 

**Alanya Alaaddin Keykubat University Basic Methods and Princibles in Image Processing**

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**RESEARCH ARTICLE**

Enhancing Tumor Visibility in Mammography through Advanced Image Processing Techniques

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**ABSTRACT**

This study presents an innovative approach to enhancing tumor detection in mammography through the application of specialized image processing techniques. Recognizing the limitations and challenges inherent in the interpretation of mammographic images, focusing on the utilization of advanced filtering and normalization methods. These techniques are meticulously applied to improve the clarity and contrast of mammographic images, thereby aiding in the more effective identification of potential tumors. The project demonstrates how image processing techniques can play a crucial role in medical imaging, particularly in breast cancer screening, by offering an alternative method that is both accessible and effective in highlighting areas of concern.

Keywords: Breast cancer, mammogram, segmentation, image processing and enhancement,

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1. Introduction

In recent years, the field of medical imaging has witnessed significant advancements, particularly in the realm of breast cancer screening through mammography. Mammography remains a critical tool in the early detection of breast cancer, offering the potential to identify tumors at stages when they are most treatable. However, the interpretation of mammographic images can be challenging due to the subtle nature of early tumorous formations and the inherent complexities in breast tissue imaging. This challenge necessitates the development of enhanced image analysis techniques that can aid radiologists in identifying potential areas of concern with greater accuracy.

This project addresses this need by employing a series of sophisticated image processing techniques to improve the visibility of possible tumors in mammography images. Unlike many contemporary approaches, our methodology eschews the use of machine learning and artificial intelligence, focusing instead on the application of traditional image processing methods such as filters and normalization. The objective is to refine the quality of mammographic images in a way that potential tumorous regions are highlighted, thereby aiding in more accurate and confident diagnoses. This approach offers a novel perspective in the ongoing effort to improve breast cancer screening processes, emphasizing the utility of image processing techniques in medical diagnostics.

1. Writing Equations

Normalization Equation (1)

|  |  |
| --- | --- |
| Data Transformation: Standardization vs Normalization - KDnuggets (1)  Gaussian Equation (2)  Image Processing and Analysis - Scilab: Scilab: Gaussian Blur (2)  Thresholding(3)  Image segmentation | PPT (3) |  |

3. Tables and Figures

3.1 Tables

|  |  |
| --- | --- |
| Step | Description |
| 1 | Grayscale Conversion |
| 2 | Normalization(1) |
| 3 | Gaussian Blurring(2) |
| 4 | Brightness Reduction |
| 5 | Thresholding(3) |
| 6 | Post-Processing |

3.2 Flowchart

A white squares with black text

Description automatically generated

Figure 1 Flow Chart

1. Algorithms, Codes, and Pseudocodes

Algorithm 1 Algorithm Example

|  |  |
| --- | --- |
| 1  2  3  4  5  6  7  8 | Load an image  Converting the image to a grayscale image  Normalize the image  Denoising the image  Reduce Brightness  Perform Thresholding  Combine Normalized and Thresholded images  Save the Enhanced Image |

Code 1

A screen shot of a computer program

Description automatically generated

Acknowledgments

We extend our deepest gratitude to all those who have contributed to the success of this project. First and foremost, we wish to thank our project advisor, Dr. Özge ÖZTİMUR KARADAĞ, whose expertise and guidance were invaluable in shaping both the direction and the execution of this study.

We are also grateful to Alanya Alaaddin Keykubat University for providing the necessary facilities and resources that enabled us to carry out our work. Special thanks to the technical staff whose assistance was crucial in our handling and analysis of the mammographic images.

References

After eight and more authors, “et al.” should be used after the first author’s name. Otherwise, the names of all authors should be expressed.

[1] https://radiopaedia.org/search?lang=us&modality=Mammography&page=1&scope=cases&sort=date\_of\_publication&system=Breast

[2] https://www.youtube.com/watch?v=oXlwWbU8l2o&t=3537s