

عنوان مقاله:

A comprehensive review of deep learning methods for creating synthetic magnetic resonance images using computed tomography scans

محل انتشار:

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

تعداد صفحات اصل مقاله: 2

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خلاصه مقاله:

Computed tomography (CT) scans and magnetic resonance imaging (MRI) are commonly used in the diagnosis and radiation therapy treatment planning of cancer patients. However, obtaining both scans for a patient can be challenging due to time, comfort, and cost. Consequently, researchers use deep learning methods like generative adversarial networks (GANs) to generate synthetic MR images from CT data. These synthetic images resemble real MR scans, improving diagnosis and treatment planning while addressing the limitations of acquiring separate CT and MRI scans. This study aimed to provide a comprehensive review of deep learning methods for creating synthetic MR images based on CT data. PubMed, Science Direct, Web of Science, and Google Scholar databases were explored up to May ۲۰۲۳, using different combinations of the keywords: "image synthesis", "computed tomography", "artificial intelligence", "synthetic magnetic resonance images", and "deep learning". After screening the results seven more recent and relevant papers were included in the study. Deep learning methods, such as Unsupervised Image-to-Image Translation Networks (UNIT), Pix۲Pix, and U-Net Variants, have demonstrated promising results in synthesizing MR images from CT data. Utilizing GANs facilitated the creation of these synthetic images, increasing the sensitivity of brain lesion detection. The U-Net method outperformed other techniques in cross-modality image synthesis. Additionally, the accurate diagnosis of an acute ischemic stroke is aided by GAN-based CT-based synthetic MRI. Deep-learning methods have shown potential for synthesizing MR images from CT scans. Estimating MR images using advanced deep-learning algorithms can enhance patient treatment while saving time and costs. The development of deep learning methods can lead to revolutionizing the synthesis and segmentation of medical images and provide helpful resources for clinicians in the process of diagnosis and treatment planning.

کلمات کلیدی:

image synthesis, computed tomography, artificial intelligence, synthetic magnetic resonance images, deep learning

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