Chapter 22
Application of Content-Based Image Retrieval in Medical Image Acquisition

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ABSTRACT

Content-based image retrieval is a promising technique to access visual data. With the huge development of computer storage, networking, and the transmission technology now it becomes possible to retrieve the image data beside the text. In the traditional way, we find the content of image by the tagged image with some indexed text. With the development of machine learning technique in the domain of artificial intelligence, the feature extraction techniques become easier for CBIR. The medical images are continuously increasing day by day where each image holds some specific and unique information about some specific disease. The objectives of using CBIR in medical diagnosis are to provide correct and effective information to the specialist for the quality and efficient diagnosis of the disease. Medical image content requires different types of CBIR technique for different medical image acquisition techniques such as MRI, CT, PET Scan, USG, MRS, etc. So, in this concern, each CBIR technique has its unique feature extraction algorithm for each acquisition technique.

INTRODUCTION

Content-based image retrieval (CBIR) is a handy Image searching system that searches for images by image content. Image content means the color, shape, texture, or other information which can get from an image directly. It has been one of the most exciting areas of research in the field of computer vision

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science since last ten years. CBIR is also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) (Karthikram & Parthiban, 2014). This application is a solution to the image retrieval problem, the problem of finding an image in a vast database. Nowadays, in medical system images are widely used like Magnetic Resonance Imaging (MRI), Computed Tomography (CT) Scan, Positron Emission Tomography (PET), Ultrasonography (USG). CBIR considered as one of the most efficient ways to access the visual data. In the year of 2002, The Radiology Department of the University Hospital of Geneva generates near about 12,000 pictures per day. The aggregate sum of cardiologic picture information created in the Geneva University Hospital was around 1 Terabyte (TB) in 2002 (Müller, Michoux, Bandon, & Geissbuhler, 2004). In the case of the centralized medical system in any Health organization, a considerable amount of image is scanned and stored every day. To retrieve this data, CBIR is a very efficient process. It analyzes the image by color, texture, shape and space relationship of objects, etc. rather than keywords, tags and set up feature vectors of an image(Müller et al., 2004).

Standard Boolean based queries used for searching purpose in any case, with the rise of enormous picture databases, the conventional content-based inquiry experiences the accompanying constraints: Manual tag require a lot of time and are costly to execute (Waoo, N., Kashyap, R., & Jaiswal, A., 2010). Increasing numbers of Images in a database proliferates. It isn't practical to physically explain all tags of the picture content for a large number of pictures because of the following reasons (Erickson, 2009).

1. Manual tags neglect to manage the disparity of subjective observation. The textual portrayal isn't adequate for delineating personal inspection. Ordinarily, a medicinal picture more often than not, contains a few attributes, which pass on specific data. In any case, extraordinary radiologists can do distinctive translations for an obsessive zone. To catch all information, ideas, considerations, and affections for the substance of any pictures is practically unthinkable.
2. The contents of medical images are hard to be adequately descriptive in words. For instance, irregular natural shapes can only with significant effort communicated in textual structure. However, individuals may hope to look for pictures with comparable substance dependent on the models they give.

These issues limit the plausibility of text-based look for medicinal image recovery. The improvement of CBIR is required to upgrade the massive development in the volume of images and the broad application in therapeutic fields. In the late 1970s, models were first commented on with text and afterward sought to utilize a text-based methodology from conventional database management frameworks. It is troublesome for the traditional text-based techniques to help an assortment of subordinate assignment inquiries. This procedure likewise neglected to keep up the massive size of the database. Along these lines, this framework did not work effectively. In 1992, the National Science Foundation of the United States suggested a productive and natural approach to speak to and list visual data. It based on specific properties of the image which has a place with that image. The expression "Content-Based Image Retrieval" may begin in this period. IBM brought the central business arrangement of CBIR; they named it as Query by Image Content (QBIC) (Flickner et al., 1995). In this framework shading rates, shading format, texture, shape, area, color format, color gradient, and different keywords utilized (Datta, Joshi, Li, & Wang, 2008).