

## Computer-Aided Diagnosis System Based on Multiple Quantitative Magnetic Resonance Imaging Features in the Classification of Brain Tumor

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**Abstract :** Brain tumor is not the cancer having high incidence rate, but its high mortality rate and poor prognosis still make it as a big concern. On clinical examination, the grading of brain tumors depends on pathological features. However, there are some weak points of histopathological analysis which can cause misgrading. For example, the interpretations can be various without a well-known definition. Furthermore, the heterogeneity of malignant tumors is a challenge to extract meaningful tissues under surgical biopsy. With the development of magnetic resonance imaging (MRI), tumor grading can be accomplished by a noninvasive procedure. To improve the diagnostic accuracy further, this study proposed a computer-aided diagnosis (CAD) system based on MRI features to provide suggestions of tumor grading. Gliomas are the most common type of malignant brain tumors (about 70%). This study collected 34 glioblastomas (GBMs) and 73 lower-grade gliomas (LGGs) from The Cancer Imaging Archive. After defining the region-of-interests in MRI images, multiple quantitative morphological features such as region perimeter, region area, compactness, the mean and standard deviation of the normalized radial length, and moment features were extracted from the tumors for classification. As results, two of five morphological features and three of four image moment features achieved p values of  $<0.001$ , and the remaining moment feature had p value  $<0.05$ . Performance of the CAD system using the combination of all features achieved the accuracy of 83.18% in classifying the gliomas into LGG and GBM. The sensitivity is 70.59% and the specificity is 89.04%. The proposed system can become a second viewer on clinical examinations for radiologists.

**Keywords :** brain tumor, computer-aided diagnosis, gliomas, magnetic resonance imaging

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