UTILIZING ARTIFICIAL INTELLIGENCE FOR THREE-DIMENSIONAL ORGAN RECONSTRUCTION FROM MAGNETIC RESONANCE AND COMPUTED TOMOGRAPHY IMAGING

Manojkumar Godhaniya[1], Rajesh Patel[2], Abhay Dalsaniya[3]

[1]Veer Narmad South Gujarat University
[2]LTIMindtree Ltd
mdgodhaniya@vnsgu.ac.in

Advancements in artificial intelligence have revolutionized medical imaging, particularly in transforming 2D MRI and CT scans into 3D organ representations. These high-resolution 3D reconstructions are especially valuable for surgical planning, offering surgeons enhanced visual information during procedures. Traditional segmentation methods for 3D modeling rely on manual outlining, which is known to be laborious, prone to errors, and time-intensive. This research introduces two novel approaches to improve existing clinical techniques for generating 3D models from 2D slices. These AI-driven methods aim to automate and streamline the process, making it more efficient and accurate.

This study utilizes Convolutional Neural Networks (CNNs) and Generative Adversarial Networks (GANs) for processing and analyzing medical images. The dataset comprises various MRI and CT scans used to develop and evaluate the models. Performance metrics, including the Dice coefficient and Intersection over Union (IoU), were employed to assess reconstruction accuracy. Findings demonstrate that AI-driven models outperform traditional approaches in terms of speed, precision, and efficacy. The study also addresses concerns regarding data confidentiality, computational demands, and potential clinical implementation. However, future research must consider the enhancement of the models, management of other data classes, and the realization of their use in real-time operating theaters. Skipped line starts a new paragraph.

Keywords: *3D modeling, AI, Medical imaging, Deep learning, CNNs*