Context Dependent Logo Detection and Recognition based on Context Dependent Similarity Kernel

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ABSTRACT
Graphics detection and recognition are fundamental research problems in document image analysis and retrieval. Logo detection and recognition continues to be of great interest to the document retrieval community as it enables effective identification of the source of a document. From the past analysis, this paper is going to implement novel technique which can match and recognize different instances of different reference logos in images. Reference logos and text images are verified depending on some features like regions, interest points etc &by decreasing the energy function the logos can be recognized, feature matching quality is measured by fidelity term, geometry co-occurrence of a feature can be obtained by neighborhood criterion and smoothness of the matching solution is controlled by a regularization term. This paper also introduces a technique which is a novel detection method and is implemented using MATLAB and results are shown.

Keywords
Logo detection, logo recognition, context dependent similarity kernel

1. INTRODUCTION
For the declaration of any document source, in business and government documents logos are used. For immediate public recognition logos are used, a logo is a graphic mark or symbol to help as well as to support immediate identification. Purely graphic are composed of the name of the organization for the recognition. Sometimes they have both a graphic and a word mark.

Logos are appearing in graphical representation form. These logos are used to remember some real world objects and highlight a name, simply gives the conceptual secret code which have strong perceptual demand. [See Figure. 1(a)]. To evaluate the logo identity color has some significance. Graphic designers and social communication experts are carefully studied about the logos and given the uniqueness of logos. To catch the attention of the customer and express the information related to logo properly and long lastingly the graphic layout of logos is very important. Different logos may have alike layout with a little different structural outlook of the full elements, size and shape, and presence and absence of one or some character with wicked tampering. [Figure: 1(b)]. Logos present in images or videos in real world. They are superimposed on shirts of players. Sometimes logos are corrupted by illumination effects, noise. Due to this reasons changes are occur in original logos. Regions that are present in logos contain few information and these are small [Figure. 1(c)]. Detection & recognition plays vital role for number of applications. So many examples present in the text, for usual classification of products on the web for the development of profitable search-engines, the conformation of the marketing logos in sports [1] [2]-[4], the detection of near-duplicate logos [5],[6]. For supporting the blind particular applications and recognition of provisions are reported [7].

Figure. 1. (a) Different popular logos giving information of real world objects, explicit signs, difficult layouts, realistic details of text. (b) Couple of logos with wicked small changes (c) Examples of logos with partial occlusions and deformations.

2. STATE OF REVIEW OF ART
2.1 Existing System
In existing system work is done related to matching the objects based on shape contexts and recognizes the objects. For the representation of two-dimensional shape global descriptors are used. Global descriptors works based on logo contours and shape descriptors works based on shape context. Another algorithm is used for the detection of logo depends on spatial-spectral saliency & partial spatial context. Spatial-spectral saliency is used to keep away from the effect of confusion back ground also the logo detection is speed up. All these methods are work only when the logo picture is fully visible, noise free and not subjected to changes. These methods are not suitable for real time images. The main drawback of these methods is image resolution.

3. PROPOSED METHOD
In this proposed method, a novel approach for logo recognition & detection depends on the description of a Context Dependent Similarity (CDS) kernel. This method is not limited to any derivable arrangement model means it is model free. It mainly deals with the spatial context of local features.

Flow chart of proposed method is present in fig:1. In this first consider two logos, reference logo and test logo. Resize that two

logos and match them by considering list of interest points. For matching purpose SIFT descriptor is used. Each single SIFT key point represented as context. Finally average precision in computed. This context criterion considers pair of interest points of reference and test logos with high alignment score.

To show contiguous as well as repeating local structures in case of graphic logos this CDS kernel is used. For this local regions are compared across the image.

3.1 Feature Selection and Extraction

Logos are represented as difficult mixtures of graphics, formatted text. For the purpose of matching logos, it is necessary to extracting strong and general features. Edge detectors and corner detectors are used for this purpose. To eliminate false corners adaptive local thresholds and dynamic regions are used.

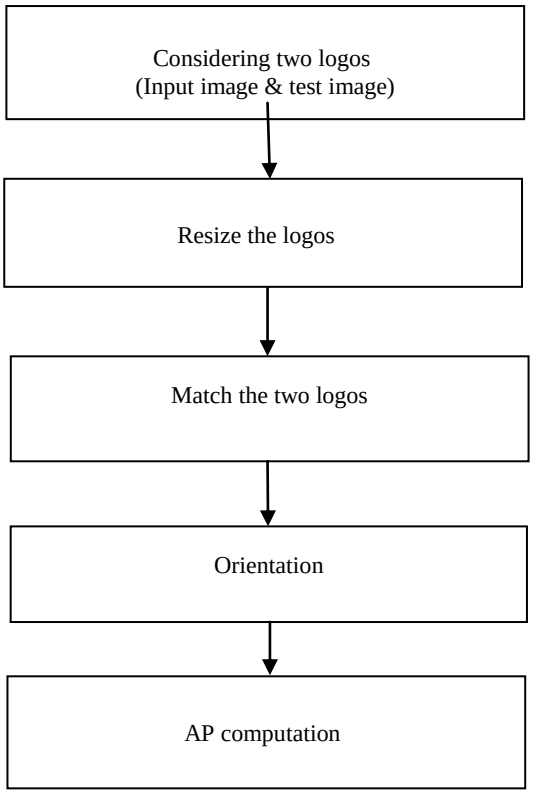

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Fig : 1 Flowchart of proposed method

4. CONTEXT-DEPENDENT SIMILARITY

In this context-dependent similarity (CDS) the function is related to two difference logos one is reference logo and second on is test logo, by taking list of interest points in these two logos. Assume that list of interest points as $S_X = \{x_1, \ldots, x_n\}$, $S_Y = \{y_1, \ldots, y_m\}$. Due to S_X, S_Y the values of n, m are changed. It requires definition of context as well as similarity design [9],[10].

4.1 Context

The interested points Spatial configuration in both S_X,S_Y is defined as the context . An interest point $xi \in SX$ is defined as $x_i = (\psi g(x_i), \psi f(x_i), \psi o(x_i), \psi s(x_i), \omega(x_i))$ where the symbol $\psi g(x_i) \in R_2$ stands for the 2*D* coordinates of x_i while $\psi f(x_i) \in Rc$ corresponds to the feature of x_i is taken for spatial information.

4.2 Similarity Design

Similarity measure between two interest points $(x, y) \in S_X \times S_Y$, is defined by function k. By solving the minimization problem similarity **K** of the two logos SX, SY is obtained with the help of this similarity design.

5. LOGO DETECTION AND RECOGNITION

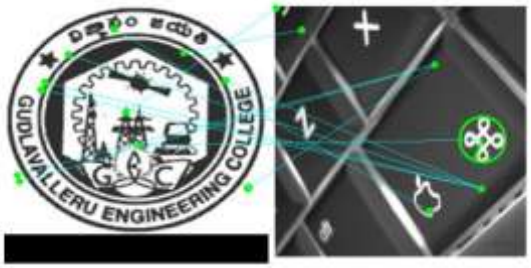
For logo recognition and detection CDS wants to provide a matching condition and verifying its probability of success. Let $R \subset R^2 \times R^{128} \times [-\pi,+\pi] \times R^+$,from the reference logo images interest points are obtained which are required and *X* a random variable position for interest points in *R*. Same as, describe $T \subset R^2 \times R^{128} \times [-\pi,+\pi] \times R +$ as the list of interest points obtained from all the achievable test images either logos are present or not & *Y is* a random variable used for representation of interest points in *T* . Assume that X & Y are tired from occupying the probability distributions which are unknown. Here consider $S_X = \{X_1, X_n\}$, $S_Y = \{Y_1, Y_m\}$ as *n* & *m* realizations having the equal distribution as *X* and *Y* correspondingly. Assume that matching between *YJ* and *X* is assessed iff to avoid false matches

$$K_{YJ/X} \geq \sum_{i \neq J}^{m} K_{Y_j}/X$$

when $\mathbf{K}_{YJ\,|X}$ >> $\mathbf{K}_{Yj}\,|X$ the perception becomes as strong , the entropy of the conditional probability distribution **K**.|*X* is near to 0, then achievable matches of *X* will be decreased. Match the each interest points in both S_X, S_Y. Getting the match in S_Y is present for each interest point of S_X and if the amount of matches is suitably maximum then declare reference logo S_X is present in test logo . All these steps are used to know the full procedure for logo recognition also detection.

6. RESULTS

Logo matching and detection is done using Context Dependent Similarity method. It is based on the idea[8] where a reference logo is detected in a test image, if the overall number of SIFT matches is above a fixed threshold. SIFT matches are obtained by computing its Euclidean distance for each interest point in S_X to all interest points in S_Y , and keeping only the nearest-neighbors.



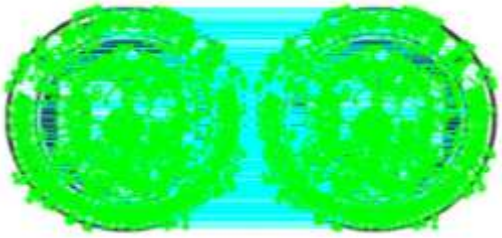
(a)

(b)

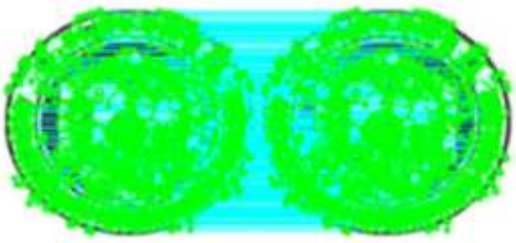
(c)

(d)

(e)



(f)



(h)

Fig. 2(a,b,c,d,e,f,g,h). Some examples of logo detection results.

7. CONCLUSION

This proposed method is a novel technique which detects logos and matches with the reference logos. In this technique a reference logo is compared with the set of given test logos and in each case the reference logo is compared with the interest points in the test image . All these values are plotted by using precision vs recall as the axes of the graph. Hence by using this novel technique, the obtained results has high degree of detection and matching percentage .

8. ACKNOWLEDGEMENTS

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