Chapter 4
A Content-Based Approach to Medical Image Retrieval

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ABSTRACT

Medical images stored in distributed and centralized servers are referred to for knowledge, teaching, information, and diagnosis. Content-based image retrieval (CBIR) is used to locate images in vast databases. Images are indexed and retrieved with a set of features. The CBIR model on receipt of query extracts same set of features of query, matches with indexed features index, and retrieves similar images from database. Thus, the system performance mainly depends on the features adopted for indexing. Features selected must require lesser storage, retrieval time, cost of retrieval model, and must support different classifier algorithms. Feature set adopted should support to improve the performance of the system. The chapter briefs on the strength of local binary patterns (LBP) and its variants for indexing medical images. Efficacy of the LBP is verified using medical images from OASIS. The results presented in the chapter are obtained by direct method without the aid of any classification techniques like SVM, neural networks, etc. The results prove good prospects of LBP and its variants.

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INTRODUCTION

Due to the enormous size of medical image data repository, CBIR can be used for medical image retrieval. This chapter is envisioned to propagate the knowledge of the CBIR approach to deal with the applications of medical image management and to pull in more prominent enthusiasm from various research groups to rapidly propel research in this field.

The image is presumably a standout amongst the most essential tools in medicine since it provides a method for diagnosis, monitoring drug treatment responses and disease management of patients with the advantage of being a very fast non-invasive procedure, having very few side effects and with an excellent cost-effect relationship.

Table 1. Types and sizes of some commonly used digital medical images from Huang (2004)

Image Type	One Image(bits)	No. of Images/Exam	One Examination
Nuclear medicine (**NM**)	128X128X12	30-60	1-2 MB
Magnetic resonance imaging (**MRI**)	256X256X12	60-3000	8 MB
Ultrasound (**US**)*	512X512X8	20-240	5-60 MB
Digital subtraction angiography (**DS**)	512X512X8	15-40	4-10 MB
Digital microscopy	512X512X8	1	0.25 MB
Digital color microscopy	512X512X24	1	0.75 MB
Color light images	512X512X24	4-20	3-15 MB
Computed tomography (**CT**)	512X512X24	40-3000	20 MB
Computed/digital radiography (**CR/DR**)	2048X2048X12	2	16 MB
Digitized X-rays	2048X2048X12	2	16 MB
Digital mammography	4000X5000X12	4	160 MB

*Doppler US with 24 bit color images

Hard-copy image formats used to support for medical images are not utilized these days. The expense and resource involved in maintenance, storage room and the amount of material to display images in this format contributed for its disuse. Nowadays digital images, that doesn't face problems mentioned for hard copy formats are used. **Table 1** gives a review of digital images per exam in medical imaging. This transition from hard-copy to soft-copy images is still the center of an interesting debate related with human perception and understanding issues during exam analysis. Elizabeth (2000) have tended to the significance of observation in medical imaging.

Increase of medicinal information in digital libraries makes tougher to perform analysis on search related tasks. Since textual information retrieval is as of now a developed discipline, an approach to overcome this issue is to utilize metadata for image indexing. Key description, patient identification, kind of exam and its technical details or even a small text comment concerning clinical relevant information can be utilized to represent the image in its index. With these annotations, text-matching techniques that assess the similarity between the search statement and the metadata can be applied for retrieving images. This is called text-based or concept-based image retrieval.