Backprojection Reconstruction Algorithm Using Order Statistic Filters In Breast Tomosynthesis

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Breast cancer is the most common cancer type and one of the leading cause of death among women. It has been recognized over the years that preventing the disease is the most powerful weapon, and the implementation of screening mammography has had significantly reduced the death rate. However, it is also proven that conventional mammography does not detect approximately 30 percent of breast cancers. Inventing new imaging technologies for the earlier detection of breast cancer is vital and is in the center of many ongoing studies. There are several new techniques using different imaging modalities that are under investigation. The most promising is the breast tomosynthesis, an advanced x-ray application that addresses the problem of structure superimposition, one of the major deficiency of 2D mammography, by reconstructing a range of slices providing additional 3-dimensional information of the breasts.

Our goal is to investigate and develop reconstruction algorithms that fit into the new mathematical model of tomosynthesis used in mammography. In this paper we show a backprojection reconstruction technique that is especially well-suited for the problem in question. This algorithm is capable to produce contrast-enhanced slices of the breast by taking only the projections that are most probably holds the "important" information of the targeted lesions, ignoring part of the projections. This statistical approach also offers a good noise management performance, as a fortunate side-effect. After discussing the algorithm we publish the results of the comparison of this technique with other popular methods of the algorithm-family. We also look out the strict boundaries of the work done suggesting improvements of the reconstruction algorithm.

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