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Research Article

Improved Image Fusion in PET/CT Using Hybrid Image Reconstruction and Super-Resolution

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Abstract

Purpose. To provide PET/CT image fusion with an improved PET resolution and better contrast ratios than standard reconstructions. *Method*. Using a super-resolution algorithm, several PET acquisitions were combined to improve the resolution. In addition, functional PET data was smoothed with a hybrid computed tomography algorithm (HCT), in which anatomical edge information taken from the CT was employed to retain sharper edges. The combined HCT and super-resolution technique were evaluated in phantom and patient studies using a clinical PET scanner. *Results*. In the phantom studies, 3 mmF18-FDG sources were resolved. PET contrast ratios improved (average: 54%, range: 45%–69%) relative to the standard reconstructions. In the patient study, target-to-background ratios also improved (average: 34%, range: 17%–47%). Given corresponding anatomical borders, sharper edges were depicted. *Conclusion*. A new method incorporating super-resolution and HCT for fusing PET and CT images has been developed and shown to provide higher-resolution metabolic images.