ISSN (Print) : 2320 – 9798
ISSN (Online): 2320 – 9801

International Journal of Innovative Research in Computer and Communication Engineering
Vol. 1, Issue 3, May 2013

Partial Feature Based Ensemble of Support Vector Machine for Content based Image Retrieval

Kirti Jain[1], Dr. Sarita Singh[2], Dr. Gulab Singh[3]

Assistant Professor, Dept. of CSE, LNCTS, Bhopal, India[1]

Professor, Dept. of Electronics, M.I.T.S, Gwalior, India[2]

Professor, Dept. of CSE, LNCTS,Bhopal, India[3]

ABSTRACT: Ensemble of classifier provides a great versatility of classifier for pattern recognition and classification. The pattern recognition and classification is a new age direction for content based image retrieval. The content based image retrieval depends on lower content feature of image. The lower content of feature extraction of image is colour texture and geometrical dimension of image. The geometrical dimension of image gives the shape structure of image. The partial feature ensemble is process of merging a classifier value according to matched feature of query image and stored image in database. The "ensembling feature" of classifier depends on extraction process of feature of image. The partial feature extraction is basically based on outside boundary value of image. The movement of image varies according to its rotation or length and breadth. The value of rotation of image feature extraction plays a role of ensemble point of classifier for image retrieval. For the classification of feature support vector machine classifier has been used.

Keywords: Content Based Image Retrieval, feature extraction, Ensemble, Support Vector Machine.

I INTRODUCTION

Content based image retrieval faces a problem due to a gap between query image and retrieval image from data of multimedia. Various authors proposed a method based on lower feature extraction and classification technique [1,2] which provide the method for reduction of semantic gap between query and retrieval in content based image retrieval. The process of classification provides the most similar image for query processor for retrieval and also used some feedback system for enhancement of efficiency of classifier. Support vector machine classifier is widely used in image classification and content based image retrieval. The support vector machine classifier reduces the risk of classification of Gaussian property of data .The partial feature extraction of image database uses some geometrical function for boundary edge detection in shape matching such as counter method and wave edge[3,4]. In this paper, a rotation invariant feature extraction process has been discussed for ensemble of points in classifier for classification of image database for retrieval of image. In feature extraction process, the rotation invariant function moves the images according to sin and cosine function along with hyper plane of classifier. The hyper plane of classifier acquired two regions of data, one is positive and another one is negative. The length and width of image database is processed along with sine and cosine function of rotated image in free from angle movement. The ensembling of parameter for classifier used feature subset with number of classifier. The merging process of classifier increases the rate of similarity and improves the rate of image retrieval. In this invariant feature extraction has been used, which gives features of shape's contour by simple basic image movement like moving, scaling, and rotation. SVM is one of the popular small sample learning methods widely used in recent years and obtains the state-of the- art performance in classification for its good generalization ability. The SVM can achieve a minimal structural risk by minimizing the noise and improved the feature constrained similarity measure for image retrieval, which learns a boundary that divides the images into two groups, and samples inside the boundary are ranked by their Euclidean distance to the query image. The SVM active learning method selects samples close to the boundary as the most informative samples for the user to label. Partial feature sampling techniques were applied to alleviate unstable, invariant, and over fitting problems in SVM[5,6]. Nevertheless, most of the SVM cascaded approaches ignore the basic difference between the two distinct groups of features, i.e all the positive features share a similar concept while each negative feature usually varies with different concepts. The rest of this paper is organized as follows: In Section II, the partial feature extraction is provided. In Section III, feature ensemble with support vector machine is given. In section IV the process block diagram of feature ensemble is discussed. In section V Conclusion and future work is given.

II PARTIAL FEATURE EXTRACTION PROCESS

Partial feature extraction process in image database is comprised of image rotation invariant process through sine and cosine transform function. If conventional shape based feature extraction such as chain code, edge detection and Hough

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transform function are used for outer boundary feature detection and if any shape of image is divided as triangular and trapezoidal pattern ,the extraction of feature process such as chain code and edge detection sufferes as shown in figure 1 . So some authors used ridglet transform function which is based on resolution of point function. But ridglet transform generate so many point function which makes computation of point function very complex. Therefore the feature extraction process also becomes very complex. Now to solve this problem sin function, cosine function and tangential function for partial feature extraction are used based on boundary value of image. The given image is divided into three section such as hypotenuse, opposite and adjustment for finding of three parameters hypotenuse, opposite and adjustment, before applying edge detection technique for getting X and Y parameter in the plane for better continuity of edge detection used in many edge detection methods. Now process of all deriv*ate*s is explained using a formula.

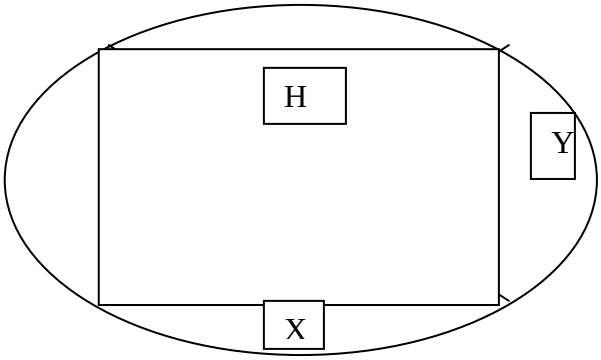

Figure 1 shows that circular image and divide this image into three sections X, Y and H

Process of feature extraction using triangular formula of image

1. Apply canny edge detection method for finding boundary value of image
2. After that find the centred point of boundary value of shape.
3. Find the Xc and Yc as
   Xc=$\sum_{i=1}^{n} xi/n$.....(1)
   Yc=$\sum_{i=1}^{n} yi/n$.....(2)
4. After getting a value of (Xc and Yc)
   H=$\sqrt{\sum_{i=1}^{n} \frac{xi}{n} + \sum_{i=1}^{n} \frac{yi}{n}}$
5. After getting a value of H apply sine, cosine and tangent function for shape of boundary
6. Sin=Xc/H and cosine =Yc/H and tangent = Yc/Xc
7. After getting of sin ,cosine and tangent , find three consecutive matrix of shape
8. All three shape parameter match the boundary value of feature.

This is the basic principle component of partial shape feature extraction process in image retrieval. For the improving of retrieval policy we used ensemble classifier for extracted feature form database image.

III ENSEMBLE OF PARTIAL FEATURE WITH SVM CLASSIFIER

Support vector Machine is a binary classifier. The performance of classification of support vector machine is high in comparison of another binary classifier such as decision tree, KNN and bays classifier. The support vector machine classifier used here is an ensemble of three consecutive features of shape retrieval [7]. In this paper , for ensemble

method E N should be (N > 1) for individual feature of sine, cosine and tangent {Fi, i = 1, 2, …, N}because if N=1 there is no use of ensemble method. For the convenience of using the simple ensemble rule, we set N as an odd number: N = 2K + 1, where K is a natural number. Further assume there is a consecutive feature of n images {(**x**j, yj), j = 1, 2, …, n}. Each input image **x**j is a vector with n features (variables) {xjk, k = 1, 2, …, n} and each output yj is a feature label in {–1, 1}. For each input image xj, each individual Feature Fi predicts an match of Cij. We set

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Zij=$\begin{cases} 1\ cij = yj \\ 0\ cij \neq y \neq j \end{cases}$ so the ensemble method E predicts the image Xj correctly if and only if $(\sum_{i=1}^{n} Zij)$ >K by the ensemble rule. We denote Pi=$\sum_{j=1}^{n} Zij/n$ as the predication accuracy of each feature Fi and Pi=count$\left((\sum_{i=1}^{n} Zij) > K\right)/n$ as the predication accuracy of the ensemble E. After ensemble of feature set of geometrical feature extraction, the ensemble of feature is found linear. Now apply linear kernel function for support vector machine classifier[8]. In the feature extraction model, assume that a partial feature consists of three subsets: sine, cosine, and tangent. The numbers of features in the sine, cosine, and tangent subsets are defined as n1, n2, and n3, respectively, so n1 + n2 + n3 = n. For an ensemble method E with N individual feature of database {Fi, i = 1, 2… N}.

IV PROCESS BLOCK DIAGRAM OF FEATURE ENSEMBLE

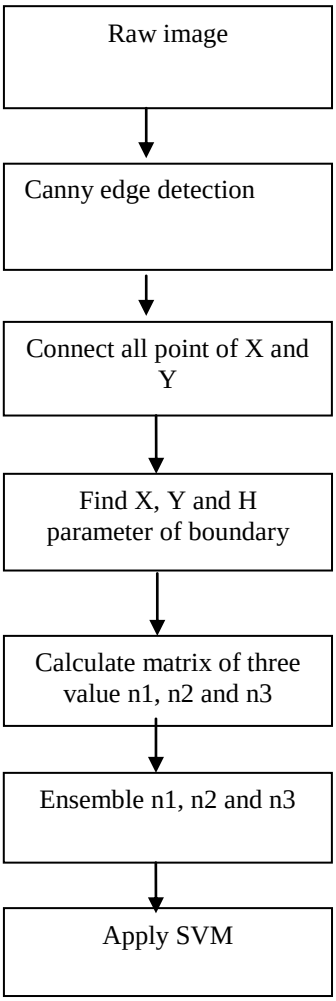

Figure 2 process block diagram for partial feature ensemble for image retrieval

The process block diagram shows that working function of partial feature ensemble for classification with retrieval of image in content based image retrieval system. Our ensemble technique of feature works with linear support vector machine classifier, because the extracted feature of image for a linear equation is n1+n2+n3>1. The applied support vector machine classified the feature of data as negative and positive. The negative data are discarded form query section and improve the quality of image retrieval.

V CONCLUSION AND FUTURE SCOPE

In this paper a geometrical function is applied for feature extraction of partial shape matching for content based image retrieval. The process of geometrical feature extraction gives the value of features in terms of sine, cosine and tangent function. These generated consecutive features follow ensemble rule for the combination. To combination of feature and rules generate a linear equation of feature set. This linear equation work as kernel function of support vector machine. The support vector machine classifier discards the negative feature value and generate similar pattern of shape

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for image retrieval. In future we shall implement this model and validate with other techniques of image retrieval such as QBIC and FCMG.

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