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TM1:LAKKIMSETTY LEELA SAI -4293
TM2: LALAM GIRISHMA -4294
TM3: MOGILI SUMA -42A6
TM4: MULPURU CHINNARI-42B3
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AI-LLM Based Medical Imaging Classification and Segmentation

Abstract

The integration of Vision-Language Models (VLMs) into medical imaging represents a paradigm shift from purely pixel-based analysis to semantically grounded reasoning. Traditional deep learning approaches, while effective, often suffer from heavy reliance on large-scale annotated datasets and a lack of interpretability. This abstract explores the emerging application of VLMs—such as adaptations of CLIP, LLaVA, and domain-specific architectures like Med3DVLM—to the tasks of medical image classification and segmentation. By aligning visual features with clinical textual embeddings, VLMs enable zero-shot and few-shot learning capabilities, allowing models to generalize to unseen pathologies and modalities without extensive retraining. In classification, VLMs facilitate context-aware diagnosis and automated report generation by learning joint representations of radiological images and medical reports. In segmentation, the paradigm shifts toward "promptable" architectures (Vision-Language Segmentation Models or VLSMs), where text prompts (e.g., "segment the left ventricle") guide the model to delineate specific anatomical structures, significantly reducing the burden of manual annotation.

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