Background Suppression manual

(version 1.0)

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http://www.gici.uab.es - http://gici.uab.cat/GiciWebPage/downloads.php

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1   Description

X-ray angiography (angio) images are acquired by injecting a contrast agent into the blood vessels followed by X-ray fluoroscopic imaging, in order to visualize and quantify the human vascular system. Normally several images are acquired at different time intervals, the resulting imaging data comprises a collection of frames describing the flow of the contrast agent through the vessels over a specific period of time.

In X-ray angio images, there are usually two distinguishable areas in each frame: the Region of Interest (ROI), depicting skeleton and tissues, and the Background (BG), depicting no clinically relevant information, as shown in Fig. 1. A diagnostically-lossless compression strategy is proposed in our work [1] for angio images: the BG is first accurately identified and then suppressed by setting the intensity values of the pixels in BG to zero, which increases the redundancy data in angio images and benefits the compression performance.

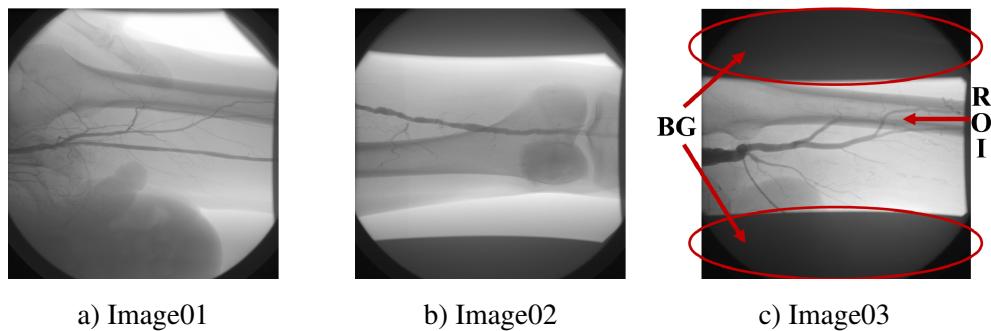This source codes are the implementation of background suppression for X-ray angio images.

| a) Image01 | b) Image02 | c) Image03 |

Fig. 1: Sample frames of three different X-ray angio images.

The following functions are included:

BG_SUPPRESSION which applies the background suppression strategy [1] to the input X-ray angio images. (Note that this function only does background suppression, not with image compression. You may need the other image compression tools to do the image compression.)

2   Requirments

This software is programmed in MATLAB, so you might need a MATLAB software from MathWorks to run this application. We have used MATLAB 2013a.

3   Usage

The example of using function **BG_SUPPRESSION** is shown below. You can run the following command line by line in the command window of MATLAB:

```
>> close all

% add path
>> addpath(genpath('./'))

% read image file and do frangi enhancement
>> t = cputime;   % count the running time
>> file_name = '39468421-4x1024x1024-3.000-2_Bytes-LittleEndian';
>> ln = 4;
>> bg_suppression([file_name,'.raw'],ln,file_name);

% display the running time
>> t = cputime - t;
>> fprintf('The time for computing is %d seconds\n', t);
```

Or you can creat one .m file in the editor of MATLAB and run it once in the command window of MATLAB, which is done in file 'demo.m', and only the following command is needed:

```
>> demo
```

More details about choosing parameters inside each function, please refer to the notes in the .m files in the package.

4   Notes

If you need further assistance, you might want to contact us directly.

References

[1] Z. Xu, J. Bartrina-Rapesta, V. Sanchez, J. Serra-Sagristà, and J. Munoz-Gómez, "Diagnostically lossless compression of x-ray angiography images based on automatic segmentation using ray-casting and α-shapes," in *Image Processing (ICIP), 2013 20th IEEE International Conference on*.   IEEE, 2013, pp. 738–742.