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Medical Imaging Fusion: A Teaching-Learning Simulation Environment

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Abstract : The use of computational tools has become essential in the context of interactive learning, especially in engineering education. In the medical industry, teaching medical image processing techniques is a crucial part of training biomedical engineers, as it has integrated applications with healthcare facilities and hospitals. The aim of this article is to present a teaching-learning simulation tool developed in MATLAB using a graphical user interface for medical image fusion that explores different image fusion methodologies and processes in combination with image pre-processing techniques. The application uses different algorithms and medical fusion techniques in real time, allowing you to view original images and fusion images, compare processed and original images, adjust parameters, and save images. The tool proposed in an innovative teaching and learning environment consists of a dynamic and motivating teaching simulation for biomedical engineering students to acquire knowledge about medical image fusion techniques and necessary skills for the training of biomedical engineers. In conclusion, the developed simulation tool provides real-time visualization of the original and fusion images and the possibility to test, evaluate and progress the student's knowledge about the fusion of medical images. It also facilitates the exploration of medical imaging applications, specifically image fusion, which is critical in the medical industry. Teachers and students can make adjustments and/or create new functions, making the simulation environment adaptable to new techniques and methodologies.

Keywords : image fusion, image processing, teaching-learning simulation tool, biomedical engineering education
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