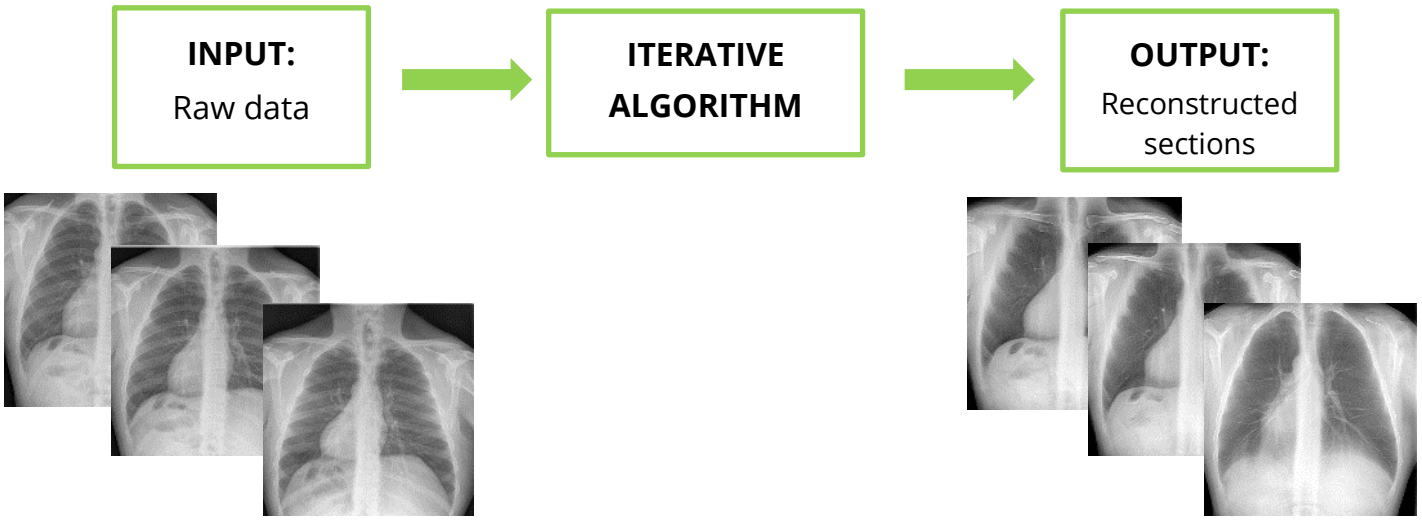
Tomosynthesis: iterative algorithm

Tomosynthesis is an x-ray imaging modality technique that provides volumetric information about anatomical structures. The iterative approach is a novel reconstruction, where the algorithm operates in a recursive fashion, updating the estimates of the object volume until it converges to an optimal solution, so that the reconstructed image has less noise.



Digital tomosynthesis began as conventional tomography, where only a single in-focus plane can be obtained with one x-ray event, during a single sweep of the x-ray tube and detector. In tomosynthesis, multiple images are acquired through multiple x-ray pulses at very low doses, from different angles during a single linear or arc sweep of the x-ray tube and (eventually) detector. The data are then digitally processed to reconstruct different planes, thus obtaining volumetric and depth information of patient's anatomical structures, with a lower dose than a Computed Tomography (CT) scan.

Compared with conventional radiography and fluoroscopy, Tomosynthesis reduces the visibility of overlying structures, can improve anatomic visualization and depth information about structures of interest, and may reduce the need for multiple projections to obtain different views.

Moreover, Tomosynthesis could have an easier accessibility and availability with a lower cost than CT.

Iterative approach

Iterative tomosynthesis is a novel reconstruction approach, where the algorithm operates in a recursive fashion, updating the estimates of the object volume until it converges to an optimal solution.

The subsequent iterations gradually allow an adaptation of the calculated projections, in order to make them adhere to the real projection measurements.

Considering the high power of modern GPUs, the computational time and effort is no longer a problem, and the iterative algorithm may become a valuable solution to obtain high-quality sectional images.

Iterative tomosynthesis is a cost-effectiveness solution to obtain high quality reconstructed sections. Today, the iterative approach is considered as a valid tool for reducing noise in the reconstructed images, compared to non-iterative algorithm.

References

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