



# Image processing for Digital Breast Tomosynthesis

Project Management and Software Development  
for Medical Applications

## General Info

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## Project Abstract

Digital Breast Tomosynthesis (DBT) is a relatively new 3D imaging modality contributing to capturing breast cancer along with mammography. In this project, we want to explore various image processing techniques to improve the rendering of these images and hence make them more understandable.

## Background and Motivation

Mammography is a long-time reference for breast cancer screening, but suffers from its two-dimensional nature, resulting in the difficulty of volume analysis. DBT is a new 3D modality coping with this difficulty. Unfortunately, the generated volumes contain a substantial amount of slices, are often noisy, and are quite heterogeneous across the vendors. That has two major drawbacks: 1) the review of the images is often hefty, and 2) the automated algorithms trained on mammography struggle to provide reliable predictions. Some techniques are allowing to cope with these issues (1,2), however, there is still uncertainty about their effectiveness.

In this work, we will explore different approaches intended to improve the interpretability of the images. That is, we aim for generating images increasing signal-to-noise ratio, and better depicting breast pathologies.

## Student's Tasks Description

The student will deal with high-resolution medical image processing from a public dataset (3). He/she will need to explore relevant literature, and departing from existing methods, propose improved or alternative solutions for processing and combining DBT slices. The images resulting from the proposed method could be first, reviewed by a group of imaging experts at Hera-MI, and second, processed with deep learning classifiers. The student will have a chance to discover medical imaging formats, study image-processing techniques (including deep learning), and understand the challenges related to high-resolution imaging such as DBT.

## Technical Prerequisites

- Python (mandatory),
- Image processing basics (strongly desirable)
- Scikit-image, cv2 (strongly desirable)
- Linux, Docker (optional)

## References

1. Diekman et al.  
Doi: [10.1007/s10278-007-9075-y](https://doi.org/10.1007/s10278-007-9075-y)
2. Pujara et al.  
Doi: [10.1148/radiol.2020192805](https://doi.org/10.1148/radiol.2020192805),
3. Buda et al.  
Doi: [10.1001/jamanetworkopen.2021.19100](https://doi.org/10.1001/jamanetworkopen.2021.19100)