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Survey

Logo and seal based administrative document image retrieval: A survey

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ABSTRACT

With the advance of technology, business offices and organizations together with their clients create a massive amount of administrative documents every day. Administrative documents commonly contain some salient entities such as logos, stamps or seals as the means of their authentication and proprietorship. These salient entities provide quite discriminative information, which can effectively be used for different tasks of document image retrieval, classification and recognition in document-based applications. Thus, proper detection/recognition of these entities in document images increases the performance of such applications in terms of document retrieval, classification, and recognition. To present the state-of-the-art research on the retrieval of administrative document images, this paper deals with a survey of administrative document image retrieval in relation to seals and logos. All the available datasets, feature extraction and classification techniques for logo and seal detection/recognition are discussed systematically. The shortcomings of the present technologies on logo and seal based document processing are also highlighted. Avenues of the future works are further given for the benefit of readers. To the best of authors' knowledge, there is no survey on administrative document image retrieval and hence the authors hope that this work will be helpful to the researchers of the document analysis community.

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1. Introduction

With the advance of science and the prevalence of electronic media in every step of daily life, the need for transforming different information in the form of documents into electronic format is increasing day-by-day. Furthermore, digital born documents are also increasing rapidly. Libraries and archives are generally interested in mass-digitization and transcription of their collected books and resources. Administrative, communication and filing procedures, which were mostly paper-based, are driven into a digital environment by the ubiquity of different computation facilities. In all these applications, the objective is not only to preserve documents in a digital format, but also to process documents to provide an easy access and retrieval service to a wider number of users. Traditionally, document retrieval is associated to textual analysis. The records in typewritten and structured documents are indexed with the use of a traditional high performing commercial Optical Character Recognition (OCR) product. Once the document image is OCRed/indexed, the resulting ASCII information is compared to the query using a string-matching algorithm [1]. However, the OCR generally fails to perform accurately on the documents with a high degree of degradation, such as fax and scanned documents. Recently, many systems and technologies have become available to comprehend huge volume of electronic documents and to handle such type of documents [2-4,1]. In general, Content Based Image Retrieval (CBIR) is one of such technologies employed in a wide range of applications. Content-based Document Image Retrieval (CBDIR) is a subdivision of CBIR, where large-scale document retrieval is performed according to a users' request. CBDIR involves a search process, where the user's request is a model or a concept to be found [3,1].

Public organizations, institutes, companies and private sectors are generally interested in implementing digital mailrooms to improve the efficiency of paper-intensive workflows and to reduce the burden of manual processing of different administrative documents including incoming mails, faxes, forms, invoices, reports, employee records, health record, etc. By this digital mailroom, public and private sectors would obviously like to have an automatic indexation of their incoming documents that results in automatic classification, distribution, and also easy access and retrieval of those documents in future. As mentioned, one possible solution is the use of textual information for automatic indexation of those administrative documents. However, besides the presence of textual information, administrative documents commonly contain different salient entities such as logos, stamps/seals, layout-structure, signatures, and bar-codes, which refer to the paradigm of corresponding organization, institute, product or personnel. These salient entities have a rich context information providing distinctive features and characteristics to deal with the problem of document image analysis. Truly speaking, these salient entities have mainly been considered as an alternative pathway for administrative document image retrieval (ADIR) and document classification.

Logo and seal can be considered as two important and popular salient entities presented in administrative documents. The manual identification/verification of logos/seals is not an easy task, as the documents in-flow in organizations is growing rapidly. Therefore, many research works have been carried out to automatically detect and verify logos/seals facilitating such administrative document-based systems. Indeed, accurate detection and recognition of logo/seal in document images provide us with a more reliable and appropriate system.

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