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Research Article

Clustering-Based Linear Least Square Fitting Method for Generation of Parametric Images in Dynamic FDG PET Studies

Xinrui Huang,[1,2] Yun Zhou,[1,3] Shangliang Bao,[1] and Sung-Cheng Huang[4]

[1]The Beijing City Key Lab of Medical Physics and Engineering, Peking University, Beijing 100871, China
[2]School of Basic Medical Sciences, Peking University, Beijing 100083, China
[3]The Russell H. Morgan Department of Radiology and Radiological Science, School of Medicine, Johns Hopkins University, Baltimore 21287, MD, USA
[4]Department of Molecular & Medical Pharmacology, David Geffen School of Medicine, University of California, Los Angeles 90095, CA, USA

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Abstract

Parametric images generated from dynamic positron emission tomography (PET) studies are useful for presenting functional/biological information in the 3-dimensional space, but usually suffer from their high sensitivity to image noise. To improve the quality of these images, we proposed in this study a modified linear least square (LLS) fitting method named cLLS that incorporates a clustering-based spatial constraint for generation of parametric images from dynamic PET data of high noise levels. In this method, the combination of K-means and hierarchical cluster analysis was used to classify dynamic PET data. Compared with conventional LLS, cLLS can achieve high statistical reliability in the generated parametric images without incurring a high computational burden. The effectiveness of the method was demonstrated both with computer simulation and with a human brain dynamic FDG PET study. The cLLS method is expected to be useful for generation of parametric images from dynamic FDG PET study.