Chapter 5
Trademark Image Retrieval

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**ABSTRACT**

With the rapid increase in the amount of registered trademarks around the world, trademark image retrieval has been developed to deal with a vast amount of trademark images in a trademark registration system. Many different approaches have been developed throughout these years in an attempt to develop an effective TIR system. Some conventional approaches used in content-based image retrieval, such as moment invariants, Zernike moments, Fourier descriptors and curvature scale space descriptors, have also been widely used in TIR. These approaches, however, contain some major deficiencies when addressing the TIR problem. Therefore, this chapter proposes a novel approach in order to overcome the major deficiencies of the conventional approaches. The proposed approach combines the Zernike moments descriptors with the centroid distance representation and the curvature representation. The experimental results show that the proposed approach outperforms the conventional approaches in several circumstances. Details regarding to the proposed approach as well as the conventional approaches are presented in this chapter.

**1. INTRODUCTION**

With the invention of the digital cameras, personal computers and the Internet, people are now allowed to create, share and distribute multimedia content effortlessly. As a consequence, the amount of digital data has been increased tremendously in past decades. Automatic searching for the multimedia content becomes prominent at reducing search efforts. As a result, content-based image retrieval (CBIR) and multimedia content description interface (MPEG-7) has been emerged to cope with this problem.
1.1 Background and Motivation

Prior to the existence of CBIR and MPEG-7, the traditional approach to retrieving digital data requires a lot of manual processes. Digital data are first categorised according to their manners and are annotated manually afterwards by assigning keywords or names with respect to their content. This approach, however, is not efficacious enough. Faults or slips may appear because of different perception of the digital data throughout the annotation process. This leads to the development of CBIR and MPEG-7. The purposes of CBIR and MPEG-7 are both designed to bridge the semantic gap between human percept images and machine percept images. CBIR is relatively pragmatic by comparing to MPEG-7. Instead of producing a collection of standardised descriptions of the digital asset to increase interoperability, CBIR concerns more on pictorial data management in an individual system.

Although CBIR does not allow any search across different repositories, it can be widely applied in different areas. For instance, in the medical field, CBIR can be used to deal with different types of radiographs such as mammograms and brain tomograms; in the law enforcement field, CBIR can be used to cope with the criminal database and last but not least, CBIR can also be applied for the trademark registration in the management of intellectual property.

As CBIR covers many different aspects, this chapter was only focused on trademark image retrieval (TIR). According to Alwis and Austin (1998), a trademark is a distinctive sign which can be uniquely identified for products and services in the commercial environment. With the use of trademark, a company can differentiate its own product from other companies’ products. By concerning the rapid increase in the amount of registered trademarks around the world, TIR has been developed to deal with a vast amount of trademark images in a trademark registration system. Concerning Eakins, Graham, and Boardman (1997), the traditional classification of registered trademark images is based on their shape features and types of objects depicted by employing manually-assigned codes. Currently, the traditional classification has been proven to be infeasible in dealing with a gigantic amount of trademark images that contain little or no representational meanings (Alwis and Austin, 1998).

As mentioned previously, the techniques used in the CBIR system for a trademark image database are mainly focused on shape extraction. Therefore it is sensible to utilise different shape descriptors to characterise the trademark images in a TIR system. The intention of ensuring the existing trademarks is sufficiently distinctive from new candidate trademark images, TIR techniques are incorporated into the existing trademark registration system to surmount the traditional classification and augment the competence in retrieving perceptually and conceptually relevant trademark design in an enormous trademark image database.

1.2 Challenges

Although it is easy to spot a trademark in our daily lives, it is difficult to classify and search for the similar trademarks when there are an enormous amount of trademark images present. The process of classifying and retrieving trademark images is indeed very challenging. Since trademark images can have a significant amount of variations from one another, this complicates the comparison between different trademark images.

Trademarks can be categorised into few different natures. A trademark can either be identified as a word-only mark, a device-only mark or a device-and-word mark (see Figure 1). For a word-only mark, the design of the trademark consists purely of text words or phrases. For a device-only mark, the
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