Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **3178** Type: **Poster not-in-competition (Graduate Student) / Affiche non-compétitive (Étudiant(e) du 2e ou 3e cycle)**

(POS-17) PET Image Denoising and Enhancement Based on Partial Differential Equation

Tuesday, 7 June 2022 17:30 (2 minutes)

Positron emission tomography (PET) is an excellent medical imaging technique in clinical applications such as brain disease detection and tumor diagnosis. To reflect the level of brain molecular metabolism accurately, larger amounts of radio tracers are sometimes needed, which can be problematic for radiation dose. Improving the quality of the PET image using smaller amounts of radiotracers can be beneficial. In the paper, we propose a denoising and enhancement method for the low-dose PET images. Specifically, we use partial differential equations (PDE) to denoise images and apply the limited-contrast adaptive histogram equalization method to enhance images. We designed the diffusion coefficient of the anisotropic diffusion model by adding variance and bilateral filtering, which can better preserve details. In addition, we introduce the adaptive threshold method to adjust the diffusion coefficient and apply the regularization terms for further protecting the original details of the image. During the process of enhancement, we fine-tuned the denoised image using a limited-contrast adaptive histogram equalization method and adjusting the image contrast. Experiments show that our algorithm can remove much noise as well as maintain both the global structure and the fine textures of the PET image. On diverse datasets, the proposed method outperforms other methods in terms of qualitative and quantitative compared results.

Keywords: Positron emission tomography, PET, PDE, denoising, enhancement

Primary authors: Ms WANG, Xue (Anhui University); Prof. ZHANG, Gong (Anhui University); Prof. WANG, Huabin (Anhui University); Prof. HUANG, Wei (Anhui University); MARTIN, Melanie (University of Winnipeg); Prof. HAN, Xianjun (Anhui University); Prof. LI, Xuejun (Anhui University); Prof. DIAO, Xianju (Sino Canada Health Engineering Research Institute); MADISON, Chisholm (University of Winnipeg)

Presenter: Ms WANG, Xue (Anhui University)

Session Classification: DAPI Poster Session & Student Poster Competition (4) | Session d'affiches DPIA et concours d'affiches étudiantes (4)

Track Classification: Technical Sessions / Sessions techniques: Applied Physics and Instrumentation / Physique appliquée et de l'instrumentation (DAPI / DPAI)