International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 3 Issue 5, May - 2014

Multimedia CBIR II: Implementation of LTP and LDP algorithms

Nagaraja G S
Professor, Computer Science&Engineering,
RVCE
Bangalore, India

Rajashekara Murthy S
Associate Professor, Information Science&Engineering
RVCE
Bangalore, India

Manas M N
PG Student, Computer Science&Engineering,
RVCE
Bangalore, India

Sridhar N H
Research scholar, Computer Science&Engineering
RVCE
Bangalore, India

***Abstract* - Multimedia is an amalgamation of four components which includes text, image, audio and video. Multimedia information networking requires storage and transmission of multimedia objects. How these objects are represented and stored in a digital computer is a challenging issue while retrieving the information from the existing database to meet the demands of various domains like medical, military, design, architecture, advertising, publishing and Internet applications. We proposed an integrated solution for Content Based Image Retrieval (CBIR) by using Local Ternary Pattern (LTP) and Local Derivative Pattern (LDP) algorithms. The proposed algorithms gives high level accuracy compare to other image retrieval system. This accuracy can be achieved by using images of resolution ranging from 200*200 to 600 * 600 pixels.**

Keywords - Content Based Image Retrieval, Local Ternary Pattern, Local Derivative Patter .

I.INTRODUCTION

Multimedia contents are growing intensively and the need for multimedia retrieval is occurring more and more frequently in our daily life. Due to the complexity of multimedia contents, image understanding is a difficult but interesting issue in this field[1][2]. The rapid expansion and development of large-scale storage, high performance workstation and broadband network technology, the information transferred on the Internet consists of not only text and images, but also varieties of multimedia communication, which is possible on technical and economic aspects. Multimedia communication makes video, audio, text, images as one kind, as well as provides richer user experience, so that it is used more and more extensively. Streaming media technology makes it possible to transfer audio, video or animation to users' PC continuously and in real-time mode instead of waiting for the whole completion. In today's world more and more multimedia Information is stored in databases like images audio and video. An image may be better or more effective than a substantial amount of text. CBIR is concerned with effectively and efficiently accessing desired images from large and varied image collections. Conventional databases allow for textual searches on Meta data only whereas CBIR uses various visual features to search images from large scale image databases based on users request in the form of a query image. The need for CBIR are more appropriate along with multiple features for better retrieval accuracy. The scope of the paper includes the design and implementation of various algorithms for performing image retrieval for large set of database.

A. Previous Work

In our earlier work the obtained results shows that Local Binary Pattern (LBP) and AVG RGB algorithms provides 75 percentage accuracy for sorted images for CBIR. The CFSD Algorithm couple with database forms highly efficient system which retrieves at most three similar images quite accurately[20]. The images were sorted based on the two algorithms LBP [3][4] and Avg RGB. The values were calculated for the images for both these algorithms and the sorting was done based on LBP values. If the images have same LBP values then its sorted based on the AvgRGB values. Similar images are retrieved based on the values generated by using LBP and Avg RGB algorithms[19].

B. *Proposed Work*

In the current work LDP and LTP algorithms are implemented. LDP calculates the center pixel values using different angles like 0^0, 45^0, $90^0$and 135^0 degrees. LTP is used to calculate center pixel by keeping the center value fixed or some threshold is maintained. Images are extracted from the database and stored in the folder or file. For this purpose BLOB(Binary large object) and CLOB(Character large object) methods are used. Finally images are sorted based on different algorithms.

II. ALORITHM DESCRIPTION

A. Local Ternary Pattern (LTP)

LTP are the higher version of Local binary patterns (LBP), it does not threshold the pixels into 0 and 1, and rather it uses a threshold constant to threshold pixels into three values where gray value in zone of width ±t around g_c the value taken as 0, above that (g_c+t) value taken as +1, below that (g_c-t) value taken as -1,where t is the threshold constant, g_c is the value of the center pixel and x is the value of the neighboring pixel[7].

In this way, each threshold pixel has one of the three values. Neighboring pixels are combined after thresholding into a ternary pattern. Computing a histogram of these ternary values will result in a large range, so the ternary pattern is split into two binary patterns. Upper Pattern and Lower Pattern. In LTP algorithm, values are compared between center pixel values, neighbor pixel and threshold value, to get three values -1, 0 and 1. Fig1 shows LTP pattern obtained from the user image and is converted into 0,1 and -1of LTP. The obtained pattern is divided by upper and lower pattern as shown in below Fig 2.

17	29	1
5	9	9
17	3	2

1	1	-1
0		0
1	-1	-1

Fig1: LTP pattern obtained from the user image.

1	1	0
0		0
1	0	0

0	0	1
0		0
1	1	1

Fig 2: Upper Pattern and Lower Pattern of LTP.

Algorithm Steps for LTP:

Step 1: Pattern is obtained from the user.

Step 2: Find the threshold value (that depends on the user defined image.)

In ternary pattern matrix values are -1, 0, 1 that is obtained from the center pixel value computed with the neighbor pixel value

Step 3: The obtained ternary pattern is further divided into upper and lower binary patterns.

The upper pattern is obtained by replacing -1 with 0. Lower pattern is obtained by replacing -1 with 1 and rest of them are filled with 0.

Step 4: Neighbor pixel is computed with gray level from binary to decimal

B. Local Derivative pattern (LDP)

LBP is conceptually regarded as the non-directional first-order local pattern because LBP encodes all-direction first-order derivative binary result while LDP encodes the higher-order derivative information which contains more detailed discriminative features that the first-order Local Binary Pattern (LBP) cannot obtain from an image[8].

LDP concentrate and evaluate edge response values, these responses encodes the texture of the image. Given an image I, the first-order derivatives along 0^0, 45^0, 90^0, and 135^0 are calculated and in this framework to encode directional pattern features based on local derivative variations. The n order LDP is proposed to encode (n-1) order local derivative directions variation [12][18]. By doing so, more detailed information is obtained than LBP. Fig. 3 Shows the LDP in different direction along with different angles.

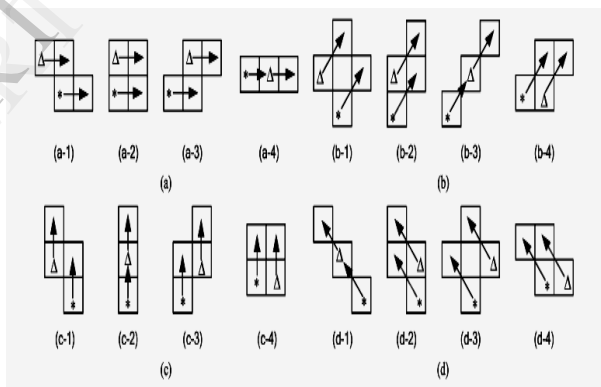


Fig 3. Derivative Pattern in different direction along with angles 0(a) ,45(b) ,90(c), 135(d)

Algorithm Steps for LDP:

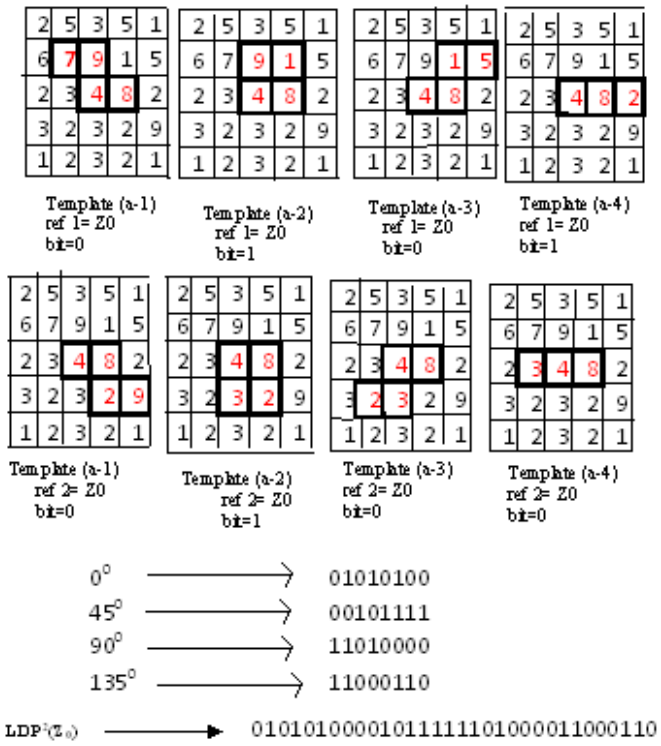
Step 1: Pattern obtained from the user,

Step 2: Apply the derivatives in horizontal, vertical and diagonal axis

Step 3: ref 1 * is the center pixel value, ref2 Δ is neighbor value, fig 3 shows in different angles.

Condition 1: both the direction values in increment or decrement binary values is taken as 0 otherwise 1

The Fig4. Shows the values calculated for LDP in binary form for zero degree, Similarly other values calculated for different angles such as 45^0, 90^0 and 135^0.The obtained results are shown in fig4.



The obtained result in the form of 32 bit binary values.

Fig 4. Local Derivative Pattern for zero degree in binary form.

III. EXPERIMENTAL ANALYSIS AND RESULTS

The proposed Algorithm are used to sort the similar images. Four algorithms are used in this scenario namely LBP, LTP, LDP and Avg RGB. In order to evaluate the performance of the proposed algorithms of images (512 * 512) pixels as depicted in figure 5. The given input is taken in the form of matrix, in that matrix the values are compared between centre pixel values with the neighbor pixel. First the Algorithm calculates the values of local Binary pattern, local ternary pattern, local derivative pattern and Avg RGB .It sorts the images based on LBP in ascending order. If two or more images have same values for LBP then the image is sorted based on the LTP. If two or more images have same values for LTP then the image is sorted based on the LDP. Similarly if two or more images have same values for LDP then the image is sorted based on the Avg RGB,which is depicted in Fig 6. In the next step query image is given by the user and similar images are retrieved.

Fig 5. Images for Experimental Analysis

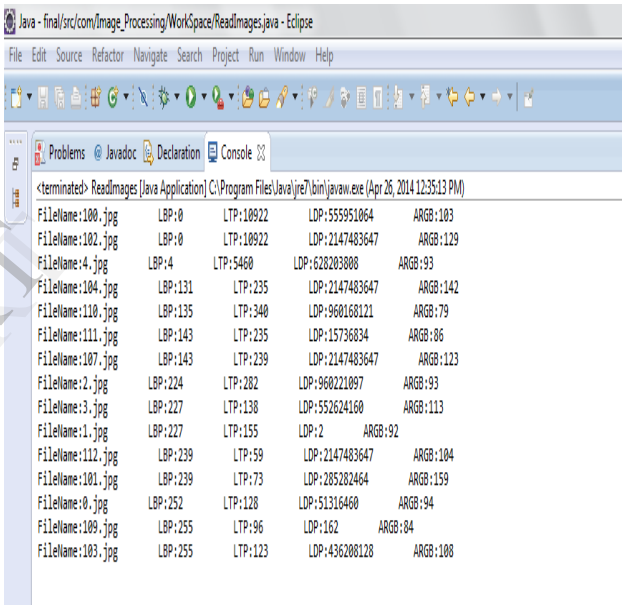


Fig 6: Results of LBP, LTP, LDP, Avg RGB Algorithms.

IV. CONCLUSION

The obtained results shows that LTP and LDP algorithms gives better accuracy compared to LBP and Avg RGB algorithms. In order to improve the retrieval accuracy the sorted images are traced from the proposed algorithms like LTP and LDP. The accuracy of images obtained from the database is mainly depends on the functionality of different algorithms.

V. ACKNOWLEDGEMENT

The work presented in this paper is supported by University Grant Commission (UGC), New Delhi, under the major research project F.No.41-644/2012 (SR),We would like to thank RVCE research team for their moral support towards the project.

REFERENCES

[1] S. Calderara , R. Cucchiara and A. Prati "Multimedia surveillance: Content-based retrieval with multicamera people tracking", Proc. ACM Int. Workshop Video Surveillance and Sensor Networks (VSSN 2006), 2006

[2] Del Bimbo and P. Pala "Content-based retrieval of 3D models", ACM Trans. Multimedia Computing, Commun. Applic., vol. 2, no. 1, 2006, pp.20 -43.

[3] T. Ahonen, A. Hadid, and M. Pietikainen, "Face recognition with local binary patterns," Proceedings of 8th European Conf. Computer Vision, Prague, Czech Republic,2004, pp. 469-481.

[4] T. Ahonen, A. Hadid, and M. Pietikainen, "Face description with local binary patterns: application to face recognition," IEEE Trans. on Pattern Analysis and Machine Intelligence, 28 (12),2006, pp.2037-2041.

[5] H. Jin, Q. Liu, H. Lu, and X. Tong, "Face detection using improved lbp under Bayesian framework," Proceedings of 3rd International Conference on Image and Graphics, Hong Kong, China,2004, pp. 306-309.

[6] A. Petpon, and Sanun Srisuk, "Face recognition with local line binary pattern," Proceedings of 5th International Conference on Image and Graphics, Xi'an, China, 2009,pp. 533-539.

[7] X. Tan, and B. Triggs, "Enhanced local texture feature sets for face recognition under difficult lighting conditions," IEEE Trans. on Image Processing, 19 (6),2010, pp. 1635-1650.

[8] T. Jabid, M.H. Kabir, and O. Chae, "Local Directional Pattern (LDP) for face recognition," Proceedings of 2010 Digest of Technical Papers International Conference on Consumer Electronics, Las Vegas, NV, USA,2010, pp. 329-330.

[9] B. Zhang, Y. Gao, S. Zhao and J. Liu, "Local derivative pattern versus local binary pattern: Face recognition with high-order local pattern descriptor," IEEE Trans. on Image Processing, 19 (2),2010, pp.533-544.

[10] P.J. Phillips, H. Wechsler, J. Huang, and P. Rauss, "The FERET database and evaluation procedure for face recognition algorithms," Image and Vision Computing, 16 (5), 1998, pp. 295-306.

[11] K.C. Lee, J. Ho, and D. Kriegman, "Acquiring linear subspaces for face recognition under variable lighting," IEEE Transactions on Pattern Analysis and Machine Intelligence, 27 (5), 2005,pp. 684-698.

[12] S.M. Zakariya, Rashid Ali, Nesar Ahmad, "Unsupervised CBIR by Combining visual features of an image with a threshold", Special issue of IJCCT Vol.2 Issue 2,3,4 2010 for International Conference[ICCT-2010], December 2010, pp. 204-209.

[13] P.S.Suhasini , Dr. K.Sri Rama Krishna, Dr. I. V. Murali Krishna, "CBIR Using Color Histogram Processing" Journal of Theoretical and Applied Information Technology, Vol6. No1. 2009, pp. 116 – 122.

[14] Shengjiu Wang, "A Robust CBIR Approach Using Local Color Histograms," Department of Computer Science, University of Alberta, Edmonton, Alberta, Canada, Tech. Rep. TR 01-13, October 2010, pp. 23-35.

[15] Simily Joseph, Kannan Balakrishnan, "Multi Query CBIR system using Local Binary Patterns" International Journal of Computer Applications (IJCA), Volume 17– No.7, March 2011, pp. 1-5.

[16] Glenford J. Myers, "The Art of Software Testing", John Wiley & Sons, Inc. , second edition, Nov. 2006, ISBN-13 9788126510061.

[17] Aman Chadha, Sushmit Mallik, Ravdeep Johar, "Comparative Study and Optimization of Feature-Extraction Techniques for Content based Image Retrieval" International Journal of Computer Applications (IJCA), Volume 52– No.20, August 2012, pp. 35-42.

[18] Baochang Zhang, Yongsheng Gao, Senior Member, IEEE, Sanqiang Zhao, and Jianzhuang Liu, Senior Member, IEEE" Local Derivative Pattern Versus Local Binary Pattern: Face Recognition With High-Order Local Pattern Descriptor" IEEE Transactions On Image Processing, Vol. 19, No. 2, February 2010.

[19]Manas.M.N. Nagaraja.G.S. Rajashekaramurthy.s" Implementation of Content Based Image Retrieval using LBP and Avg RGB Algorithms"IJSRD,Vol 1,Issue 11,2014,pp2360-2363.

[20] Nagaraja.G.S. Samir Sheriff, Raunaq Kumasr" Implementation Of Content Based Image Retrieval Using The CFSD Algorithms"IJRET,Vol 2, ISSUE 1,JAN 2013,pp 75-79.

[21]Sesha Kalyur, Nagaraja.G.S." Image Digest:A Numbering Scheme for Classifying Digital Images"ICECIT,Elsevier Publications 2013, SIT Tumkur.