Minimal Class Separation Distance for Evaluating Multimodal Model Robustness to Noisy Annotations

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: Can the minimal class separation distance framework be adapted to evaluate the reasoning robustness of multimodal models against noisy image-text pair annotations. 11 claims were extracted from source literature; 11 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 9.0/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: The Multimodal Brain Tumor Image Segmentation Benchmark (BRATS). Research question: Can the minimal class separation distance framework be adapted to evaluate the reasoning robustness of multimodal models against noisy image-text pair annotations?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 9.0/10.

3 Results

13 papers retrieved. 11 claims extracted; 11 independently verified. Quality review score: 9.0/10.

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
The Multimodal Brain Tumor Image Segmentation Benchmark (BRATS) was organized in conjunction with the MICCAI 2012 and 20	✓	0.41
Twenty state-of-the-art tumor segmentation algorithms were applied in the BRATS benchmark.	✓	0.23
The benchmark dataset included 65 multi-contrast MR scans of low- and high-grade glioma patients.	✓	0.25
The patient MR scans were manually annotated by up to four raters.	✓	0.15
The benchmark dataset included 65 comparable scans generated using tumor image simulation software.	✓	0.27
Quantitative evaluations revealed Dice scores in the range of 74%-85% for human raters segmenting various tumor sub-regi	✓	0.34
Different algorithms achieved the best performance for different tumor sub-regions.	✓	0.18
Top-performing algorithms reached performance levels comparable to human inter-rater variability.	✓	0.16
No single algorithm ranked in the top position for all tumor sub-regions simultaneously.	✓	0.23
Fusing several good algorithms using a hierarchical majority vote yielded segmentations that consistently ranked above a	✓	0.32
The BRATS image data and manual annotations are publicly available through an online evaluation system.	✓	0.25

References

- https://doi.org/10.1109/access.2021.3140175
- https://doi.org/10.1109/tmi.2014.2377694
- https://doi.org/10.1007/s11704-026-60308-3