

عنوان مقاله:

A Study on Robustness of Various Deformable Image Registration Algorithms on Image Reconstruction Using 4DCT Thoracic Images

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خلاصه مقاله:

Background: Medical image interpolation is recently introduced as a helpful tool to obtain further information via initial available images taken by tomography systems. To do this, deformable image registration algorithms are mainly utilized to perform image interpolation using tomography images. Materials and Methods: In this work, 4DCT thoracic images of five real patients provided by DIR-lab group were utilized. Four implemented registration algorithms as ۱) Original Horn-Schunck, ۲) Inverse consistent Horn-Schunck, ۳) Original Demons and ۴) Fast Demons were implemented by means of DIRART software packages. Then, the calculated vector fields are processed to reconstruct 4DCT images at any desired time using optical flow based on interpolation method. As a comparative study, the accuracy of interpolated image obtained by each strategy is measured by calculating mean square error between the interpolated image and real middle image as ground truth dataset. Results: Final results represent the ability to accomplish image interpolation among given two-paired images. Among them, Inverse Consistent Horn-Schunck algorithm has the best performance to reconstruct interpolated image with the highest accuracy while Demons method had the worst performance. Conclusion: Since image interpolation is affected by increasing the distance between two given available images, the performance accuracy of four different registration algorithms is investigated concerning this issue. As a result, Inverse Consistent Horn-Schunck does not essentially have the best performance especially in facing large displacements happened due to distance increment.

کلمات کلیدی:

Four-Dimensional Computed Tomography, Radiotherapy, Image-Guided, Image Processing, Computer-Assisted, Respiratory motion, Deformable Image Registration

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