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Title: Optimization for customized trajectories in Cone Beam Computed Tomography

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Short abstract:

Nowadays, cone-beam computed tomography (CBCT) has become a vital tool for interventional radiology. In this study, we developed a target-based CBCT imaging framework (Figure 1) for optimizing an unconstrained three-dimensional (3D) source–detector trajectory by incorporating prior image information. Our main aim is to enable a CBCT system to provide topical information about the target using a limited angle non-circular scan orbit with a minimal number of projections. Such a customized trajectory consists of few partial arcs and should include enough information to sufficiently reconstruct a particular volume of interest with devices under kinematic constraints which may result from the patient size or additional surgical or radiation therapy related equipment. We demonstrated that applying limited angle non-circular trajectories with optimized orientations in 3D space can provide a suitable image quality for particular image targets and has a potential for low-dose and limited angle CBCT-based interventions under strong spatial constraints.