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openSSS: open-source custom geometry and total-body PET scatter correction

Scatter correction is essential for quantitative and accurate time-of-flight (TOF) PET imaging. However, scatter estimation algorithms for total body and other custom geometries are not available in open-source libraries. To this end, we have developed an open-source implementation of the TOF-aware single-scatter-simulation (SSS) algorithm (openSSS). It is validated on the NEMA phantom and the XCAT phantom, for conventional and custom geometries, compared to Monte-Carlo simulations and a vendor-specific reconstruction. A total-body scatter estimation is performed for the UI uEXPLORER geometry. The reconstructed images with openSSS scatter correction are visually similar with comparable contrast recovery. Feasibility of total-body scatter estimation is shown by analyzing the estimated scatter distributions. In conclusion, we have developed and validated an open-source TOF-aware SSS for use with reconstruction frameworks such as CASToR, compatible with custom and total-body scanner geometries.

Field

Software and quantification

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