International Journal of Advanced Trends in Computer Applications
www.ijatca.com

Image Retrieval and Classification Using Feature Swarm Neural Network Based SVM Classifier

Neha Gupta[1], Bharat Verma[2]
[1]Neha Gupta
CGC, LANDRAN
nehhag@gmail.com

[2] Bharat Verma
CGC, LANDRAN

Abstract: *The content-based image retrieval (CBIR) system is very complex and applicable and often used for image retrieval and classification strategies, as it can be used to construct image database efficiently and with high effective order. The CBIR method usually retrieves the images by utilization of image features. We propose a neural system based system for enhancing image feature based recovery. We utilize colour histogram, wavelets analysis, texture using colour correlation graphing, distance metrics of separated pictures to catch the spatial relationship among pixels and in addition worldwide/visual appearance of pictures. Test results on a subset of 500 image dataset show the viability of the proposed technique and examinations show that the proposed technique gives critical change over previous Neural Technique based on 3 level feature extraction. In this research work, we exploit a technique called SVM (Support Vector Machine) as an image feature matching to help effectively retrieving the images using feature matching which have been randomly arranged. Moreover, we use vector quantization to reduce the features comparison for improving the retrieval efficiency. The experimental results show that the method with high recall and precision is promisingly high from previous optimizations.*

Keywords: *ANN, CBIR, RNN, Features, Shape recognition, Retrieval Simulator tool.*

1. INTRODUCTION

In CBIR (Content-Based Image Retrieval), visual components, for instance, shape, shading and synthesis are removed to depict pictures. Each of the components is addressed using one or more component descriptors. In the midst of the retrieval, segments and descriptors of the inquiry are diverged from those of the photos in the database to rank each recorded picture according to its partition to the request. In biometrics structures pictures used as illustrations (e.g. extraordinary imprint, iris, hand et cetera.) are similarly spoken to by highlight vectors. The contenders samples are then recouped from database by differentiating the partition of their component vectors. The part extraction methods for this application are inspected. In diverse PC vision applications comprehensively used is the technique of retrieval pined for pictures from a considerable amassing on the reason of components that can be normally removed from the photos themselves. These structures called CBIR (Content-Based Image Retrieval) have gotten heightened thought in the composition of picture information retrieval since this extent was started years former, and accordingly a wide extent of frameworks has been proposed.

There is have to find a looked for picture from an aggregation is shared by various master get-togethers, including authors, plot masters and craftsmanship understudies of history. In the midst of the necessities of picture customers can change fundamentally, it can be important to speak to picture questions into three levels of thought first is primitive components, for instance, shading or shape, second is reliable parts, for instance, the character of articles showed and last is theoretical qualities, for instance, the enormity of the scenes depicted. While CBIR structures starting now function admirably exactly at the most insignificant of these levels, most customers intrigue more lifted measures of retrieval.

A normal CBIR structure hence evacuate visual qualities like shading, shape, arrangement and spatial information of each photo in the database considering its pixel values and stores them into an alternate database within the system called segment database [7,8]. The

component data for each of the visual characteristics of each photo is all that much tinier in size diverged from the photo data. The segment database contains an impression of the photos in the photo database; each photo is addressed by littler representation of its substance like shading, organization, shape and spatial information as an adjusted length honest to goodness regarded multi-part highlight vectors or imprint. The customers generally get prepared request picture and present to the structure. The system thusly isolate the visual properties of the inquiry picture in the same mode as it performs for each database picture and a short time later recognizes pictures in the database whose component vectors facilitate those of the request picture, and sorts the best equivalent articles as demonstrated by their closeness regard. In the midst of operation the system frames less decreased component vectors rather than broad size picture data hence giving CBIR its unobtrusive, brisk and gainful ideal position over substance based retrieval. CBIR system can be used as a piece of one of two ways. In any case, exact picture organizing, that is facilitating two photos, one a case picture and the other, picture in picture database. Other than is vague picture organizing, which is finding most about match pictures to a request picture [9].

CBIR incorporates the subsequent four segments in structure affirmation, data amassing, create highlight database, look in the database, engineer the solicitation and deal with the results of the recovery.

1) Data get-together:-By using Internet bug program that can assemble organizes normally to meeting Internet and do the get-together of the photos on the webpage, then it will go over the different systems through the URL, reiterating this technique and assembling all the photos it has studied into the server.
2) Extract segment database:-Using record structure framework do examination for the assembled pictures and concentrate the component information. Starting now, the parts that use by and large incorporate low-level components, for instance, shading, surface and so forth, the inside level components, for instance, shape.
3) Searching in the Database:-System uproot the component of picture that sits tight for chase when customer incorporate the photo test that need request, then the web searcher will look the suitable part from the database and figure the equivalent division, then find some related systems and pictures with the minimum similar detachment.
4) Process and record the results:-Index the photo obtained from looking in view of the likeness of components, and after that benefits the recuperation pictures to the customer and grant the customer select. In case the customer is not fulfilled by the looking result, he can re-recuperation the photo yet again, and request database afresh.

2. LITERATURE REVIEW

Lin et al. [2] proposed a shading surface and shading histogram based picture recovery framework (CTCHIR). They proposed (1) three picture elements, in light of shading, surface and shading dissemination, as shading co-event network (CCM), contrast between pixels of sweep example (DBPSP) and shading histogram for K-mean (CHKM) separately and (2) a strategy for picture recovery by incorporating CCM, DBPSP and CHKM to upgrade picture location rate and disentangle reckoning of picture recovery.

Jhanwar et al. [3] have made a relative study on picture recovery strategies, utilizing distinctive component extraction routines like shading histogram, Gabor Transform, shading histogram+gabour change, Contourlet Transform and shading histogram+contourlet change.

Hiremath and Pujari [6] proposed CBIR framework in light of the shading, surface and shape includes by dividing the picture into tiles. The elements processed on tiles serve as neighbourhood descriptors of shading and composition highlights. The shading and composition examination are examined by utilizing two level network structures and the shape highlight is utilized by utilizing Gradient Vector Flow.

Rao et al. [10] proposed CTDCIRS (colour-texture and dominant colour based image retrieval system), they integrated three features like Motif co-occurrence matrix (MCM) and difference between pixels of scan pattern (DBPSP) which describes the texture features and dynamic dominant colour (DDC) to extract colour feature.

Fazal Malik, Baharum Baharudin [11] proposed a CBIR technique which is in light of the execution examination of different separation measurements utilizing the quantized histogram factual surface elements. The closeness estimation is performed by utilizing seven separation measurements. The trial results are examined on the premise of seven separation measurements independently utilizing diverse quantized histogram receptacles such that the Euclidean separation has better proficiency in reckoning and compelling recovery.

Manimala Singha and K. Hemachandran [12], they exhibited a novel methodology for Content Based Image Retrieval by consolidating the shading and composition components called Wavelet-Based Colour Histogram Image Retrieval (WBCHIR). Likeness between the pictures is learned by method for a separation capacity.

Md. Iqbal Hasan Sarker and Md. Shahed Iqbal [13] recommended that utilizing just a solitary element for picture recovery may be wasteful. They utilized shading minutes and composition elements and their examination results showed that the proposed system has higher

recovery exactness than alternate routines in light of single component extraction.

N.R. Janani and Sebhakumar P. recommends [14] a substance based picture recovery system which consolidates shading and composition highlights to enhance the segregating force of shading indexing procedures furthermore an insignificant measure of spatial data is encoded in the shading file.
Arvind Nagathan , Manimozhi and Jitendranath Mungara [15] expressed in their paper that the utilization of neural system has impressively enhanced the review rate furthermore recovery time, because of its profoundly effective and precise arrangement capacity. They utilized a three layer neural system as classifier which is situated up and designed with parameters that are best suitable for picture recovery assignment.
B. Darsana and G. Jagajothi [16] utilized the neural system order technique in their paper for powerful recovery of pictures. In their paper they legitimize that the neural system arrangement technique accomplishes the objectives of grouping pertinent pictures utilizing meta-heuristics and powerfully alters the component space by sustaining programmed pertinence criticism with no human connection.
Kulkarni and Verma [17] present a fluffy rationale based methodology for the understanding of composition questions. Tamura highlight extraction strategy is utilized to concentrate every surface element of a picture in the database. A term set on each Tamura highlight is created by a fluffy bunching calculation to represent an inquiry regarding common dialect.

3. PROBLEM STATEMENT

In the colour, texture and shape based image mapping the RGB Colour model is used. Colour images normally are in three dimensional. RGB colour components are taken from each and every image. In previous methods from base and references the most common form is using the colour values for retrieval system with not varying details, but study on varying detail system is not intense, according to the base approach the deep neural network is introduced for retrieval but is too complex for simple system. So, we propose to use a 3 way approach for classification and consider the texture value of R, G, and B layer for both query image and target images are calculated and thirdly the shape feature details. These two extra values for each image are stored and considered as features. By using these stored features the target image from the repository is retrieved with respect to the query image. The following problems are proposed to be solved. Classification of retrieval properties, Time used in construction of database, Retrieval time optimization, Probability of false detection.

4. PROPOSED SYSTEM

Get the image and perform initial pre processing. The image dataset is then analyzed with a swarm of feature filtering networks based on colour features, texture features, variance of mean, wavelet based derivative energy. After performing Swarm Particle filtering for colour, shape and size extraction the features are then sent to a local database with sequential storage. The database is then analyzed using neural learning for aligning and filtering relevant. Features and reducing errors among the extracted features data. Performing the Neural analysis for extraction of the feature maps for each swarm particle system from previous step improves time efficiency and match accuracy. Select a query for retrieval of similar images from dataset of featuresand perform classification of response using SVM. Perform comparative analysis with other processes
Precision-versus-recall curve is the basic evaluation measure in information retrieval. They are defined as follow:

$$\text{Recall} = \frac{number\ of\ relevant\ images\ retrieved}{total\ number\ of\ relevant\ images\ in\ the\ database}$$

$$\text{Precision} = \frac{number\ of\ relevant\ images\ retrieved}{total\ number\ of\ relevant\ images\ retrieved}$$

5. BLOCK DIAGRAM

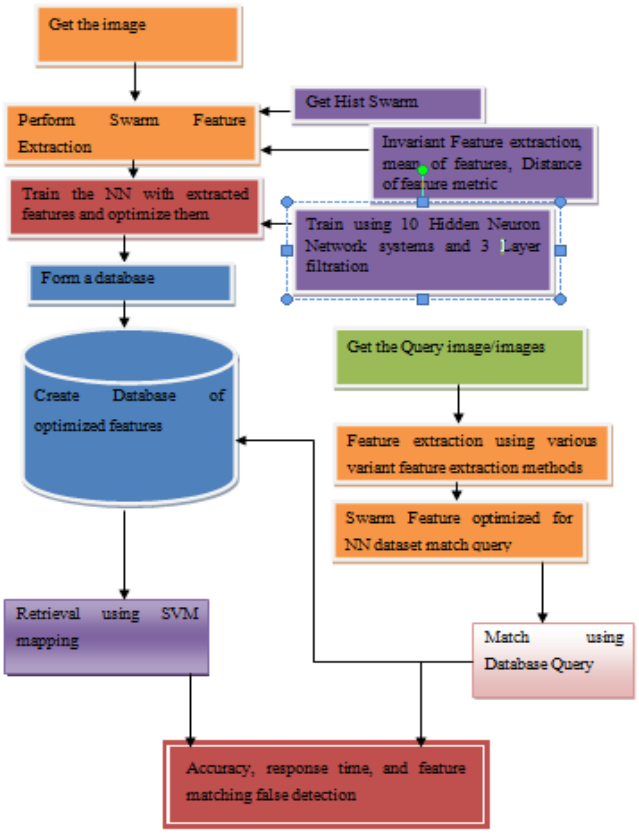

Figure 1: Shows the proposed System Diagram

6. RESULTS

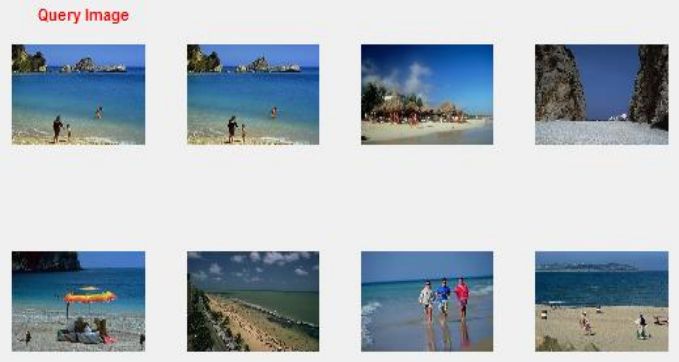

Figure 2 Shows output for Query image with random selection using Optimized Dataset System

Figure shows the returned response to query images for the optimized system and can be seen that the returned images are very significant to the query in terms of colour texture and graphic details though the dataset was not limited to these images and had a mixed level of details, still the system retrieved the best queries and the following section shoes the results calculated by SVM and time based analysis of retrieval

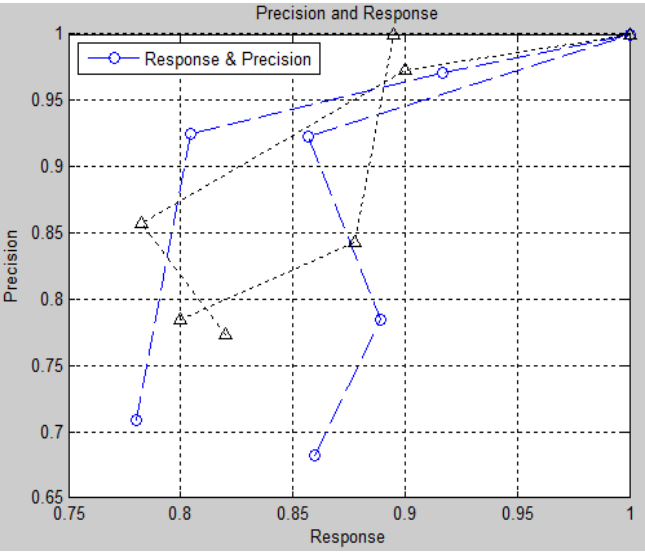

Figure 3 shows the comparison of the retrieval response and precision of system comparion both base and proposed systems (base in blue and proposed in black)

The above figure shows the response to precision ratio for the proposed system (in triangle plot) and base system (in circle) for 2 random image queries for the optimized system and can be seen that the accuracy of the proposed system is very significant and close to 1, starting at 0.8 precision response and the base precision is starting at 0.7 response rate, through this we can conclude that the proposed theory has enhanced the efficiency of the retrieval system, still the system retrieved the best queries and the following section shoes the results calculated by SVM and time based analysis of retrieval

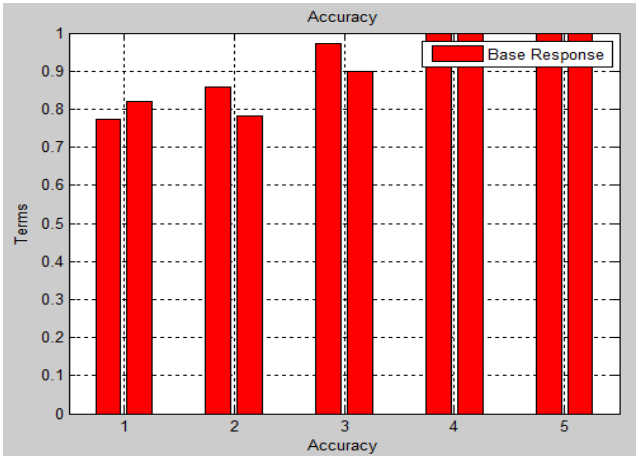

Figure 4 shows the accuracy response of base system for random 5 samples from query output images

The above figure shows the accuracy response of the base system in terms of retrieval accuracy for random response for any 5 retrieved images from proposed system, the system achieves full accuracy with 4th retrieval image and hence then achieves fully precise response

7. CONCLUSION

Content retrieval systems are a need for the growing demand for search and query and thus need to be very specific for the content to be retrieved, thus we have designed a system for query search and optimized feature extraction and classification, which involves the use of multiple features extraction using variance of image data, this variance feature extracted is the n sent to the neural network for training and sampling the needed features from the database. This neural classification has decreased the time required for the retrieval and has also improved the efficiency with respect to the data and has also proved efficient for mixed data content in the observed experimental analysis.

REFERENCES

[1] R. Datta, D. Joshi, J. Li and J. Z. Wang, "Image retrieval: Ideas, influences, and trends of the new age", ACM computing Survey, vol.40, no.2, pp.1-60, 2008.

[2] C.H. Lin, R.T. Chen and Y.K. Chan, "A smart content-based image retrieval system based on color and texture feature", Image and Vision Computing vol.27, pp.658–665, 2009.

[3] N. Jhanwar, S. Chaudhurib, G. Seetharamanc and B. Zavidovique, "Content based image retrieval using motif co-occurrence matrix", Image and Vision Computing, Vol.22, pp-1211–1220, 2004.

[4] P.W. Huang and S.K. Dai, "Image retrieval by texture similarity", Pattern Recognition, Vol. 36, pp-665–679, 2003.

[5] G. Raghupathi, R.S. Anand, and M.L Dewal, "Color and Texture Features for content Based image retrieval", Second International conference on multimedia and content based image retrieval, July-21-23, 2010.

[6] P. S. Hiremath and J. Pujari, "Content Based Image Retrieval based on Color, Texture and Shape features using Image and its complement", 15th International Conference on Advance Computing and Communications. IEEE. 2007.

[7] Alaa H. Halawani, Alexandra Teynor, Lokesh Setia, Gerd Brunner,Hans Burkhardt, " Fundamentals and Applicationsof Image Retrieval": An Overview"Datenbank-Spektrum 18/2006

[8] Fahui Long,Hongjiang Zhang and David Dagan Feng," Fundamentals of content-based image retrieval",Microsoft corporation research articles, 2003.

[9] Zijun Yang and Jay Kuo, "Survey on content-based analysis, indexing and retrieval techniques and status report of MPEG- 7",Tamkang journal of science and engineering, vol.2, No.3 pp.101-118, 1999.

[10] M. B. Rao, B. P. Rao, and A. Govardhan, "CTDCIRS: Content based Image Retrieval System based on Dominant Color and Texture Features", International Journal of Computer Applications, Vol. 18– No.6, pp-0975-8887, 2011.

[11] Fazal Malik , Baharum Baharudin (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.

[12] Manimala Singha 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.

[13] 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.

[14] 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.

[15] Arvind Nagathan, Manimozhi, Jitendranath Mungara "Content-Based Image Retrieval System Using Feed-Forward Back propagation Neural Network" (2013) International Journal of Computer Science Engineering (IJCSE) ISSN : 2319-7323 Vol. 2 No.04 pp.143-151.

[16] B. Darsana and G. Jagajothi (2014) "DICOM Image Retrieval Based on Neural Network Classification" International Journal of Computer Science and Telecommunications Volume 5, Issue3 ISSN 2047-3338 pp.21-26.

[17] Kulkarni, S., & Verma, B. (2003). Fuzzy logic based texture queries for CBIR. Proceedings of the 2003 International Conference on Computa-tional Intelligence and Multimedia Applications, (pp. 223-228).