عنوان مقاله:

A Review And Analysis On The Application Of Machine Learning In The Segmentation Of Brain Tumors In Mri Images

محل انتشار:

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خلاصه مقاله:

Brain tumor is one of the life threatening diseases that challenges millions of people. A brain tumor diagnosis and classification system is essential to ensure the early diagnosis and classification of brain tumors. Since misidentification leads to dire and fatal results, classification and segmentation techniques must provide high accuracy while performing tumor classification. Therefore, the diagnosis of brain tumors and their classification are among the vital tasks for evaluating tumors and making a treatment decision based on this. On the other hand, the impact of machine learning in our life and society is increasing, artificial intelligence may also play an important role in medical diagnosis and supporting doctors and surgeons. Many machine learning methods have been developed to diagnose brain tumors. However, these methods, even if they provide good results, have not yet been used. Therefore, this remains an important research topic and still needs to be investigated. Computer-aided diagnosis and treatment of multimodal magnetic resonance imaging (MRI) brain tumor image segmentation has always been a hot and significant topic in the field of medical image processing. Multimodal MRI brain tumor image segmentation utilizes the characteristics of each modal in the MRI image to segment the entire tumor and tumor core area and enhanced them from normal brain tissues. However, the grayscale similarity between brain tissues in various MRI images is very immense making it difficult to deal with the segmentation of multimodal MRI brain tumor images through traditional algorithms. Therefore, we employ the deep learning method as a tool to make full use of the complementary feature information between the multimodalities and instigate the following research: (i) build a network model suitable for brain tumor segmentation tasks based on the fully convolutional neural network framework and (ii) adopting an end-to-end training method, using two-dimensional slices of MRI images as network input data. The problem of unbalanced categories in various brain tumor image data is overcome by introducing the Dice loss function into the network to calculate the network training loss; at the same time, parallel Dice loss is proposed to further improve the substructure segmentation effect. We proposed a cascaded network model based on a fully convolutional neural network to improve the tumor core area and enhance the segmentation accuracy of the tumor area and achieve good prediction results for the substructure segmentation on the BraTS ۲۰۱۷ data set.

کلمات کلیدی:

Artificial intelligence; Brain tumor; Convolutional neural network; Deep learning; Segmentation.