# Reducing noise of digital breast tomosynthesis

Project Management and Software Development
for Medical Applications

## General Info

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## Project Abstract

In this work we will work with Digital Breast Tomosynthesis (DBT), recent technique for breast detection. We will explore image processing technique to generate high-quality, clinically plausible slab images for better interpretation by radiologists and by computer vision.

## Background and Motivation

Digital Breast Tomosynthesis (DBT) is a new imaging technique aiming to improve predictive value of mammography. However, the DBT may generate noisy images leading to a difficulty of visual interpretation as well as to challenges for computer vision algorithms. Slabbing [1,2] is a common technique used in 3D imaging allowing to summarize a portion of volume in one 2D projection. Unfortunately, it sometimes may further increase the amount of noise.

In this work we will study different image processing techniques (including machine and deep learning) aiming to generate more realistic and less noisy slab images. We will rely on a existing codebase produced by TUM student. The images for the study will be sourced from two large public datasets [3,4]. The algorithm will be assessed on visual quality of the images, as well as on the performances of provided machine learning classifiers.

## Student's Tasks Description

The student will depart from the existing codebase allowing to generate slab images from DBT input. After carefully setting up the tools, he/she would need to enrich existing slabbing techniques and implement alternative ones using python image processing libraries. The student should design and execute an evaluation pipeline to assess the quality of the generated images.

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, pydicom (strongly desirable)
- Linux, Docker (optional)

## References

[1] Diekman et al.

DOI: 10.1007/s10278-007-9075-y

[2] Pujara et al.

DOI: 10.1148/radiol.2020192805,

[3] Buda et al.

DOI: 10.1001/jamanetworkopen.2021.19100

[4] DOI: 10.7937/2BAS-HR33

Please send the completed proposal to tianyu.song@tum.de, shervin.dehghani@tum.de and felix.tristram@tum.de. Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in case of acceptance.