

## An Advanced Automated Brain Tumor Diagnostics Approach

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**Abstract :** Medical image processing is generally become a challenging task nowadays. Indeed, processing of brain MRI images is one of the difficult parts of this area. This study proposes a hybrid well-defined approach which is consisted from tumor detection, extraction and analyzing steps. This approach is mainly consisted from a computer aided diagnostics system for identifying and detecting the tumor formation in any region of the brain and this system is commonly used for early prediction of brain tumor using advanced image processing and probabilistic neural network methods, respectively. For this approach, generally, some advanced noise removal functions, image processing methods such as automatic segmentation and morphological operations are used to detect the brain tumor boundaries and to obtain the important feature parameters of the tumor region. All stages of the approach are done specifically with using MATLAB software. Generally, for this approach, firstly tumor is successfully detected and the tumor area is contoured with a specific colored circle by the computer aided diagnostics program. Then, the tumor is segmented and some morphological processes are achieved to increase the visibility of the tumor area. Moreover, while this process continues, the tumor area and important shape based features are also calculated. Finally, with using the probabilistic neural network method and with using some advanced classification steps, tumor area and the type of the tumor are clearly obtained. Also, the future aim of this study is to detect the severity of lesions through classes of brain tumor which is achieved through advanced multi classification and neural network stages and creating a user friendly environment using GUI in MATLAB. In the experimental part of the study, generally, 100 images are used to train the diagnostics system and 100 out of sample images are also used to test and to check the whole results. The preliminary results demonstrate the high classification accuracy for the neural network structure. Finally, according to the results, this situation also motivates us to extend this framework to detect and localize the tumors in the other organs.

**Keywords :** image processing algorithms, magnetic resonance imaging, neural network, pattern recognition

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