

iii. Shape: Shape does not mention to the shape of an image but to the shape of a specific region that is being sought out. Shape descriptors may also need to be invariant to translation, rotation and scale. Some shape descriptor includes:
   a) Fourier Transform
   b) Moment Invariant

IV. APPLICATIONS OF CBIR

There are different possible applications for CBIR technology has been determined. Some of these are cited below:

a. Investigations: In investigation CBIR used as face recognition systems and copyright on the Internet
b. Shapes Identification: In this identification of defect and fault in industrial automation.
c. Medical Diagnosis: In medical diagnosis CB IR plays very important role in Tumors detection, Improve MRI and CT scan Understandability.
d. Remote Sensing: Various information systems, weather forecast, satellite images.
e. Trademark Databases, Art galleries, museums and archaeology.
f. Architectural and engineering designs.
g. Cartography: map making from photographs, synthesis of weather maps.
h. Digital Forensics: finger prints matching for crime detection.
i. Radar Engineering: helps in detection and identification of targets

V. CBIR TECHNIQUES

There are some techniques the content based image retrieval system used for image retrieval in many applications. Relevance Feedback: As per time varies different users may have different need [10]. User follows the following typical scenario for relevance feedback in CBIR:

i) Machine provides early image retrieval results.
ii) ii) User provides his estimation that whether the retrieved image is relevant or not.
iii) Machine takes the consumer feedback and again search for images according to user query.

a) Semantic Template: This technique is generated to support high level image retrieval & not so widely used. This method is usually defined as the representative feature of concept calculated from a collection of sample images [11].
b) Wavelet Transform: Wavelet transform is based on diminutive waves called wavelet of varying frequency and limited duration. Discrete Wavelet transform divides the images into 4 different parts namely higher frequency part (HH), High Lower Frequency part (HL), Low High Frequency part (LH), and Lower frequency part (LL). After doing the vertical parts as 1-level pictures decomposition, it computes moments of all parts & store & use it as feature to obtain images [12].
c) Gabor Filter: It is widely used for texture analysis because of its similar features with human perception. A 2 dimensional Gabor function g(x, y) consists of a sinusoidal plane wave of some frequency and orientation (Carrier), and two dimensional translated. Gaussian Envelope is used to modulate it [13].
d) Support Vector Machine: It is supervised learning technique in which data is analyzed and identify pattern used for classification purpose [14]. In classification it takes set of input, read it and forms output for each desired input and if the output is continuous then regression is performed.

VI. CONCLUSION

The Content based image retrieval system is an emerging way of image retrieval from a large database. Although this area has been explored for decades, there is still a very large scope for achieving the accuracy of human visual insight in distinguishing pictures. The CBIR system can be improved by improving the indexing, retrieval design and feature extraction mechanism and to reduce the time better clustering approach through image decomposition & feature extraction can be used. To achieve more accurate and fast results better methods of image decomposition can be applied. Other techniques of clustering can be used with the system. At last in this paper we studied the basic Content based image retrieval system and the use as well as the evolution of wavelets in the field of CBIR systems.

REFERENCES

[1]ManimalaSingha, “Content Based Image Retrieval usingColor and Texture ”Signal & Image Processing : AnInternational Journal (SIPIJ) Vol.3, No.1, February 2012.[2]

[2] M. Rehman, M. Iqbal, M. Sharif and M. Raza, “Content Based Image Retrieval: Survey”,

DOI:10.5829/idosi.wasj.2012.19.03.1506,World Applied Sciences, vol. 19, no. 3, (2012), pp. 404-412, ISSN 1818-4952; IDOSI Publications, 2012.

[3] Deepak S. Shete1, Dr. M.S. Chavan (2012) "Content Based Image Retrieval: Review" International Journal of Emerging Technology and Advanced Engineering ISSN, Volume 2, pp2250-2459.

[4] Fazal Malik , BaharumBaharudin(2013) "Analysis of distance metrics in content-based image retrieval using statistical quantized histogram texture features in the DCT domain", Journal of King Saud University –Computer and Information Sciences Vol 25 ,pp.207 -218.

[5] ManimalaSingha and K.Hemachandran(2012) "Content based image retrieval using color and texture "Signal & Image Processing : An International Journal (SIPIJ) Vol.3, No.1, pp.39-57.

[6] Md. Iqbal Hasan Sarker and Md. Shahed Iqbal (2013) "Content-based Image Retrieval Using Haar Wavelet Transform and Color Moment" Smart Computing Review, vol. 3, no. 3, pp.155-165.

[7] MS. R. Janani, Sebhakumar.P (2014) "An Improved CBIR Method Using Color and Texture Properties with Relevance Feedback International Journal of Innovative Research in Computer and Communication Engineering Vol.2, Special Issue 1.

[8] Shamik Sural, "segmentation and histogram generation using the hsv color space for image retrieval" IEEE ICIP 2002.

[9]Deepak John, "Content Based Image Retrieval using HSV-Color Histogram and GLCM "International Journal ofAdvance Research in Computer Science and Management Studies Volume 2, Issue 1, January 2014.

[10]K. Haridas, "Well-Organized Content based Image Retrieval System in RGB Color Histogram, Tamura Texture and GaborFeature" International Journal of Advanced Re search inComputer and Communication Engineering Volume 3, Issue10, October 2014 .

[11]Mussarat Yasmin, "Use of Low Level Features for Content Based Image Retrieval: Survey" ISSN 2277-2502 Vol. 2(11),65-75, November (2013).

[12]K. Nirmala , "Comparative Analysis in Content Based ImageRetrieval System Using Color and Texture" InternationalJournal Of Engineering Sciences & Research Technology, November (2013).

[13]Mr. Milind et al, "Efficient Content Based Image Retrieval Using Color and Texture", International Journal of Scientific& Engineering Research, Volume 4, Issue 6, June- 2013 121ISSN 2229-5518 8B. Ramamurthy and K.R. Chandran,"Content Based Medical Image Retrieval with Texture.

[14]Sapthagiri.k, "An Efficient Image Retrieval Based on Color,Texture (GLCM & CCM) features, and Genetic-Algorithm "International Journal Of Merging Technology And AdvancedResearch In Computing.

Aasia Ali has a Master's degree in Computer Science and Engineering from SMVD University, Katra Jammu and a Bachelor's degree in Computer Science and Engineering from Islamic University of Science and technology Awantipora Jammu & Kashmir. She has been involved in a number of research projects relating to the field of image processing and her areas of expertise are Image processing, Artificial Intelligence and Neural Networks.

Prof. Sanjay Sharmaholds a Master's degree in Computer Science and Engineering and is currently working as an Assistant Professor in the Department of Computer Science and Engineering at SMVD University, Katra Jammu. He has been involved in a number of projects relating to the field of Neural Networks and Artificial Intelligence. His areas of expertise include Image Processing, Computer Architecture and Artificial Intelligence.