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A NOVEL AUTOMATED HUMAN BRAIN TUMOR CLASSIFICATION FRAMEWORK BASED ON DIFFUSION MRI

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As cancer stays to be a major public health problem worldwide, being able to discriminate among different tumor pathologies are of great importance for the evaluation of tumors and the analysis of cancer. Brain tumor is the third deadly cancer for adults and first deadly cancer for children in the United States. Malignant brain tumor has poor prognosis. With the innovative diffusion MRI histology (D-Histo) imaging technique which generates feature maps that help better differentiate between pathologies in tumor, we apply machine learning techniques to MRI data and classify tumors into designated categories. In this study, we develop techniques specifically to differentiate brain tumor pathologies. Our techniques can classify the selected brain tumors into high cellularity tumor, tumor necrosis, and tumor infiltration with accuracies over 90%, 92% and 83% respectively and these designated categories are clinically important prognosis factors. We see the potential of this classification framework in the analysis of human brain tumor, as well as other types of tumors.