CBIR USING MODIFIED RANK LEVEL FUSION

V. V. Satyanarayana Tallapragada[1], N. Ananda Rao[2]
[1]Associate Professor, Department of ECE, Matrusri Engineering College, Hyderabad.
[2]Assistant Professor, Department of ECE, VFSTR University, Guntur.
Email: satya.tvv@gmail.com[1], anandnelapati@gmail.com[2]

Abstract

Content Based Image Retrieval (CBIR) is an emerging research area where researchers are concentrating these days. The existing systems based on conventional techniques that process features that are extracted from the images are further stored to have a decision identified via a classifier, resulting in the class of the image that has been given as an input are of in vain as the database size increases. Hence, in this paper we propose to use modified rank level fusion algorithm which uses modified borda count method to test the input test case. Results show that the proposed technique outperforms the existing conventional techniques.

Index Terms: CBIR, Rank Level Fusion, Borda count, Features.

I. INTRODUCTION

Highlight In the recent past, content based image retrieval (CBIR) has gained much importance, as the research in this area enthralled most of the researchers. To overcome the problems in matching, indexing and further retrieving which is based on semantic retrieval, many CBIR techniques have got evolved. CBIR retrieves images automatically based on the features that are extracted from a database of images against a test case image. The features that are extracted from the images must be of high level such that they should represent the image sufficiently in terms of image semantics, where the semantic retrieval is an existing problem. Applications of CBIR include both industry as well as academics and are wide spread.

It is a well-known fact that as the number of features increases the accuracy of a system increases. But the as the number of features increases the computational complexity also increases, further posing a problem in classification. So, a single classifier will not perform well. Hence, in this paper we propose to given ranks by using different classifiers and then perform final classification.

Rank level fusion combines the ranks that are obtained from different individual classifiers. It is nothing but consolidation of the ranks that are attained from individual classifiers and is used for making the final decision. There are different levels of fusion that exist in biometrics such as sensor level fusion, feature level fusion and rank level fusion[8].

II. LITERATURE SURVEY

Relevant images are retrieved based on the features that are extracted from the images that exist in the database and this technique is CBIR. Feature matrix is constructed using LSI framework which is formed using various wavelets which is used to extract texture features. This technique is observed to have high level of accuracy[1]. CBIR makes use of the contents that can be visulaised as a picture using the global features like color, shape and texture features that are further used to signify and index the image. A proposal is given using the combination of DWT and GLCM for feature extraction and are further classified using

SVM[2]. CBIR can be extended to medical image retrieval such that it could aid medical diagnosis. Existing systems depend on supervised learning that maps the contents of the image which are of low level to a high level where the diagnostic process takes place. The time taken by the doctors in the space of training and evaluation is more, hence, CBIR in such a place may aid them for successful examination. The textual distances are measured from the existing report and these are further used to convert the image space into textrual distnace which are further used for classification purpose[3]. Diagnosis is the first step before giving a medicine to the patient. In the recent past such diagnosis is performed using medical images where segmentation is the prime part in the medical image retrieval which improves the feature set that is collected from the segmented image. A novel technique is proposed to segment the medical image a semi decision algorithm that can segment only the tumor part from the CT image. Further texture based techniques are used to extract the feature vector from the segmented region of interest. Medical images under test are classified using decision tree classifier. Results show better performance in terms of accuracy when compared to the conventional methods[4].

Human brain classifies and detects the image using two lobes that are present in the brain. The information is exchanges between these two lobes and are enabled to recognize and further detect the object in a scene that may be complex. A novel framework in this connection is proposed which is coined as RADAR (Retrieval After Detection And Recognition), for solving the problem of object centric CBIR[5]. Shapes are one of the common descriptors of the image features. Lots of images are classified and detected based on the shape description. The shape of the images can be described either as regular shapes, irregular shapes or edge descriptors. The edges can be further described by either Prewitt/Sobel/Krish edge operators or Hough transformation based edge operators. But most of the common objects are of not of known shapes like rectangle, triangle, circle etc. in this work we propose a unique technique to classify the objects based on their irregular shape description and retrieve the like objects from the database using CBIR technique when an image is given as the input[6]. An attempt is made for investigation of CBIR using the combination of wavelets and colour histogram. In this Singha et. Al[7] have used Haar wavelet which also uses the lifting scheme. The color features are selected in such a way that they are translation and rotation invariant.

Various levels of fusion[8-9] are available and are used in biometric systems. They are Score, Decision and Rank level fusion which are used to increase the performance of the system in terms of recognition accuracy.

III. PROBLEM DEFINITION

Existing approaches that are used in CBIR are ineffective as per the discussion that is given in section 2. This is due to the use of a single classifier which is used for classification or recognition. Hence it is quite necessary to devise a new classification mechanism that can enhance the existing classification accuracy that is produced using a single classifier.

IV. PROPOSED SOLUTION

The classification results that are evident from the use of single classifier can only be enhanced by the use of multiple classifiers, but, it further increases the complexity in classification, which also increases the time in classification, thus making the system unusable. Hence, it is proposed in this work, to use rank level based classification which uses borda count method. This method is modified such that the accuracy of the proposed technique outperforms the existing technique.

V. METHODOLOGY

Different features[12] are extracted from the images in the database[10-11] and classified using different classifiers[2,4,6,13]. Further ranks are issued to the classified data based on the borda count method. It is observed that the number of ranks that are given based on the borda count are more, hence, in order to reduce this number the existing technique is modified and the average value of the features that are extracted from each image and each feature are reduced by taking the average value as the threshold.

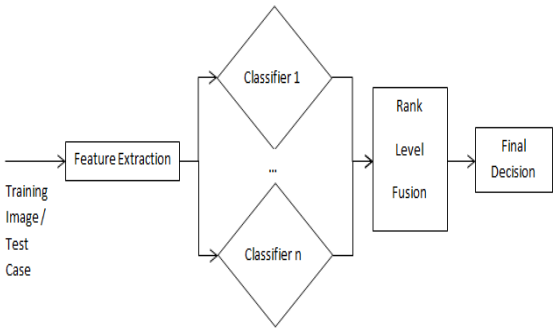

Figure 1 Block Diagram of the Proposed Technique.

This threshold is used for giving the ranks. Hence, the modified borda count method has been coined here and the number of images that are considered as the output got decreased. Figure 1 below shows the block diagram of the proposed technique.

VI. RESULTS

Wang database[10-11] is used in this work which consists of a total of 1000 images and 10 classes each of 100 images. Figure 2 shows the snapshot of the database that is used in this work.

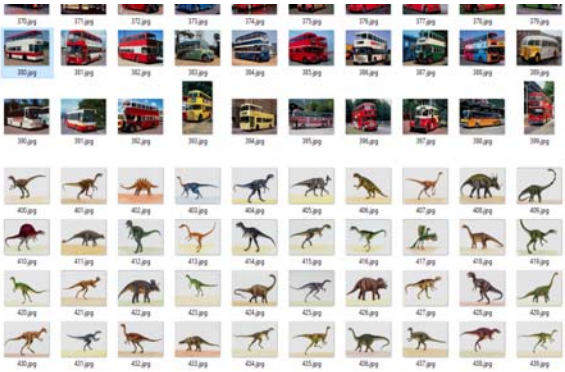

Figure 2 Snapshot of the database used in this work.

final_feavec <100x614 double>

	1	2	3	4	5	6	7	8	9	10
1	42.1058	0.7043	0.9426	0.9426	1.2673e+03	-103.0306	0.4027	0.2200	2.4827	0.8
2	28.4718	0.5576	0.9607	0.9607	1.1307e+03	9.8101	0.3479	0.1199	2.7437	0.8
3	35.6703	0.8086	0.9361	0.9361	1.0046e+03	-53.3602	0.4685	0.1340	2.8171	0.8
4	46.0431	0.7015	0.9130	0.9130	900.3782	-85.0363	0.3899	0.2080	2.3921	0.8
5	41.0149	0.5451	0.9280	0.9280	666.0416	-58.9737	0.3674	0.1467	2.6065	0.8
6	44.2598	0.7225	0.8807	0.8807	557.9607	-51.7315	0.4342	0.1516	2.5978	0.8
7	40.3936	0.7254	0.9245	0.9245	809.9445	-64.8226	0.4516	0.1396	2.7736	0.8
8	39.1292	1.0305	0.9092	0.9092	933.8547	-67.4041	0.5538	0.1499	2.8367	0.7
9	39.9132	0.9667	0.9074	0.9074	850.1266	-64.5131	0.5331	0.1542	2.8037	0.7
10	44.1437	0.5330	0.9401	0.9401	940.2056	-83.3043	0.3560	0.1910	2.5039	0.8
11	42.4188	0.6062	0.9419	0.9419	1.0628e+03	-89.1444	0.3758	0.1925	2.5435	0.8
12	44.1966	0.7889	0.9184	0.9184	1.1952e+03	-106.2577	0.4234	0.1828	2.4897	0.8

Figure 3 Features extracted from each class.

Various features are extracted using the techniqus proposed in [12] and are stored in the database for further classification. Figure 3 shows the features that are extracted.

The next step after feature extraction is testing process. A test case is taken as an input, compared against the stored features in the database and are further classified based on the input test case. Further, each classifier provides identifies its own class data, based on which, ranks are provided.

final_rank <7x2 double>

	1	2	3	4	5	6	7	8	9	10
1	0	1								
2	1.2684e+05	11								
3	1.0872e+05	21								
4	1.3118e+05	32								
5	8.6326e+04	33								
6	9.1477e+04	91								
7	1.2177e+05	98								
8										
9										
10										
11										
12										

Figure 4 Finally classified images and their respective class label using modified borda count method.

In this work, we modified this count technique and we have separated those classes which are having less than the mean value and are separated so that the final class images from each classifier got reduced. Results show that the proposed technique tend to show a precision of 0.70 which is better when compared to the existing systems. Figure 5 shows the comparative result analysis of the proposed system with the existing system.

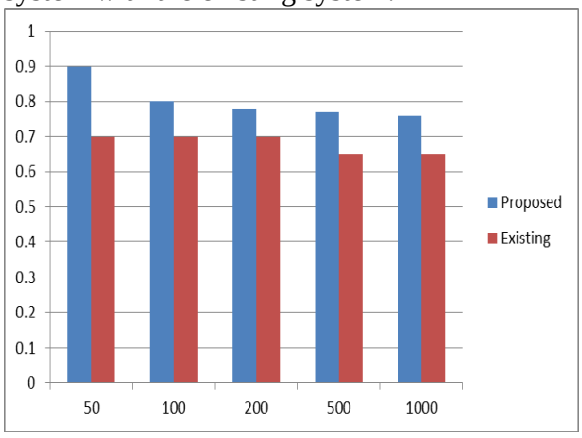

Figure 5 Precision comparison of the proposed technique with the existing technique.

VII. CONCLUSION

Retrieving similar images from a large database is of major concern. Hence, in this paper, to improve the recognition accuracy

which is measured interms of precision, we propose a novel technique which uses modified borda count method. This technique decreases the final output classes based on the elimination of the classes whose feature vector value is less than the mean value of the existing values, thus, reducing the final classes that are been classified. Results show that the precision value that is achieved using this technique is 0.7.

REFERENCES

[1] Ahmad Alzu'bi, Tareq Jaber, Abbes Amira, "The effectiveness of LSI-based CBIR with image noise using wavelet-based texture", 2014 4th International Conference on Image Processing Theory, Tools and Applications (IPTA), October 2014, pp. 1-6.

[2] Ekta Gupta, Rajendra Singh Kushwah, "Combination of Global and Local Features Using DWT and SVM for CBIR", 2015 4th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO) (Trends and Future Directions), September 2015, pp. 1-6.

[3] José Ramos, Thessa T. J. P. Kockelkorn, Isabel Ramos, Rui Ramos, Jan Grutters, Max A. Viergever, Bram van Ginneken, Aurélio Campilho, "Content-Based Image Retrieval by Metric Learning From Radiology Reports: Application to Interstitial Lung Diseases", IEEE Journal of Biomedical and Health Informatics, Vol. 20, No. 1, 2015, pp. 281-292.

[4] V. V. Satyanarayana Tallapragada, D. M. Reddy, P. Shashi Kiran, D. V. Reddy, "A Novel Medical Image Segmentation and Classification using Combined Feature Set and Decision Tree Classifier", International Journal of Research in Engineering and Technology, Vol. 4, No. 9, 2016, pp. 83-86.

[5] Nitin Gupta, Sukhendu Das, Sutanu Chakraborti, "Extracting information from a query image, for content based image retrieval", 2015 Eighth International Conference on Advances in Pattern Recognition (ICAPR), 2015, pp. 1-6.

[6] M. Naresh, V. V. Satyanarayana Tallapragada, G. Manjunath, "A Novel Shape Recognition Technique By Shape Context and Zernike Moments for Content Based 3D Object Retrieval System", International Conference on Systemics, Cybernetics and Informatics, January 2011, pp. 1-6.

[7] M. Singha, K. Hemachandran, A. Paul, "Content-based Image Retrieval Using the Combination of the Fast Wavelet Transformation and the Colour Histogram", IET Image Processing, Vol. 6, No. 9, 2012, pp. 1221-1226.

[8] N. Radha, A. Kavitha, "Rank Level Fusion Using Fingerprint and IRIS Biometric", Indian Journal of Computer Science and Engineering, Vol. 2, No. 6, 2012, pp. 917-923.

[9] Ayman Abaza and Arun Ross, "Quality Based Rank-Level Fusion in Multibiometric Systems", IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS), September 2009, pp. 1-6.

[10] Jia Li, James Z. Wang, ``Automatic linguistic indexing of pictures by a statistical modeling approach," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 25, no. 9, pp. 1075-1088, 2003.

[11] http://wang.ist.psu.edu/docs/related/

[12] V. V. Satyanarayana Tallapradada, E. G. Rajan, "Morphology Based Non Ideal Iris Recognition Using Decision Tree Classifier", International Conference on Pervasive Computing, 2015, pp. 1-4.

[13] V. V. Satyanarayana Tallapradada, E. G. Rajan, "Iris Recognition based on Non linear dimensionality reduction of Iris Code with KPCA and SVM based Classification", International Journal of Computer Applications, Vol. 33, No. 13, 2012, pp. 42-46.