عنوان مقاله:

Evaluation of geometric distortion Brain MRI Images on a ۱.۵T Scanner

محل انتشار:

سومین کنگره بین المللی انجمن علمی دانشجویان رادیولوژی کشور (سال: 1402)

تعداد صفحات اصل مقاله: 1

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خلاصه مقاله:

Background and purpose: Traditionally, computed tomography (CT) images have been the primary modality used for radiotherapy (RT) treatment planning. However, in recent years, magnetic resonance imaging (MRI) has emerged as a valuable tool specifically tailored for radiotherapy purposes. MRI images offer superior visualization of soft tissues, fulfill the dose painting requirements in radiation therapy, and provide access to valuable physiological information such as diffusion and perfusion, which can aid in tumor delineation. However, it is crucial to address and evaluate the geometric distortions inherent in MRI images to ensure high-accuracy MRI treatment planning.Therefore, the aim of this study was to evaluate of geometric distortion present in MRI images, as this information is vital for ensuring accurate and reliable treatment planning.Materials and methods: CT images, which serve as our standard reference with minimal geometric distortion, were registered with MRI images using the ISOGray Treatment Planning System. Subsequently, contours were generated and extracted from the registered images. Finally, quantitative assessments such as the Dice coefficient and Hausdorff distance were calculated, and the volumes of the contours were compared using ۳D Slicer modules.Results: The values of the Dice coefficient and Hausdorff distance were measured as ۰.۹۴ and ۱۹.۳۵, respectively, when using CT as the reference and comparing it to the DWI segment. Similarly, when comparing it to the FLAIR segment, the values were ۰.۹۵ for the Dice coefficient and ۱۸.۴۷ for the Hausdorff distanceConclusions: The numerous advantages of MRI images compared to CT have sparked significant interest in using MRI images alone for treatment planning in the last few decades. This study has revealed differences between the contoured regions, highlighting the need for designing a phantom to quantify the extent of geometric distortion present.

کلمات کلیدی:

Radiotherapy, Magnetic resonance imaging, CT, Geometric distortion, treatment planning