Detection of Logo using Wavelet Transform Analysis and NN Classifier

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Abstract- In this paper, we present recognize the fake logos by matching the fake logo with original one with respect to their pixel intensities. The matched interest points are denoted by geometrical lines between the two images representing the same pixel intensity. Then (Discrete wavelet transform) DWT is applied on each row of the image recursively until getting a single point for each row. Finally DWT is again applied on the column vector recursively until getting a vector of four points which is used for verification of fakeness. Similar work is done previously except the selection of (Region of interest) ROI. The combined scheme of ROI and DWT approach of the project work provides better result of previous works.
This methodology is implemented on MATLAB and performance is computed by using precision and recall rate calculations

Keywords- ROI, PTP, Discrete wavelet transform

I. INTRODUCTION

Logo is a key visual feature for readers to distinguish the origin or ownership of a document along with other features such as title and seal. In the applications of automatic document image processing, the main focus of logo detection is to find and extract logos with high speed and reliability. Logo analysis in document images involves two main steps: (1) detecting the probable logo from a document image; (2) classifying the detected logo candidate segment into one of the learned logos in the database. The first step is referred to as logo detection, while the second is usually called logo recognition. From the machine learning point of view, logo recognition is considered a multi-class classification task since each logo category is considered a separate target class. The goal of this paper is to find out the similarity between the logos of the same company and dissimilarity between different company. The system model starts with normal preprocessing approach. The enhancement process prepares to level-up the image and makes better the ridge pattern clarity so that it can run with maximum degree of favorable termination in further processing. At first an RGB image is taken as an input image. The RGB image is then enhanced to increase the quality of the logo Enhancement is performed by binarizing the image to highlight the ridges in the logo with black color while furrows are white. Ridge thinning scheme is then applied to eliminate the redundant pixels of ridges till the ridges are just one pixel wide. After the operation the ridges of the image become thinner and separable. We then determine Region of Interest (ROI) of the image to eliminate the unnecessary part of the fingerprint image. The ROI of the image is then extracted from the original image. Now DWT is applied recursively on each row of the resulting image until we find a single point for each row. DWT is again applied recursively on the resulting column vector until we get only 4 points, i.e. a vector of dimension 1x4. The corresponding vector for each fingerprint image is then stored in the database.

II. PROPOSED SYSTEM

The performance proposed system will be evaluated using MATLAB software tools and the algorithm. The system modules includes following processes,

1) Pre-processing
2) Segmentation
3) Feature extraction
4) Interest point recognition
5) Logo matching

1) Pre-processing: Consists of processes aimed at the geometric and radiometric correction, enhancement or standardization of imagery to improve our ability to interpret qualitatively and quantitatively image components.

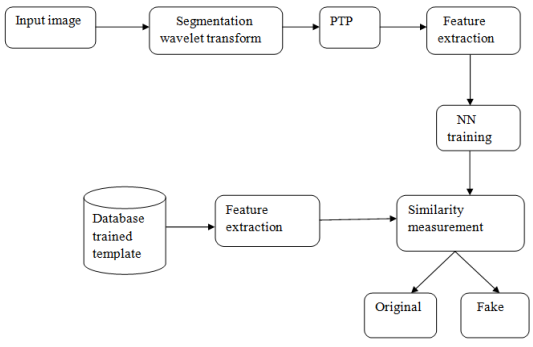

Fig.1 Block diagram for logo identifications

It is the most important step among all. Image pre-processing is done to strengthen or intensify some of the features of image important for future analysis and processing. In this approach the image is separated into different channels (red, green and blue). Noise from the separated image is eliminated using median filter.

2) Segmentation:

Discrete Wavelet Transform

Discrete Wavelet transform (DWT) is a mathematical tool for hierarchically decomposing an image. The DWT decomposes an input image into four components labeled as LL, HL, LH and HH [9]. The first letter corresponds to applying either a low pass frequency operation or high pass frequency operation to the rows, and the second letter refers to the filter applied to the columns. The lowest resolution level LL consists of the approximation part of the original image. The remaining three resolution levels consist of the detail parts and give the vertical high (LH), horizontal high (HL) and high (HH) frequencies. Figure 2 shows three-level wavelet decomposition of an image.

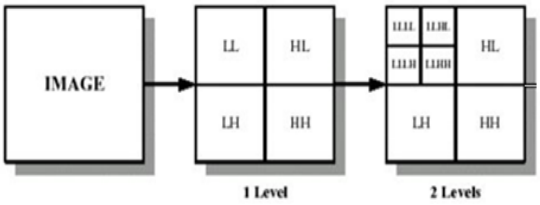

Fig.2 segmentation using DWT

3) Feature Extraction:

Feature extraction employs the selection and extraction of some of the effective and important features, among the largest data set of the features which are extremely important for the recognition of fake logo. Some features of an image are: Size or Area. Every denomination differs from each other in the size parameter. Therefore size can be used as a feature for logo recognition. But the major limitation of this feature is that the size of the image varies depending on the distance from which photo of the image has been taken. To overcome this problem a new parameter named aspect ratio was used to classify the denominations.

4) Region of Interest (ROI): A region of interest (ROI) is a portion of an image that you want to filter or perform some other operation on. You define an ROI by creating a binary mask, which is a binary image that is the same size as the image you want to process. In the mask image, the pixels that define the ROI are set to 1 and all other pixels set to 0.

You can define more than one ROI in an image. The regions can be geographic in nature, such as polygons that encompass contiguous pixels, or defined by a range of intensities. In the latter case, the pixels are not necessarily contiguous.

Intersection point between two or more edge segments. The context and orientation of the interest points are considered. Context refers to the 2D spatial coordinates and orientation refers to the angle of the interest points. Interest point recognition is based on edges and curvature of the logo images.

5) Logo matching: Detect the same feature points independently in both logo images, reliable matching of a corresponding point. Localization is used to find exact point.

III. SIMULATION AND RESULTS

1) Given a query logo instance and a database of detected logos, our goal of logo matching is to compute an effective ranked list for logos in the database. By constructing the list of best matching logos, we effectively retrieve the set of documents from the same organizational entities.

2) Edge Detection: Edge detection method especially due to its two thresholding. Canny's method uses two thresholds to detect strong and weak edges, and includes the weak edges in the output only if they are connected to strong edges.

3) Logo Persistence: The presence of a logo is corroborated if the edge persists from frame to frame. To this effect, a given percentage of the edge pixels comprised in the mask region at time t-1 should survive at time t.

4) Thresholding: The time-averaged edge field is binarized via hysteresis thresholding method. First strong edges are obtained with a high threshold value, and then weak edges are included provided they are connected to strong edges.

5) Morphological Operations: Apply closing to merge neighboring pixel groups, whole filling to prevent deformation of logo mask after opening, and finally opening to remove noise in the background.

6) Shape Constraints: TV logos possess typical shape characteristics the basic ones being the limited ranges of their area and aspect ratio. These constraints are used to eliminate improbable shapes. Furthermore logos should be sufficiently distanced from frame boundaries.

7) Logo Mask Stability: The final check consists in the stability of the logo which means that the candidate mask should not change beyond a tolerance in area, in its coordinates and in the size of the bounding box throughout the logo search sequence.

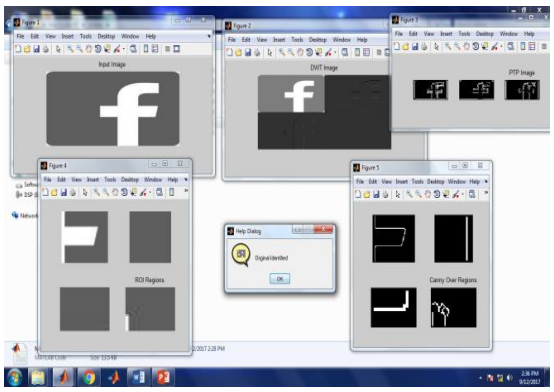

Fig.3 Original logo identified

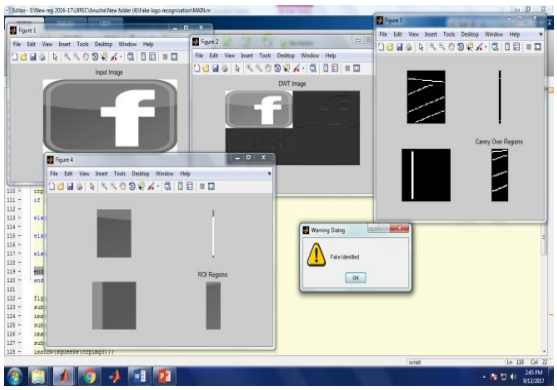

Fig.4 Fake logo identified

IV. CONCLUSION

The combined scheme of ROI and DWT gives better result than the previous work of involving only DWT. The main drawback of this scheme is that the quality of input image should be free from regional blur and mingle of ink. The most professional technique in identification of logo is minutiae based approach where termination and bifurcation points are considered as the minutiae of a fingerprint. This technique requires huge space to create database of since each image has to be stored on the database. On the other hand the proposed technique requires only a vector of four points to store an image in the database. The entire work can be enhanced incorporating invariant moment on the image of ROI for verification of fakeness so we can find the original logo of image.

IV. REFERENCES

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