عنوان مقاله:

Grading of Gliomas by Contrast-Enhanced CT Radiomics Features

محل انتشار:

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خلاصه مقاله:

Background: Gliomas, as Central Nervous System (CNS) tumors, are greatly common with ۸۰% of malignancy. Treatment methods for gliomas, such as surgery, radiation therapy, and chemotherapy depend on the grade, size, location, and the patient's age. Objective: This study aimed to quantify glioma based on the radiomics analysis and classify its grade into High-grade Glioma (HGG) or Low-grade Glioma (LGG) by various machine-learning methods using contrast-enhanced brain Computerized Tomography (CT) scans. Material and Methods: This retrospective study involved acquiring and segmenting data, selecting and extracting features, classifying, analyzing, and evaluating classifiers. The study included a total of ۶۲ patients (۳۱ with LGG and ۳۱ with HGG). The tumors were segmented by an experienced CT-scan technologist with ۳D slicer software. A total of ۱۴ shape features, ۱۸ histogram-based features, and ۷۵ texture-based features were computed. The Area Under the Curve (AUC) and Receiver Operating Characteristic Curve (ROC) were used to evaluate and compare classification models. Results: A total of ۱۳ out of ۱۰۷ features were selected to differentiate between LGGs and HGGs and to perform various classifier algorithms with different cross-validations. The best classifier algorithm was linear-discriminant with ۹۳.۵% accuracy, ۹۶.۷۷% sensitivity, ۹۰.۳% specificity, and ۰.۹۸% AUC in the differentiation of LGGs and HGGs. Conclusion: The proposed method can identify LGG and HGG with ۹۳.۵% accuracy, ۹۶.۷۷% sensitivity, ۹۰.۳% specificity, and ۰.۹۸% AUC, leading to the best treatment for glioma patients by using CT scans based on radiomics analysis.

کلمات کلیدی:

Radiomics, CT scan, Glioma, cancer, Neoplasms, tumor, Machine Learning