## ABSTRACT

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An Intelligent System to Enhance the Performance of Brain Tumor Diagnosis from MR Images.

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In the human body, cancer is caused by aberrant cell proliferation. Brain tumors are created when cells in the human brain proliferate out of control. Brain tumors consist of two types: benign and malignant. The aberrant parts of benign tumors, which contain dormant tumor cells, can be cured with the appropriate medication. On the other hand, malignant tumors are tumors that contain abnormal cells and an unorganized area of these abnormal cells that cannot be treated with medication. Therefore, surgery is required to remove these brain tumors. Brain cancers are manually identified and diagnosed by a skilled radiologist using traditional procedures. It's a lengthy and error-prone procedure. As a result, it is unsuitable for emerging countries with large populations. So computer-assisted automatic identification and diagnosis of brain tumors are recommended. This work proposes and implements a CAD system for the diagnosis of brain cancers using magnetic resonance imaging (MRI). Preprocessing, segmentation, feature extraction, and classification are the stages of automatic brain MRI processing that necessitate software based on a sophisticated algorithm. Image normalization with contourlet transform (INCT) is used in the preprocessing step to remove undesirable or noisy data. The performance metrics such as PSNR, MSE, and RMSE are computed. Then, the modified hierarchical k-means with firefly clustering (MHKFC) technique is used in the segmentation step to precisely recover the afflicted (tumor) area from the preprocessed image. The enhanced monarch butterfly optimization (EMBO) is used to select and then extract the most important gray-level co-occurrence matrix feature from the segmented image. The classification task was finally completed using the adaptive neuro-fuzzy inference system (ANFIS). The overall classification accuracy is 95.4% (BRATS 2015), 96.6% (BRATS 2021), and 93.7% (clinical data) is obtained.

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