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MR Image Adaption under Light Intensity Changes

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Abstract: in this paper, an approach is presented for the improvement of the function of algorithms that use similarity criterion based on the area. In this study the algorithm was planned in such a way that the adaption is done without local processing.

Key words: image adaption, MR, light intensity changes, transform function estimate

Introduction

One of the important grounds of image process is image adaption. Overlapping the images means finding the transform function between two images in such a way that by applying the transform function, the two desired images adapted on each other. In recent years the use of MRI in medical fields, ranging from cancer diagnosis to early discovery of MS, has been widespread. This approach is used for diagnosis and treatment. MRI assisted we can find out the backache is due to the muscle pain or the pressure on the nerves. Additionally, this approach is used in the diagnosis of the progress trend of cancer. Image adaption consists of four major stages including feature derivation applying the similarity criterion for finding corresponding points, estimating the transform function, and finally applying the transform function. Changing the extent of light intensity, which is common in MR images, causes the decrease in the precision of region-based methods. In this study, we tried to present some methods for the development and stability of the function of the algorithms which exert region-based similarity criterion based on the difference in the two images. The first stage is feature derivation or derivation of mark points in which we try to derive enough features from each of the two images. The important point in this part is that the derived features should not lose their nature under the supposed transform functions in the instruction and remain unchanged.

The second stage is the creation of one to one correspondence among the obtained features from the two images. Finding the correspondence among the features of the images is generally carried out by a similarity criterion so that more similar the two features of the two images are, more likely they are correspondent. This stage indeed is the most important stage in an algorithm of image fixation, since in this stage both the correspondent features in the two images are specified and the features without equivalence in each of the images are identified and omitted. Creating the wrong correspondence in this stage can affect greatly the overall result of algorithm.

The third stage is finding the best estimate of transform function between two images that is carried out by the help of the set of the obtained correspondent points from the second stage. In this stage the general form of the transform function is determined as a presupposition with respect to the application type and the second stage output is used only for the estimate of transform function parameters. In many approaches the second and third stages are carried out quite simultaneously.

The fourth stage is applying the transform function on the desired image and exploring the inside of the needed regions. This stage is the simplest one compared to the others and has less challenges.

Material and Methodology

In this project we implement lighting intensity-based adaption algorithms on MR images using two functions in the image processing toolbox of Matlab Software. Also a GUI or user interface will be designed in this project to use more easily the designed codes. To assess the difference power rate, the image before and after adaption is calculated compared with reference image.

imregconfig function:

To implement the lighting intensity-based adaption algorithm on the images, it is needed to do some adjustments in advance in order to apply the most optimum adaption to the images. To this end we have used the imregconfig function which is in the toolbox of Matlab image processing.

Since the type of MR images is different for adaption in this study, it is necessary to carry out the adjustments based on the multimodal case. Since in this essay the two kinds of images T1 and T2 have been used. Of course the PD images have also been used. The way of using this function is as the following:

```
[optimizer,metric] = imregconfig('multimodal');
```

imregister function:

This function is related to the lighting intensity-based image adaption.one of the most basic parts of this function is the use of another function called IMWARP that will be explained later. In fact, the imregister function calculates the input of transform function based on 2 images with which we can do the adaption practice. It calculates the related transform function using the imregtform function. Then using the obtained transform function and some other parameters and 2 images, one of the images based on the reference image and considering the transform function, is transformed. The way we use the imregister function is in the following:

```
movingRegisteredDefault = imregister(moving, fixed, 'affine', optimizer, metric);
```

Here the variable is the moving image that we intend to adapt based on the fixed reference image. Here the affine type of

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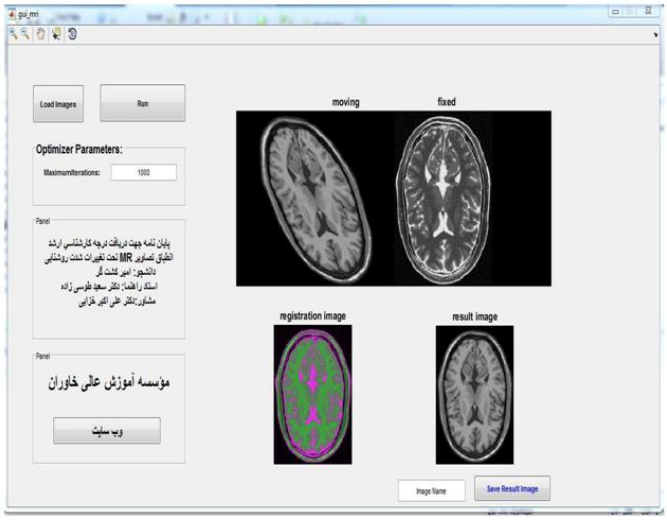
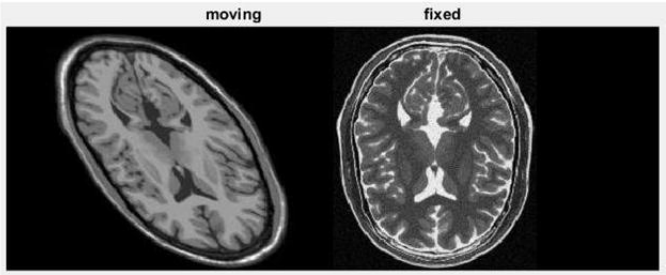
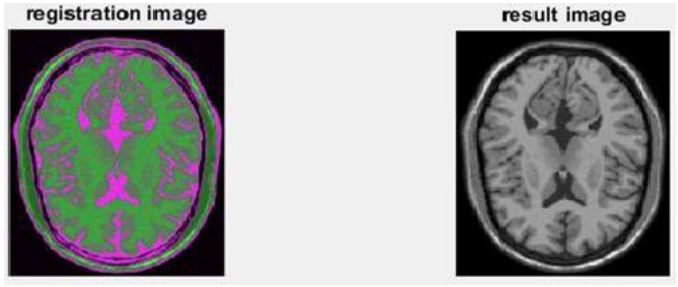
transform has been used. If you refer to Matlab guideline there are several kinds of transform for imregister function including translation, rigid, similarity affine. Translation type just performs the transfer action, but the rigid type uses rotation besides the transfer. Also the similarity type applies the scale change in addition to the mentioned cases. However in this study the affine type has been used. This kind of transform does the cutting action in addition to the operations like transfer, rotation, and scale change. Therefore in this respect this type of transform is more developed and because of this has been used in this research.

Results and Tables



This user link consists of several parts. The first part is associated with image loading. All the formats that are supported for the matlab software can be loaded in this tool, too. In the second part the optimization parameter is adjusted. This parameter determines the maximum number of adaption operation repetition. Naturally the more this number is, the more likely the adaption will be. In figure 2-5 the view of this part has been shown.





Conclusion

In this study the algorithm has been designed so that adaption can be done without local processing. Since the adaption in this study was in a form that was applied once throughout the image, so there will be no problem of rupture in the adapted image.

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