Local Independent Projection-Based Brain Tumor Segmentation

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ABSTRACT

Brain tumor segmentation is very important procedure in diagnosis of tumor in brain. There are several segmentation methods are available but brain tumor segmentation is still challenging because of complex characteristics of MRI images of brain tumor such as variety in tumor appearances and vague & unclear boundries. In this paper, automatic MRI segmentation method is used to solve these problems. Here tumor segmentation is treats as a classification problem and the classification of each voxel into different classes is done by using Local independent projection based classification (LIPC). Local independent projection is introduced into classical classification to derive classification framework. For the calculation of local independent projection, locality is important issue. The locality is determined by using local anchor embedding (LAE). LAE determine locality accurately than other coding methods. To improve classification performance softmax regression model is used which gives relation between data distribution & construction error norm. Evaluation was performed on 80 brain tumor images with ground truth data and 40 images without ground truth data. The proposed algorithm is tested by using MATLAB GUI program.

Key words: Brain tumor image segmentation, local independent projection based classification, softmax regression, local anchor embedding.

INTRODUCTION

Brain tumor segmentation is very important procedures in diagnosis of tumor in brain. However, at present, segmentation of brain tumor in brain tumor images is many times performed manually. But this process is time consuming, depends on individual operator also manual brain tumor delineation is difficult. Multimodal MRI images can provide more data on tumors therefore for segmenting brain tumor images the multimodal MRI images are used. Necrosis, non-enhancing tumor, contrast-enhancing tumor and edema are the main area

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of tumor. First of all tumor area is divided into these parts. Different MRI image modalities can disclose different parts in the tumor area. Instead of this T1C shows contrast-enhancing regions, whereas T2 shows edema regions (Fig.). These multimodal MRI images can provide complementary information in the tumor area, brain tumor segmentation is still a difficult and challenging task. Brain tumors can have various shapes and sizes and may appear at different locations, so we proposed system which is based on local independent projection based classification.

MATERIALS AND METHODS

A. Materials

The MRI of brain tumor image data gives information on 120 subjects with gliomas; it gives real patient data in 55 images, and synthetic data in 65 images. A total of 80 images with ground truth data out of 120 images are treated as training data.

![Fig. Flowchart of the proposed method](image)

The complete tumor region is divided into necrosis, non-enhancing tumor, contrast-enhancing tumor according to ground truth data, and edema parts for real patient data, whereas the complete tumor region is divided into edema parts and tumor core for synthetic data. According to publicly unavailable ground truth data remaining 40 images are tested. FLAIR, T1, T2 and post Gadolinium T1 MRI images are available for each subject. All volumes are linearly co-registered to the skull stripped, T1 contrast image, and interpolated to 1 mm isotropic resolution.

In addition to this image data, for elucidating the mechanism of the proposed LIPC method a set of interleaving spirals was also used in this.

B. Overview of the Proposed Method

The proposed method divided into 4 major steps, i.e., preprocessing, feature extraction, tumor segmentation using the LIPC method, and postprocessing. In available mechanisms computational cost also more to reduce this costs, we used multi resolution framework in proposed method. The flowchart of the proposed method is given in above Fig.
CONCLUSION

An automatic method is proposed for brain tumor segmentation in MRI images. There is segmentation problem to solve this segmentation problem an LIPC-based method was introduced here. The proposed LIPC used local independent projection into the novel classification framework and classical classification model was derived. We are evaluating the proposed method using both public available data and synthetic brain tumor image data. In both problems, our method outperformed competing methods.

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