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APPLICATIONS OF TELEMEDICINE IN BIOMEDICAL IMAGES

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Computer and its applications have become indispensable and invaluable in the lives of human beings. One such application is the field of medicine. In addition to the actual electronic gadgets and instruments, computers play a vital role in the communicative aspects in the field.

For instance, it serves as a link in three different formats and these links are exceptionally advantageous and enduring spectacular

Medical Professional and Patient

Medical Professional and Medical Professional

Medical Professional and data bank

Thus rates are three dimensional in approach and definition- diagnostic, consultative and referential through the above description may, on the whole, look simple and explicit, they are now without practical problems. But their utilitarian values are immense and far reaching. One such practical aspects of telemedical application with its humanistic approach is the possibility of making available biomedical images in medicine to any one in any part of the global who is in dire need of it. At present, the individuals, the medical instruments or the professional keep records of the diagnosis, treatment and prognosis of patients and the sharing of this information among the medical treatment is not only time consuming and costly but also atleast impossible with the current deficiency in communicative capabilities. In order to make the telenetworking of bio medical images to facilitate its availability to whomsoever needs it, the present approach is attempted in this study. Further, the inadequacy of the present system, could be explained this. At present, image database and textual explanations are put together and made available to the seekers with queries. But no methodology or system is available to specially cater to the needs of the enquiry made. No tool also presently enables the seeker of a solution to a problem to have direct access to the contents or differential patterns that he needs. Therefore an attempt is made to create visual-based (i.e. content based) interfacing and retrieval based on the information contained in the pixel data of medical images that is expected to have a greet impact on biomedical image databases. The present study undertakes to introduce and interface advanced biomedical CBIR with the new, very commonly available web based systems and also link the new collaborative efforts among the existing research work or the new CBIR deployments in biomedical environments where the impact is presumed to be very high. The planned or proposed methodology would facilitate effective and expedient communicator between the medical professionals and their patients. The patients could also conveniently send their medical data / image / information through the wired / wireless networks. Thus, such a system saves; time, energy and cost in the diagnostic or consultative study and also provides easy access and retrieval of the large store house of data available all over the world.

1. Introduction

Modern technology and the rapid strides of progress it makes enhance the potential or the human beings. This is more so and also greatly enlightening in information sharing protocols. The contiguous and pulsating throbbing of growth noticed in the integrated use of information and communicator technologies, popularly christened ICT, come in handy as solution- providers to many of the pressing and stressing processing issues noticed especially in the developing i.e. rural areas. But it should be remembered that ICT by itself is not the solution. It is a means to achieve our purpose. Through telemedicine, it even unimaginable processing details will be taken care for the general as well as clinical welfare of the population.

The concept of the study is simple and direct the study tries to create a system in which different features of information and technology integrated to make it rich and highly potent. For instance, as per the existing conditions, if a query is raised by a user and there are only limited examples or illustrations, the best choice would be to collect the images as per examination.

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Images per Examination

Table 1
Shows the Size of Medical Images Produced by Some Common Methods

Methods	Image size (pixels)	Av. Number of images per examination	Mbytes per examination
Magnetic Resonance Imaging(MRI)	256 x 256 x 12	80	10
Computerized Tomography(CT)	512 x 512 x 12	60	30
Computed Radiography(CR)	2577 x 2048 x 12	2	20
Ultrasound(US)	512 x 512 x 8	36	9
Digital Subtraction Angiography(DSA)	1024 x 1024 x 12	20	40

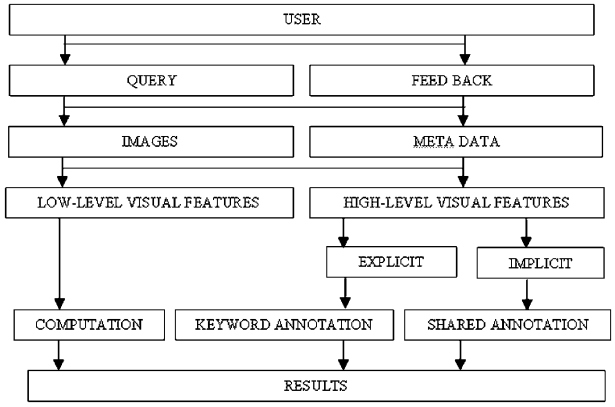

Fig. 1.1: High-level Representation of the Integration of Retrieval by Image Content, Keyword Annotation, and Shared Annotation.

1.1. CONTRIBUTIONS

The study makes an attempt at defining the converging trends of communication Technologies in Telemedicine and biomedical imaging approaches. Telemedicine is a potential area in clinical care applications but several hurdles are to be crossed before aiming at a suitable use. These hurdles are nothing but challenges known at the researches for scanning and finding solutions. The medical professionals resort to telemedicine or biomedical imaging process for various reasons. The information stored by the individual professional forms the basis for analysis.

In Introduction, clearly explain the motivation to extract the low-level image features from these limited examples and combine them for retrieving similar images in a collection is the purpose of the medical professional. Most of the Medical images (CT, MRI, US, etc.) are two-dimensional. User needs online interaction (interface) that creates queries and also image archives. The off-line user needs image database, query and medical summaries. The user specifies the query and identifies the image quality and identifies the similarity results. The user composes the query and provides feedback through a user interface.

In this description give the application of computer vision to the image retrieval problem, that is, the problem of searching for digital images in large databases. CBIR systems also make use of relevant feedback, where the user progressively refines the search results by marking images in the results as “similar”, or “not similar to the search query, then allows the repetition of the search with the new information. The goal of this method is good visualization and a rich query support Conventional information retrieval is based solely on text, and these approaches to textual information retrieval has transplanted into image retrieval in a variety of ways, including the representation of an image as a vector of feature values. Image contents are much more versatile compared with text, and the amount of visual data is already enormous and still expanding very rapidly.

Query-Retrieval Engine Method (Q-REM)

Query by Image and Retrieval Engine Method is one of the latest landmarks used in CBIR systems. It allows the user to specify the desired query and retrieve similar images. Queries are composed by directly specifying image features or by providing example images. CBIR has expanded in many directions since the introduction of Q-REM. Advances have been made in the features used to describe the image content, similarity measures employed to compare images and also how users interact with CBIR systems, including user interfaces and feedback mechanisms. This work emphasizes CBIR systems that make use of image regions, rather than stored features, for global retrieval.

Query Process

This query process is necessary to collect human data in order to establish the manual annotation needed for both annotation and keyword-based retrieval. There must be a clear benefit to the user providing this information. In hybrid approach of image retrieval, an important parameter to measure user-system interaction level is the complexity of queries supported by the system. From a user perspective, this translates to the different modalities user uses to query a system. Some of the different querying modalities, their characteristics, and the system support required are explained below.

Keyword Search: The user poses a simple query in the form of a word or diagram.

Image: The user wishes to search for an image similar to a query image.

Graphics: Computer- generated picture, or graphics could be presented as query.

Composite: Methods that involve using one or more modalities for querying a system.

Text-Based: Perform keyword-based searches and then retrieving matching pictures.

Content Based: Extraction of visual features and search for similar images.

Similarity Measurement

To measure the similarity, the general approach is to represent the data features as multi-dimensional points and then to calculate the distances between the corresponding multi-dimensional points. Selection of metrics has a direct impact on the performance of a retrieval system. Euclidean distance is the most common metric used to measure the distance between two points in multi-dimensional space. However, for some applications, Euclidean distance is not compatible with the human perceived similarity. For this method, documents and queries are represented as vectors and a vector similarity measure such as the cosine coefficient is used.

Cosine similarity is the angle between two n-dimensional vectors. The smaller the angle, the closer the vectors are. It is a common similarity measure in text document retrieval. Although it is not typically used to compare image features such as color histograms, it is a valid and applicable distance measure to use in comparing vectors. Cosine similarity is calculated as follows

$$CosD(u,v) = \frac{u.v}{\|u\| * \|v\|}$$

For clarity, this equivalent representation is also provided

$$CosD(u,v) = \frac{\sum_{i=0}^{n} u_i v_i}{\sqrt{\sum_{i=0}^{n} u_i^2}\sqrt{\sum_{i=0}^{n} v_i^2}}$$

Result

The Q-REM system combines content-based image retrieval, two-way filtering, and keyword queries together in a human-visual system. This hybrid approach creates unique challenges in evaluating the quality of the results, as the user is an essential component of the system. The open-ended nature of the interface allows a variety of expressions of queries to be composed. The system relies not only on computer-generated (content-based) information, but on human-generated features (annotation, shared information) as well. The most significant difference is the presentation of the system to the user. This variation presents Q-REM only as an image retrieval, organization, and annotation system.

Table 1
Shows Interface Features for each Query in Q-REM

Method	Multiple Examples	Scale	Position	Text Annotation
Content Based	Q	Q		
Shared Annotation	Q, L		Q, L	
Keyword	Q	Q		Q, L

Table.1 summarizes the implementation of a single interface that allows the three selected query methods to be simultaneously implemented. In this table, Q indicates a feature which is required for composing a query, whereas L indicates a feature which is needed for learning (annotation or inferring relationships).

Report of Data Integration of Retrieval by Image

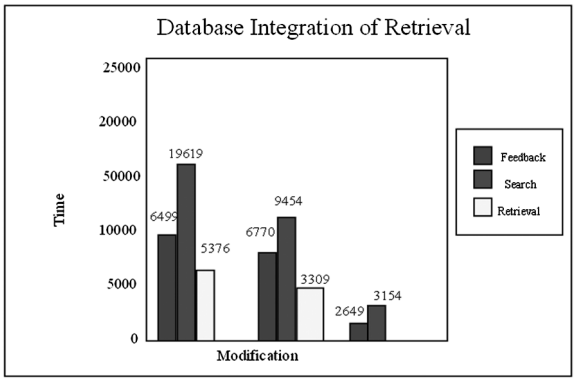

Fig.: Shows the Data Integration of Retrieval by Image

2. CONCLUSION

Hybrid approach is compatible with the method of content-based image retrieval. An interface for image retrieval is made compatible with the aforementioned new method for image retrieval by including the abilities to query by multiple example images. It provides retrieval, organization, and annotation capabilities. This is the only method which according to the user, is less effective than other methods (keyword-based retrieval). Finally, satisfaction with image retrieval systems leads to the provision of improved features for browsing and viewing images. Such features are often overlooked in image retrieval systems where the focus is on the quality of results, not of the retrieval experience of the human end-user. This is an effective query method that may operate entirely in the absence of image content, although it is not always feasible to annotate images in a suitable fashion (i.e. large database may take too long to manually annotate).

3. SCOPE FOR FUTURE WORK

The ultimate goal of these systems is to satisfy the user. The user understands the system's capabilities and the vital

qualities of an effective retrieval tool. This improved keyword retrieval method will develop stemming and other text analysis techniques. The user interface, including the interpretation of the query, is a key area for future work. Image browsing features were received positively by users. Providing the capability for users to use Q-REM to retrieve, organize, and annotate their images (rather than a pre-selected image database) is an exciting future direction. The use of the computational hybrid method of visual attention will be extended in future work. Finally, top-down information, such as pre-extracted category features or previously-defined heuristics will be used to modulate the hybrid method of visual attention.

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