



## Medical Images with Additional Annotation Features

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**Abstract:** A comprehensive “Medical Images with additional annotation features” with extensive possibilities of implementation of Picture Archiving and Communication System (PACS) with image viewer which helps radiologists to view medical images on workstations has been developed as per Digital Imaging and Communications in Medicine (DICOM) standard guidelines. The radiologists can adjust the contrast and brightness of images, and to apply spatial and graphical operations, such as user annotations, shutters, file/rotate, display area selection, and zoom. These changes can be saved in the form of a standard “DICOM” file and also in the form of “JPEG” file. This modified image file can be loaded and displayed on the image viewer.

**Keywords:** DICOM, PACS, HIS, JPEG

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### I. Introduction

DICOM is a standard for handling, storing, printing, and transmitting information in medical imaging. It includes a file format definition and a network communications. Protocol. The communication protocol is an application protocol that uses TCP/IP to communicate between systems. The DICOM files contains metadata and pixel data (one or more images, pdf) on one file, usually extension .dcm, so the image never be separated from this information by mistake. Pixel data can be compressed using a variety of standards, including JPEG, JPEG Lossless, JPEG 2000 and Run-length encoding (RLE). LZW (zip) compression can be used for the whole data set (not just the pixel data), but this has rarely been implemented. DICOM enables the integration of scanners, servers, workstations, printers, and network hardware from multiple manufacturers into a PACS (picture archiving and communication system)<sup>(1)</sup>.

### II. Objective

The purpose is to enhancing medical images with annotation feature and saving annotations on images into DICOM file format and JPEG file format. And to load and displaying these modified images on image viewer.

### III. Literature Survey

Early works has been done on medical images. For enhancing, Zohair Al-Ameen, Ghazali Sulong and Md. Gapar Md. Johar<sup>(2)</sup> proposed the worked on Enhancing the Contrast of CT Medical Images by Employing a Novel Image Size Dependent Normalization Technique in this paper they employs an easy, fast and reliable technique to improve the contrast of different types of computed tomography (CT) medical images by applying the technique directly to the entire image and normalize it depending on its size in the spatial domain. Ko BC, Lee J, Nam JY. Proposed the work presents novel multiple keywords annotation for medical images, keyword-based medical image retrieval, and relevance feedback method for image retrieval for enhancing image retrieval performance<sup>(3)</sup>. The work of Jian Yaoa, Zhongfei Zhanga, Sameer Antanib, Rodney Longb, and George Thomab has presented novel medical image retrieval method based on SEMI-supervised Semantic Error-Correcting output Codes (SEMISECC). The experimental results on IMAGECLEF 2005annotation data set clearly show the strength and the promise of the presented methods<sup>(4)</sup>.

### IV. Methodology

The methodology which is used in developing the Enhancing Medical images with annotation feature is the prototype model. The prototype model is a system development method a prototype (an early approximation of a final system or product) is built, tested, and then reworked as necessary until an acceptable prototype is finally achieved from which the complete system or product can now be developed.

### V. Algorithm for annotating DICOM images:

Our algorithm works in a three phases in those phases first phase is mandatory and rest of two phases are optional.

#### Phase I:

Step 1: Input DICOM Image.

Step 2: Apply Preprocessing any one or more than one techniques such as Invert,Flip,Rotate and Zooming this selection of technique is depend upon the need of medical professional.

- Step 3: Mark on affected area by using several drawing shapes like(Square, Ellipse, Arrow and Line with distance margins measured in MM and for lines CM).
- Step 4: Adding comment to the annotated area.
- Step 5: Save the image in .JPEG format.

**Phase II:**

- Repeat the above steps. To add several images in single screen following steps are followed.
- Step 6: Select the images and tile them in single screen.
  - Step 7: Save the file in .JPEG

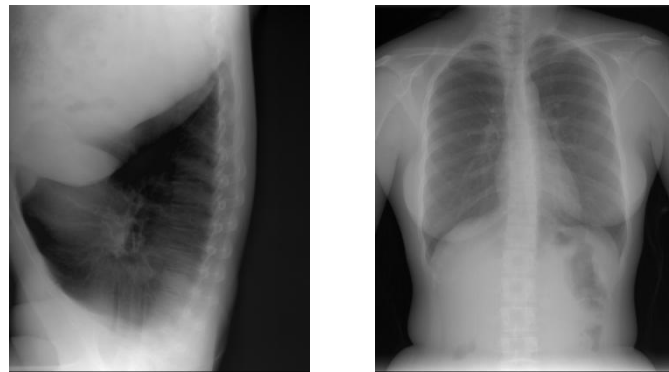
**Phase III:**

- To send the image to another computer. Follow the below steps.
- Step 8: Repeat the steps 1 to 5
  - Step 9: Give the details of server IP address, User Name and password.
  - Step 10: Image is sent to given details to Server IP address with concerned Username and Password.

**VI. Results and Discussion**

The following images shows the input image and its resulting images.

**Input Images:**



**Output Resulted Images:**

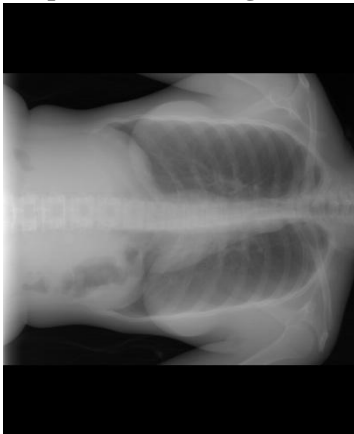


Fig 1. Rotated input image



Fig 2. Inverted Image



Fig 3. Vertically flipped Image

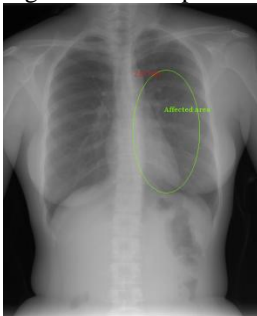


Fig 4. Annotated Image shown in ellipse shape

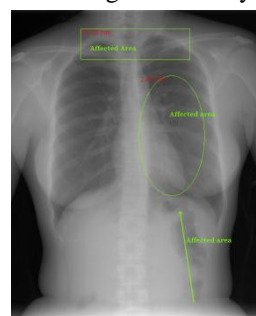


Fig 5. Annotated Image shown in various shapes.

**VII. Various Operations applied on input image**

1. Concerned Medical professional can rotate the image in all possible angles.
2. Images can flip vertically and horizontally.
3. In this the facility of zoom-in and zoom-out is present.

4. Medical Professionals can draw various shapes like(Rectangle, Ellipse and Arrow marks) on the affected area of the image and adding text on particular part of the image.
5. Medical Professional can send the images to other professionals for further diagnosis.

### **VIII. Conclusion**

Through our work most of the process that were manually done were computerized and helps in easier and fast accessing. So processing time is reduced and various reports are generated very quickly and efficiently. The errors caused in manual processing are reduced to larger extent. Still further work it needs in our paper we presented the DICOM images in grayscale only for further work it may extend to different kind of color images.

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