Translated Trademarks Retrieval using Color Autocorrelogram for Extracted Textual Parts

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ABSTRACT

This article describes a trademark retrieval system using autocorrelogram features. The proposed algorithm deals with the trademarks of a same company having different shapes in different languages. Textual and mixed logos types are considered in this study, in which the text area is located based on an edge detection algorithm and connected components merging strategy to form the bounding box enclosing the textual parts of a logo. Color autocorrelogram is applied on the extracted and quantified text area. An adapted evaluation metric is proposed to measure the performance of the proposed technique. Results show a good retrieval rate on real trademark images.

KEYWORDS

Content Based Image Retrieval, Correlogram, Edge Detection, Image Segmentation, Trademark Retrieval

INTRODUCTION

Trademark recognition has received an intensive importance in the literature of content-based image indexing and retrieval, recent applications are proposed and dealing with logo recognition including: patent office registration and copyright property protection (Doermann et al., 1996), image documents classification in which logos can be used to reduce the semantic gap problem (Zeggari et al., 2010), (Bagheri et al., 2013). Logos can be used also for vehicle type recognition in intelligent transportation system techniques (Psyllos et al., 2010).

Significant former research related to logo images retrieval problem have been described in the last years, (Wang and Chen, 2002) have proposed a content-based color trademark retrieval system, the trademark feature was computed as hit statistics based on the edge pixels and the smallest circle that covers the trademark. (Cerri et al., 2006) have proposed a three distinct families of measuring functions for size functions as shape descriptors namely: distances from points, projections and jumps. (Bagheri et al., 2013) used Dempster-Shafer theory to fuse feature classifiers including Zernike moments, generic Fourier descriptors, and shape signature. In (Gori et al., 2003), the authors have proposed a modified learning algorithm derived from the classical back-propagation, they used a weighed norm depending on the gradient of the company logos corrupted by artificial noise. (Alajlan et al., 2006) have proposed a geometry-based retrieval system for multi-object images, a curvature tree is used to model both shape and topology of image objects including holes. The authors proposed a matching scheme which agrees with many findings in psychology about the human perception of multi-object images. (Wei et al., 2009) have proposed a trademark image retrieval system, they used Canny edge detector to extracts global and local features. The global features capture the gross

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essence of the shapes while the local features describe the interior details of the trademarks. (Liu et al., 2014) proposed a kernel-based $l_2$ norm regularized least square (RLS) algorithm, in which they combine Kernel technique with the $l_2$ norm RLS algorithm to enhance the performance of a vehicle logo recognition system.

The previous works related to the problem of logo recognition deals with the general problem of retrieving a list of the most similar trademarks resemblant to the query image on the database. Most of the previous works focus on the invariance of the query image to the local deformations such as partial occlusion, broken curves and local noise, or they are adapted to the global deformations such as scale, orientation and affine transformations. The problem addressed in the current work is the retrieval of logos representing one company in different languages. Translated logos of a same company are globally similar in terms of color distribution and non-textual shapes, but they have different interior parts representing the textual name of the company or their product in another language.

The rest of this paper is organized as follows: In section 2 a brief introduction to trademark recognition is presented. The next section surveys the proposed algorithm of translated logos recognition. In Section 4, to verify the performance of the proposed method, experimental results with real trademark database are analyzed and evaluated. Finally, section 5 concludes this paper.

**Logos Recognition**

A logo is a symbolic image or other small design containing textual or/and graphical forms adopted by an institution or organization to identify its products and even individuals in a unique and salient manner. Companies designed their own logo images in order to be fast and well recognized by consumers from different countries having different cultures and eventually different languages.

For commercial purposes, international companies change their logos by translating the original company brand into local languages. In order to keep some amount of similarity between the original and the translated logos, and hence maintaining the uniqueness and the singularity of their trademark, companies maintains the same color distribution of the global image, in particular the background and the graphical parts remains the same as the original trademark, they also keep the same color and text areas as in the original logo. An example of translated color trademarks in Arabic language is given in Figure 1.

Trademarks are designed in order to be visible and quickly identifiable among other logos. In fact, color logos contain few and large consistent regions of height contrasted colors. In this paper, only textual and mixed logos types are used.

**TRANSLATED TRADEMARKS RECOGNITION**

In order to maintain a similar perception of their logos, companies designed theirs translated logos by changing only the textual parts in another language and keeping the same format of the textual zone. A lot of techniques are available for character and text detection and recognition, they are not conceived for all languages but they are performed for a specific language and edition forms. The main goal is not to detect characters and text for recognition purposes, our objective is to detect and remove the text zone from a color trademark.

The first step of the proposed color trademark recognition system is textual parts segmentation in which the text area will be located. We start by a character detection, which is conducted by the computing of the bounding box of each closed edge. Finally, the text area is selected by fusing the closest bonding boxes having similar interior histograms and representing the connected components of the text characters. In the second step of the proposed color trademark recognition system, a higher weight is given for the textual zone to compute logos similarity, whereas the remainder parts are given a lower weight to theirs features.
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