

Limitations of Natural Image Metrics in Medical Imaging versus Radiomic Distances

Assignee Research

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Abstract

One of the most common challenges in brain MRI scans is to perform different MRI sequences depending on the type and properties of tissues. In this paper, we propose a generative method to translate T2-Weighted (T2W) Magnetic Resonance Imaging (MRI) volume from T2-weight-Fluid-attenuated-Inversion-Recovery (FLAIR) and vice versa using Generative Adversarial Networks (GAN). To evaluate the proposed method, we propose a novel evaluation schema for generative and synthetic approaches based on radiomic features. For the evaluation purpose, we consider 510 pair-slices from 102 patients to train two

1 Introduction

This paper examines: Within-Modality Synthesis and Novel Radiomic Evaluation of Brain MRI Scans. Research question: What are the limitations of applying natural image perceptual metrics like FID to medical imaging domains versus specialized radiomic distances?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.7/10.

3 Results

12 papers retrieved. 5 claims extracted; 5 independently verified. Quality review score: 8.7/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
A generative method using GANs can translate T2-Weighted (T2W) MRI volumes from T2-weight-Fluid-attenuated-Inversion-Rec	✓	0.32
The evaluation of the proposed method involves a novel schema based on radiomic features.	✓	0.18
The study used 510 pair-slices from 102 patients to train two different GAN-based architectures: Cycle GAN and Dual Cycl	✓	0.38
Generative methods can produce similar results to the original MRI sequence without significant change in the radiometri	✓	0.29
The proposed method can assist clinics in making decisions based on generated images when different MRI sequences are no	✓	0.30

References

- <https://doi.org/10.3390/cancers15143565>
- <https://doi.org/10.1016/j.media.2022.102704>
- <https://doi.org/10.3390/jimaging9040081>