

# Chapter 7

## Analysis and Comparison of Developed 2D Medical Image Database Design using Registration Scheme, Retrieval Scheme, and Bag-of-Visual-Words

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### ABSTRACT

*There is certain to be a significant increase in the use of registration, retrieval and registration based retrieval of medical images in healthcare. But there is a related major concern that these initiatives are narrowly policy or technology led rather than evidence based or case based reasoning. Or else, either they will be based on old paradigm structures without considering the new paradigms that they create. It is planned to look at the image registration and retrieval from a unified perspective based on their performance for clinical diagnosis and treatment. It is concluded with an experiment carried out on histopathology and five types of anatomic (radiology) images. The results showed that this approach works better with more images from the Bag-Of-Visual words and Affine with B-Spline registration based retrieval for modality and histopathological images. Bag-of-Visual Words is more suitable for histopathological images than registration based retrieval techniques.*

### INTRODUCTION

Medical imaging refers to several different technologies that are used to view the human body in order to diagnose, monitor, or treat for various critical medical conditions. Each type of technology gives different information about the area of the body being studied or treated, related to possible disease,

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injury, or the effectiveness of medical treatment either based on evidence based and case based reasoning (Swarnambiga Ayyachamy & Vasuki S, 2013; Swarnambiga Ayyachamy, 2014). The view carried by physicians' and radiologists' is that actual medical imaging techniques are not yet precise enough for an effective clinical diagnosis and treatment.

The recent trend in computerization and interconnection of medical devices and systems are computerization of medical devices as a natural consequence for the need to rapidly acquire, process, and present an ever-increasing quantity and variety of healthcare information (Huang HK, 2004). Combined, these trends will increasingly move us away from the traditional clinical care set up hospitals and physician's offices and move us toward their virtual successors.

A user friendly front end database design is lagging for routine clinical use. The results of the various experiments done under this work have found to vary with the clinical results. To be used as a diagnostic aid, the perfect database as a tool is needed by both the physicians' and radiologists'.

Overall the last decade, automatic methods for intrasubject registration and intersubject registration methods of high resolution anatomical images have been widely developed. The registration, retrieval and registration based retrieval for medical imaging expertise is possible with Mathematical programming and algorithm design. The designs are made possible by 2D analysis and geometry editing operations, feature extraction, object segmentation and image registration. The treatment planning includes geometric applications, CAD (Computer Aided Diagnosis) applications, surgical guides, database design. The information management includes, patient lifecycle data management, visualization solution with markup and annotation support.

Content Based Medical Image Retrieval (CBMIR) is valuable to radiologists in assessing medical images by identifying similar images in large archives that could assist with decision support. Radiology images pose specific challenges compared with images in the consumer domain; they contain varying, rich, and often subtle features that need to be recognized in assessing image similarity.

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A combined perspective of semi-automatic and computer assisted clinical decision-making to integrate a larger system using registration based retrieval is designed and proposed. The major contribution of this chapter is focused on developing an entire system framework for Medical image registration based retrieval for Computer assisted clinical diagnosis. The usefulness of this activity resides in offering new elements for computer assisted diagnosis in order to improve and facilitate the physicians' and radiologists' activities. This chapter has a strong interdisciplinary character that comes from the necessity to establish the new elements for validating the results of registration techniques and retrieval techniques.

The novel work focused in this chapter is justification of the obtained results using exact medical terms and also technical discussions are carried out for scientific merit. This entire proposed system is developed and practically implemented in clinical care settings to obtain and analyze the real clinical usage effectively. Both qualitative and quantitative measures are given equal importance for supporting in real time clinical diagnosis. This developed system is certified as an immediate effective assistance for clinical diagnosis by Radiologists and Physicians. Also a unique contribution from this research for computer assisted clinical diagnosis is this framework consist of integrated database including both X-ray, CT (Computed Tomography) and MRI (Magnetic Resonance Imaging) image modalities of five various anatomical organs. But, the combination of various modalities in a single database has not been proposed so far (Maintz 1998; Quddus 2011 and Diez 2011). The objectives of this proposed work are, ultimately,

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