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Glioma Segmentation in PET/MRI studies: a preliminary comparative study between Swin Transformer and state-off-the-art CNN

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In the quantitative analyses of PET/MRI studies of Glioma patients, one of the crucial steps of the pipeline is represented by the fast, correct and, possibly, automatic segmentation of the tumors on multiple contrast MR images and PET. As a first preliminary study, we aim to compare the performance of the Swin Transformer and the current reference-standard nnUNET models in glioma segmentations on the MR images. We sought to determine how well these models can accurately delineate various glioma compartments, especially in high-grade cases. Swin UNETR and nnU-NET were trained on different datasets and evaluated on a retrospective glioma dataset. The assessment metrics included Dice coefficients and interclass correlation coefficients. High agreement between models, especially in high-grade gliomas, was observed in terms of DSC and ICC. In conclusion, we emphasize the ability of Swin Transformer to segment a necrotic-core compartment and its potential in glioma diagnosis and treatment. A further step will be to extend Swin UNETR and nnU-NET models extension to the segmentation of PET images. This study lies the groundings to investigate the concordance and variability among various segmentation software tools and clinicians with the aim of establishing a reference-standard for application to PET/MRI studies.

Field

Systems and applications

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