

A New Tool to Manipulate Computed Digital Mammograms

M Langarizadeh, R Mahmud

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Abstract

A new and powerful tool for manipulating of computed digital mammograms has been developed. This system can be useful for radiologists who want to manipulate images to get better brightness and contrast for their interpretation. The system can show original and manipulated image and related histograms for comparison purpose. There are 14 enhancement, restoration, segmentation and hybrids techniques which the system can apply on images. So in this new tool a new method also implemented to remove all background and noises and just show the region of interest that the radiologist need to view.

INTRODUCTION

Cancer is the second cause of death in US, however there are some methods to diagnosing and preventing of cancer [1].

Recently, researchers have shown that in US, 50% of men and 33% of women have cancer involvement but more than 40% of all cancers can be prevented [12].

Cancer was cause of 7.6 million deaths (out of 58 millions) in 2005 around the world and more than 70% of this deaths occurred in non-rich countries. The reason of this death rate can be lack or limitation of prevention, diagnosis or treatment facilities. World Health Organization (WHO) has predicted that deaths, due to cancer, increase up to 9 million in 2015 and 11.4 million in 2030 [2].

Breast cancer is an important problem in the women population and plays a key role in their health. Many scholars mentioned that breast cancer involves more than 8% of women in US and 5% of women in UK [345].

In Malaysia, around 4% of women are involved by breast cancer [46]. Moreover, the malignancy was the 10th cause of hospitalization and 3rd cause of death in Malaysia in 2006 [7].

There are several risk factors which are increasing breast cancer chance. No exact cause is known. More importantly risk factor is positive family history. Women who carried genes BRCA I and BRCA II have at least 40 to 85% risk to involve. Exposure to radiation, diet, obesity and late menopause are other risk factors [148].

Generally, physicians and radiologists look for masses and

microcalcifications as breast cancer signs. Detection of masses is more difficult in comparison with microcalcification because:

- masses are as same as the normal breast tissue
- masses have different shapes
- masses have smoother boundaries [39].

The radiologists try to use diverse ways to make mammogram images brighter to improve their diagnosis correctness such as image processing techniques. There are three main aspects in image processing (enhancement, restoration, and segmentation) which are including different methods that can be helpful to increase radiologists' ability to make a correct diagnosis.

Indeed, this paper will focus on a new tool to apply different image processing methods on digital computed mammograms. This new tool was developed using MatLab programming language which is an object oriented programming language that provide a very strong image processing environment.

In addition, since all users may not have enough information about using MatLab to run interface, the system has been compiled and can work alone without using MatLab.

METHODS AND DISCUSSION

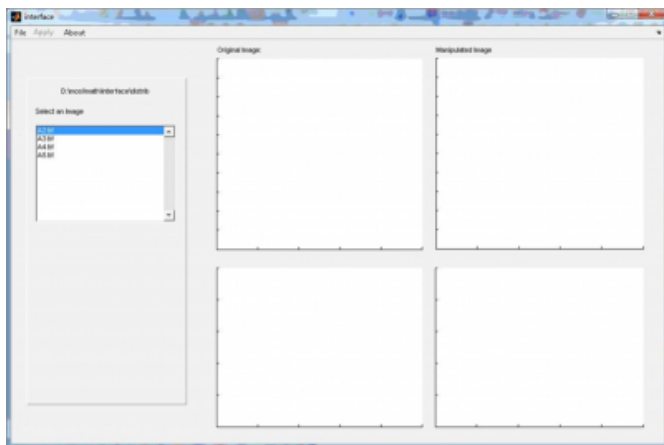
The interface is a system for manipulating and showing both original and manipulated images. The main parts of this tool are including the followings:

- Selecting the original image
- Selecting the method
- Showing original and manipulated images with the respected histograms.

At the first step system recognize the images which are exist in the current directory and user can select the original image just by a click (figure 1).

Figure 1

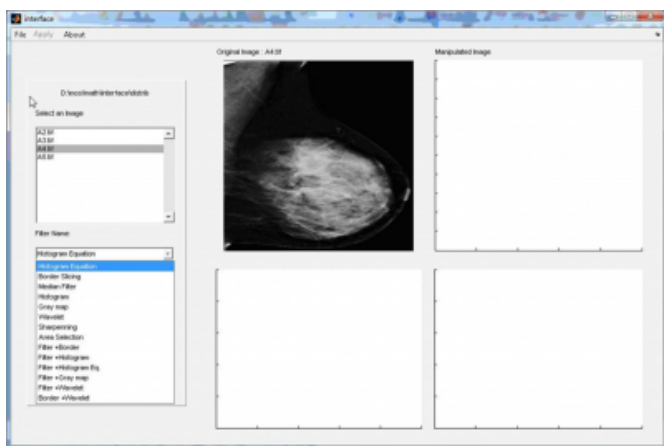
Figure 1: Images List



Once the user chose an image, the original image has showed in the right side area. Moreover, the list of methods will show to user and available (figure 2).

Figure 2

Figure 2: List of Methods



As you can see in figure 2, there are 14 different techniques in the list which are including enhancement, restoration, segmentation, and hybrid methods.

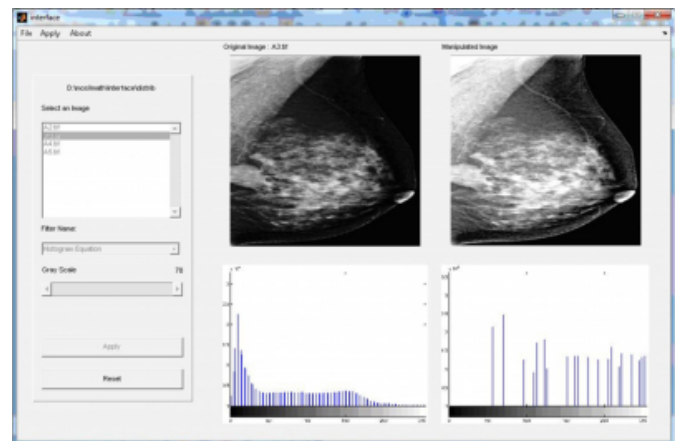
In reality, based on the method that user will select, one or

two gray level must be determine as the method parameters. For example if histogram equation has been chosen then just one gray level should enter but if the area selection has been selected then user should determine two gray levels.

At the end stage user just clicks on ‘Apply’ and results will be showed by the system (figure 3).

Figure 3

Figure 3: Final Results



As it showed, the user can compare both original and manipulated image beside together. There are two histograms related to original and manipulated images. The ‘Reset’ button allows doing another manipulation or selecting another image. User can save results before a new task.

CONCLUSION

A new and powerful tool for manipulating of computed digital mammograms has been designed and implemented. This system can be helpful for radiologists who want to manipulate mammogram images to have better brightness and contrast for their interpretation. In addition system can show original and manipulated image for comparison purpose beside together. Furthermore, 14 enhancement, restoration, segmentation, and hybrids techniques can be applied on images through using this system. As a conclusion, the radiologists won’t need to use specific software and won’t need to learn many commands or algorithms.

So in this new tool a new method also implemented to remove all background and noises and just show the region of interest that the radiologist need to view.

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Author Information

Mostafa Langarizadeh, PhD Candidate in Medical Informatics
Faculty of Medicine and Health Sciences, University Putra Malaysia

Rozi Mahmud, PhD
Associate Professor, Faculty of Medicine and Health Sciences, University Putra Malaysia