A REVIEW ON CONTENT BASED IMAGE RETRIEVAL SYSTEM PROCESS AND FEATURES

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Abstract: Nowadays, CBIR (Content-Based Image Retrieval) technology is emerged as important technique to retrieve the image; it contains color, shape or text from huge data storage collection. Onset of computer vision and increasing the number of images taken by digital video device pointed for image containing user specified characteristics in large image database has become more important. As one of the most important applications of image analysis and understanding, CBIR has received more and more attention. The tremendous growth of the quantities and sizes of digital image require powerful tools for searching in image databases collection. The sematic gap is an intermediate gap between low level and high level machine description. This gap is minimized through efficient CBIR technique process based on color and shape of images.

Index Terms **– CBIR, GAP, TEXT, COLOR, SHAPE & SKETCHES.**

I. INTRODUCTION

CBIR classified into two categories i.e. text based and content based. Text based method has less number of applications due to manual process and moreover it is inefficient compare to content based approach. CBIR is content based efficient method of retrieval system, with the help of this method, the images can be figured out based on sketch similar image or color similar image to querying image based on its feature. Most of these systems decompose images into bags of local features such as texture, edginess and color. When dealing with a query, the system extracts features from the query, compares them to that of the images stored in the database collection, then the distance between the query image and each image in database storage is evaluated according to the similarity of features. This retrieval process is termed as Query based visual retrieval (QBVR).

Color is one of the most commonly used low-level visual features and is invariant to image size and orientation. Since machines deal with low-level features extracted from image pixels, it provides a numerical description of images but with a wide gap compared to the human interpretation of the same image. This gap between the high-level human's perception and low level machine's descriptions is known as the 'semantic gap'. The user looks up for semantic similarity, but the database can only provide similar images by a digital processing.

II. CBIR PROCESS

CBIR has come in way to retrieve the image based on the content. CBIR avoids many problems with traditional way retrieval images. Content Based Image Retrieval (CBIR) is the process to retrieve images from low level features like colour, texture, shape and spatial information. The most challenge of CBIR is to determine the exact/approximate image of database to query image. It extract content based features namely colour, texture, shape from image. By comparing between query and database image determined by the difference of features of the image by distance function. A feature vector is extracted from the query image and is matched against feature vectors in indexed. CBIR takes image database, Query image, image database features, Query image features, Similarity matching process, and resultant or matched image from the database. Feature image of both query image and database image is firstly calculated. Then similarity measurement is done between two. The database image matches with query image is ranked as first and so on.

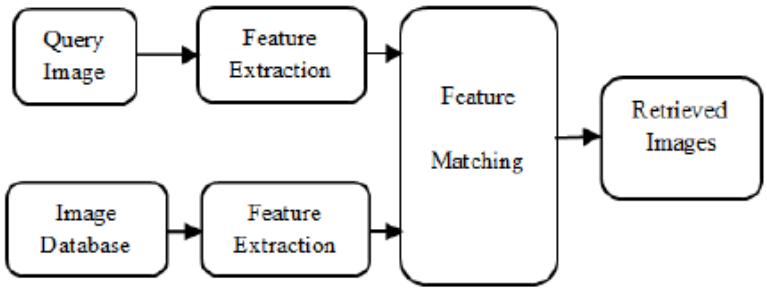

Figure1: CBIR SYSTEM PROCESS.

III. IMAGE FEATURES

Image features are well-defined as the characteristics of the image. There are classified into three levels. Namely

- Low level: It consist of texture, colour, shape, spatial information.
- Middle level: There is procedure of specific types of objects.
- High level: There is specific content of the image, Impression, emotions etc.

After Extract the feature vector of an image and calculate feature vector. So the low level features are extracted and considered.

IV.LITERATURE REVIEW

The literature survey relevant to the study of CBIR and HSV characteristics based on color and shape of images are as follows:

Avneet Kaur, Chhabra the merits and demerits of each CBIR methods are discussed. The CBIR technology can be used in several applications such as image search, social networking sites, and forensic labs, which suggest an overview of modern CBIR methods. [1]

Srikanth Redrouthu, Annapurani. K described the time comparison between various feature extraction techniques of content based image retrieval. Comparison between HSV color spaces based feature extraction and RGB color space based feature extraction was elaborated. [2]

Neelima Bagri and Punit K. Johari surveyed the futuristic based color and shape based better feature for analyzing the images. Several features of texture and shape were described and give the comparative study between them. [3]

Bhoomika Gupta, Shilky Shrivastava and Manish Guptathe research work is more robust and gives better results in terms of shape, color and texture fused categories than the texture and color features based image recovery. The investigational results show good accuracy up to 82% as compared to previous techniques. [4]

Ahmad Alzu'bi, Abbes Amira, Naeem Ramzanthe study has presented some recent interesting and promising techniques that are expected to make a breakthrough in the field of image retrieval. These techniques should vastly contribute in solving the challenges in CBIR domain such as the: semantic gap, curse of dimensionality, comprehensive image representation, automatic image annotation, ranking, and visual structure of the query. Image datasets, distance measures, and performance measures are also very important components that need to be more standardized in order to provide a robust ground for CBIR evaluations in terms of accuracy, efficiency and scalability. [5]

Mukul Majhi and Sushila Maheshkar proposed a technique that is secure and efficiently accessible using both color and texture features. The explored privacy preservation of image retrieval technique by encrypting the feature vector set obtained from texture properties of image which consists of BDIP and BVLC along with quantized HSV color space histogram. The experimental results demonstrated that the privacy of extracted feature is preserved which sustain potential cryptographic attacks with effective retrieval efficiency. [6]

Jayant Mankar, Anjulata Sahu, Kanchan Harode, Megha Pawase, Nisha Titarmare, Rima Karadbhajne, Soumya Katti the study for the retrieval of concern image data from the huge database is tedious task in terms of the storage and retrieval time. So the image data storage and retrieval time are the perplexities of any database systems. To overcome these perplexities, the image retrieval systems are exist .The majority of image retrieval systems focus mainly on color distribution. The techniques such as DWT and DCT are used. Finally compares the results of DWT with DCT, DWT is better than DCT since DWT can compress image better than DCT. [7]

Arun Singh Chouhan, Prabhleen Kaur, Saroj Bala they studied CBIR applications are used in ecommerce, image mining, feature extraction, local and global features, shape descriptors and comparative discussed methodologies used for extracting the salient low level features and various distance measures to find the similarity between images in reducing the semantic gap between the low level features and the high level semantic concepts. [8]

Kratika Sharma and Sanjeev Jain they uses different methodologies for Feature extraction, better and more accurate retrieval rate can be ensured. In order to improve efficiency of any CBIR system, discovery of semantically meaningful pattern is preferred. [9]

Vidya Kalpavrikshaand Laxmi Kullurexplains various methods of CBIR based on their related features. By using different techniques such as analyzing, searching, storing, browsing, retrieving and similarity of images from the image database can be done automatically. Based on color, the methods include RGB images, RGB color space, RGB color model, HSV color model, Color moments, color correlogram etc. Based on shape the methods include Scale Invariant Feature Transform (SIFT), Histogram of oriented gradients (HOG), nearest neighbor search method, Euclidean distance algorithm method, Prewitt operator method etc. Based on texture the methods included are Co-occurrence matrixes, Color Correlogram, Color texture moments, Local Binary Pattern (LBP), Brodatz Texture Album and CUReT Dataset. [10]

Sakshi Gupta and Nirupama Tiwari uses the substance based picture recovery framework, by giving an outline of the most essential viewpoints portraying that sort of pictures. A study on content construct picture recovery situated in light of unlabelled pictures. As decision, this paper gives a picture recovery work. A wide inquires about of have been made on picture recovery. [11]

Shabnam Kumari, Reema, Yashika Kadian explains CBIR is a fast developing technology with considerable potential. The dramatic progress by digital media at home, in enterprises, and on the web, has from above her last decade spawned great interests in developing ways for powerful indexing and searching of desired visual contents to open the worth of those contents. CBIR is the sub concern of CBR it is necessary to advance energy instruments to retrieving images from the web where the number and size of digital snap sort is developing fast. The area of content-based image retrieval is a hybrid research area that requires knowledge of both computer vision and of database systems. [12]

Brinda N. and Joshi Narendrasinh Limbad explains the several researches are going on for image retrieval by using these image features. In early stage, only single feature was used for image retrieval but because of their limitation, fusion of image features are carried out like color and texture, texture and shape, shape and color or combining all three. To make user interacting system, fuzzy rule sets were used in retrieving process that allows to user to regulate and choose the images according to their requirements. Still the researchers are continued in finding more effective method to make more accurate and efficient image retrieval. For evaluating similarity, various similarity measures are used which compares the query image with database images by calculating the distance between extracted features of images. Images having less distance are considered as more relevant images. [13]

Sunil Chavda and Lokesh Gagnani they studied that when the feature dataset is divided into similar image classes by clustering and classification the retrieval of similar images time will be decreased because there are similar images placed together. Proposed

method is better than normal method because it provide better result and less time than normal method. The proposed system used in all types of image because it is not based on dataset used. The feature work is to retrieve the exact shape from the retrieval image of the proposed method. [14]

R Rajkumar and M V Sudhamani explains the retrieval based on combination of features and SNN. The experiments were carried out on the CBIR-50 dataset. The average precision value was 82.12%. In order to enhance the precision value from the earlier method, a deep learning approach, SNN was adopted. The result obtained for average precision for all the categories is 98.62% which is more than the existing works. The time taken for the top 100 similar images on is also recorded. The Siamese neural network is seen to give high precision results. But in case of new category of images gets added, then the model needs to be retrained along with new category and this consumes time for retraining. There is a scope to improve the network such that it can retrieve the new category of image by extracting features and also avoid the retraining phase. [15]

Wengang Zhou, Houqiang Li, and Qi Tian Fellow they investigated the advance on content based image retrieval in recent years. They focus on the five key modules of the general framework, i.e., query formation, image representation, image indexing, retrieval scoring, and search re-ranking. For each component, we have discussed the key problems and categorized a variety of representative strategies and methods. Further, they have summarized eight potential directions that may boost the advance of content based image retrieval in the near future. [16]

Afshan Latif, Aqsa Rasheed, Umer Sajid, Jameel Ahmed,Nouman Ali , Naeem Iqbal Ratyal ,,Bushra Zafar ,Saadat Hanif Dar, Muhammad Sajid, and Tehmina Khalil they studied the optimization of feature representation in terms of feature dimensions can provide a strong framework for the learning of classification-based model and it will not face the problems like overfitting. The recent research for CBIR is shifted to the use of deep neural networks and they have shown good results on many datasets and outperformed handcrafted features subject to the condition of fine-tuning of the network. The large-scale image datasets and high computational machines are the main requirements for any deep network. It is a difficult and time-consuming task to manage a large-scale image dataset for supervised training of a deep network. Therefore, the performance evaluation of a deep network on a large-scale unlabeled dataset in unsupervised learning mode is also one of the possible future research directions in this area. [17]

Kai Chu and Guang-Hai Liu they studied Feature extraction and representation is an important issue in CBIR and has a close relationship with human perception. Color and edge cues are visual search components for stimuli perception that can express meaningful characteristics of images or scenes. Representing image contents via extracting color and edge features based on feature integration theory is a challenging problem. To address this problem, a new and highly simple but efficient representation based on the multiintegration features model, called the MIFH, is proposed for CBIR using the feature integration theory. [18]

Dipti Mathpal, and Sarangi Mehta explains the Almost all the tradition methods for CBIR uses metadata such as keywords, or descriptions to the images. So that retrieval can be performed over the annotation words. CBIR involves the four parts data collection, build up feature database, search in the database, arrange the order and deal with the results of the retrieval. The real world requirements are Face Recognition, Biodiversity, Information System Art Collections, Scientific Databases, Medical science and so far. [19]

Amna Sarwar, Zahid Mehmood, Tanzila Saba, Khurram Ashfaq Qazi, Ahmed Adnan and Habibullah Jamal explains the proposed method uses complementary features in the form of visual words integration of the LIOP and LBPV descriptors to overcome the issue of the semantic gap of the CBIR, which also improves the performance of the CBIR. The visual words integration also performs better as compared with the feature integration method. [20]

Paul C. Kuo studied CBIR has arisen in response to the vastly increasing amounts of image data present in the Internet. A variety of features and similarity measures have been developed to enhance the query accuracy and overall functional utility. However, many of these are not sufficiently robust or specific to adequately capture the semantic aspects of the image. Termed the semantic gap, this chasm remains the single most challenging obstacle facing the field of CBIR. The contributions to image meaning of human perception, interpretation and meaning must ultimately be incorporated into CBIR algorithms to enhance overall utility. [21]

B. Prashanth Kumar and B. N. Swamy they studied the texture feature extraction techniques into CBIR system. This area can be further explored and the techniques can be finely tuned with or without involving some pre or post processing works for increasing the retrieval efficiency. The fine-tuning may be done adding some shape and color information in well-determined form with the already existing texture information to suit the application this work can be further extended to some domain-based applications such as finger print recognition, retina identification, and object detection etc for large image database. Since texture analysis consumes a considerable amount of time for feature extraction, there is a scope for optimization also [22].

Vairaprakash Gurusamy and K.Nandhini explains the related works and its features. In textual metadata based Image retrieval, Manual image annotation is time consuming, laborious and expensive. And also it has some critical problems such as the lack of appropriate metadata associated with Images, incorrect metadata and limitation of characters in the keywords. So Researchers consider CBIR is better than the Metadata. The features combining gives the best results than the other works. [23]

Qinghe Feng, Qiaohong Hao, Yuqi Chen, Yugen Yi, Ying Wei, and Jiangyan Dai explains the fusion method called hybrid histogram descriptor (HHD), which integrates the perceptually uniform histogram and the motif co-occurrence histogram as a whole. The proposed descriptor was evaluated under the content-based image retrieval framework on the RSSCN7, AID, Outex-00013, Outex-00014 and ETHZ-53 datasets. From the experimental results, it can be concluded that the fitness quantization layers of Y and Y are computed depending upon the retrieval accuracy score. [24]

S.Govindaraju, Dr.G.P.Ramesh Kumar hey studied a new method for unsupervised image clustering using probabilistic continuous models and information theoretic principles. Image clustering relates to Content Based Image Retrieval systems. It enables the implementation of efficient retrieval algorithms and the creation of a user friendly interface to the database. This paper uses Hybrid

Fuzzy C-Means Clustering algorithm for retrieving the relevant images. An experimental result shows that the proposed technique results in better retrieval of relevant images when compared to the existing approach. [25]

D. Latha and Dr. Y. Jacob Vetha Raj studied the real world needs CBIR idea in many fields such as medical image retrieval, natural image retrieval and remote sense image retrieval etc. Some latest application developed based on CBIR to assist the fields such as image retrieval in medical, natural and remote sense images such as average precisions rate as 73% and 77% respectively. [26]

S.Rubini, R.Divya, G.Divyalakshmi and Mr T.M. Senthil Ganesan they studied the main components of a content based image retrieval system, including image feature representation, indexing, query processing, and query-image matching and user's interaction, while highlighting the current state of the art and the key-challenges. It has been acknowledged that it remains much room for potential improvement in the development of content based image retrieval system due to semantic gap between image similarity outcome and user's perception .Contributions of soft-computing approaches and natural language processing methods are especially required to narrow this gap. [27]

Safia Jabeen, Zahid Mehmood, Toqeer Mahmood, Tanzila Saba, Amjad Rehman and Muhammad Tariq Mahmood they studied the three novel techniques, known as visual words fusions, adaptive feature fusion, and simple feature fusion of SURF-FREAK feature descriptors based on the BoVW methodology in order to reduce the semantic gap between low-level features and high level semantic concepts that effect CBIR performance. The visual words fusion significantly improves the performance of the CBIR as compared to the proposed technique based on adaptive and simple features fusion of SURFFREAK, standalone SURF, and standalone FREAK techniques. The performance of CBIR is improved because the size of the dictionary in the case of visual words fusion technique is twice as large compared to features fusion, standalone SURF, and standalone FREAK techniques that formulate a single dictionary to represent visual contents of the image, containing features of the single descriptor. Furthermore, the resultant fused descriptor contains features of both descriptors in terms of fused visual words. In order to reduce the computational cost that is raised due to visual words fusion and features fusion of SURF-FREAK descriptors. [28]

Atif Nazir, Rehan Ashraf, Taiha Hamdani and Nouman Ali they studied the color and texture based image retrieval is explained in Our work by using low level features with the combination of local and global features. Combining two or more features give a better result as compared to one feature because color and texture feature gives an efficient and appropriate result in the human visual system. Local features are extracted by edge histogram descriptor and global features are extracted by color histogram and discrete wavelet transform. Appropriate color and texture features are used to form a feature vector and similarities are matched by manhattan distance. [29]

Parul Nangia1 and Sonika Jindal CBIR is the field of image processing that has been utilized in various field of digital imaging. In this paper various approaches and recent evolutions in CBIR has been illustrated that impact on use of content based image retrieval. In the process of CBIR various properties of images have been utilized that can be used for extraction of features. In this paper various approaches based on shape and colors have been discussed that can be used for extraction of valuable features. On the basis of review of literature survey we can illustrate that an optimal approach that combines features of colours and shape can lead to high accuracy in terms of content based image retrieval. [30]

Poulami Haldar and Joydeep Mukherjee they explains the approach to CBIR is proposed but it has endless scope to work with. Endless discussion can be done with it. By different approaches it has been seen that the result and retrieval ratio depends upon the image class, for some images it gives good retrieval ratio while poor for some other ones. The implemented system, the image classes used by us give very good image retrieval accuracy. Our system performance is quite reasonable as per the accuracy graph shown above. [31]

Anubhooti Purbey, Manish Sharma and Brahmdutt Bohra they studied the Content Based Image Retrieval is an active and fast advancing research area since the 1990s. During the past decade, remark-able progress has been made in both theoretical research and system development. The impetus behind content-based image retrieval is given by the wide availability of digital sensors, the Internet, and the falling price of storage devices. Given the magnitude of these driving forces, it is to us that content-based retrieval will continue to grow in every direction: new audiences, new purposes, and new styles of use, new modes of interaction, larger data sets, and new methods to solve the problems. A wide researches of have been made on image retrieval. Each work has its own techniques, contribution and limitations. [32]

Ms. Pragati Ashok deole and Rushi longadge they studied Content based image Retrieval System is a process to find the similar image in image database when query image is given. In this paper, we use color feature extraction, color feature are extracted by using three technique such as color Correlogram, color moment, HSV histogram. KNN classifier for the classification of image and Relative standard derivation to measure similarity between two images and finally compute value of Precision and Recall. [33]

Roman Stanisław Deniziakm and Tomasz Michno they studied the new CBIR algorithm which is based on decomposition object into smaller parts, called primitives. The following set of primitives was proposed: line segments, polylines, polygons, arches, poly arches and arc-sided polygons. Each primitive is described by its type and attribute. After primitives' extraction, an object graph is build which is then compared with other graphs in the database. The idea of the algorithm is to use the same graphs both for queries drawn by a human and queries using example image. The main advantage of our approach is that it may be applied to transformed or partially covered objects. [34]

Mussarat Yasmin, Muhammad Sharif, Isma Irum, Sajjad Mohsin they studied using histogram process. Edges with angle orientation are very effective representation of a visual image. Pythagorean theory has been well utilized in image description. Results prove that the method is very useful and efficient in retrieving true representation and accurate retrieval of image to maintain the balance between precision and recall, the system has been set to retrieve 30 images per search. The proposed method is resilient to geometric

attacks as the experiments have been performed on different sizes, rotated and translated images. Features are easy to calculate and to accommodate in database, therefore, the method is flexible to use in any software and hardware environment. [35]

V. CONCLUSION

From the above literature review it is clear that the time comparison between various processes is limited to only few numbers of images. Encrypted methods based on color as well as texts were useful for safety protecting images to avoid theft, which consists of BDIP and BVLC techniques but accuracy is low. Better analysis of image retrieval, CBIR become more uniform in terms of accuracy, efficiency and scalability. Therefore proposed method uses CBIR technique to overcome the time limitation, accuracy, to retrieve more number of images from large set of database. This is the solution for current image searching challenges in any social networking websites.

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