

User Manual for Medical Imaging Project: Management and Post-Processing of Prostate Perfusion MRI

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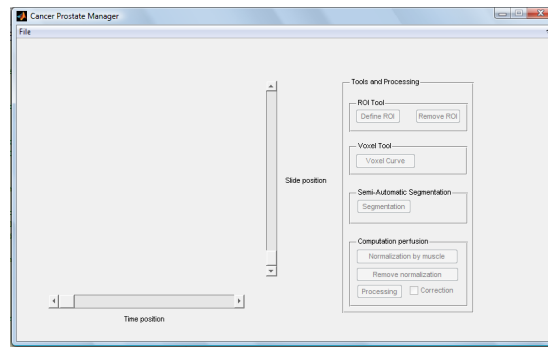
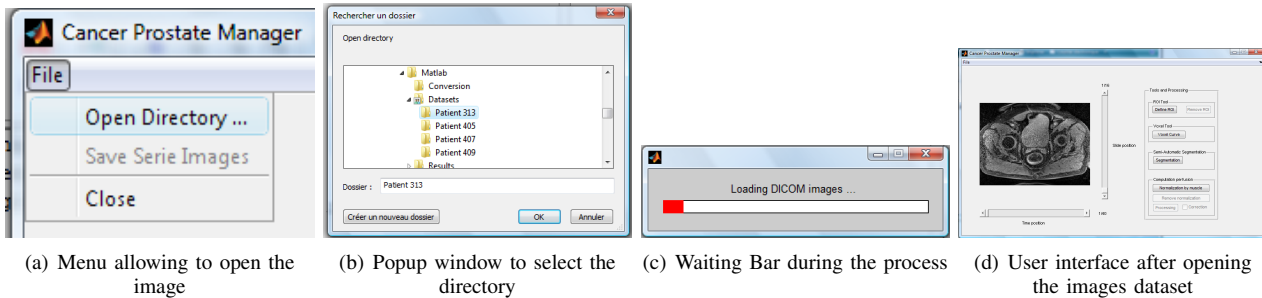


Figure 1. User interface developed



(a) Menu allowing to open the image

(b) Popup window to select the directory

(c) Waiting Bar during the process

(d) User interface after opening the images dataset

Figure 2. Screenshots showing how to open images

I. INTRODUCTION

This technical report is a user manual presenting how to use the software developed during the medical imaging course about management and post-processing of prostate perfusion in MRI. Every step allowing to use the software will be explain in this manual.

II. CANCER PROSTATE MANAGER

A. Execution of the software

The first step is to open the file *mainWindow.m* using Matlab and then run it. The user interface should appear as shown in figure 1

B. Load set of images

In order to load all images, the user has to select:

- Select menu *File*
- Select the tab *Open Directory ...*

A screenshot is shown in figure 2(a).

A popup window (figure 2(b)) will appear where the user will have to choose the directory where the images regarding the patient are stored.

The progress of the opening process can be observed in figure 2(c).

When the opening process is finished, the user interface should look like as figure 2(d).

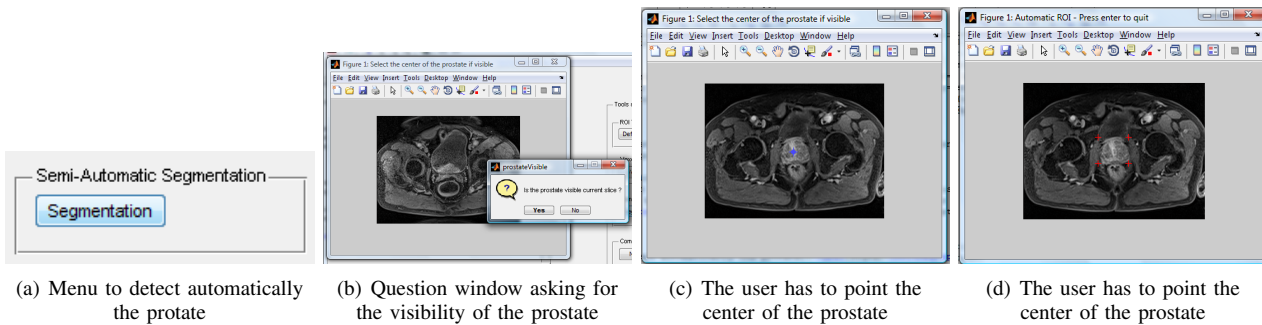
C. Browse inside the data

Two sliders are available to choose the images depending of the position (slides) and time.



(a) Menu to select manually a ROI (b) ROI selected with manual tool

Figure 3. Screenshots showing how to select manually a ROI



(a) Menu to detect automatically the prostate

(b) Question window asking for the visibility of the prostate

(c) The user has to point the center of the prostate

(d) The user has to point the center of the prostate

Figure 4. Screenshots showing how to segment automatically the prostate

D. Definition of region of interest (ROI)

Two methods are available to determine the region which will be processed. The first method allows to the user to define manually a region of interest while the second method is a semi-automatic method which allows to detect the prostate only placing a point in the center of this one.

1) *Manual definition of ROI*: To select manually a ROI inside the image, the button *Define ROI* from the toolbox *ROI tool* have to be selected as shown in figure 3(a).

A cross pointer will be available in order to draw a rectangle inside the current image which will define the ROI which will be processed as shown in figure 3(b).

2) *Semi-Automatic segmentation of the prostate*: The second method is used to detect automatically the prostate after that the user will select the center of the prostate. During the presentation, this tool was not presented because the source code is not from us. However, this tool can be used clicking on the button *Segmentation* in the toolbox *Semi-Automatic Segmentation* as shown in figure 4(a).

After clicking, a window will appear asking if the prostate is visible on the current slide shown as in the figure 4(b). The user has to answer to this question. In the case where the prostate is visible, the user have to click on the center of the prostate as shown on figure 4(c). When the processing is finished, a window appear noticing the ROI which was detected as shown on figure 4(d).

E. Computation perfusion

After that a ROI is defined by the user, it will be possible to compute the different parametric images. Two options are available. The first option will allow the user to include a normalization using the muscle while the second option will apply a correction on parametric images. Figure 5(a) shows the toolbox allowing these different processing.

1) *Normalization by the muscle*: In order to normalize the data using the muscle information, the user have to click on the button *Normalization by muscle* as shown in figure 5(b). A pointer will be available which have to be placed on a muscle area.

2) *Correction tool*: A second tool is available and will allow to correct the parametric image. The principle is to normalize the parametric image by some range pre-computed using the dataset. Figure 5(c) show the checkbox which have to be selected to apply the correction.

3) *Processing*: After fixing the parameters, the computation can be started clicking on the button *Process* as shown on figure 5(d). The evolution of the processing can be followed as shown on the figure 5(e). At the end of the processing two different windows will appear: *Parametric Images Window* and *Result Cancer Prostate*.

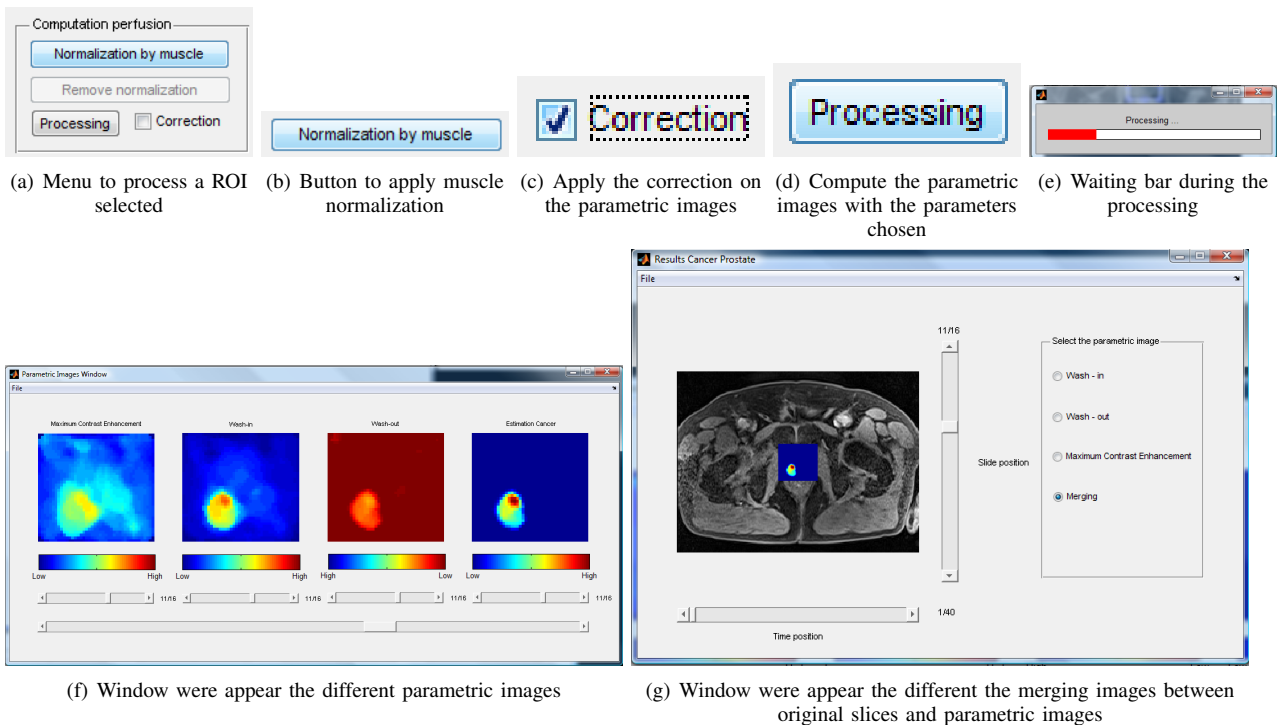


Figure 5. Screenshots showing how to compute the parametric images

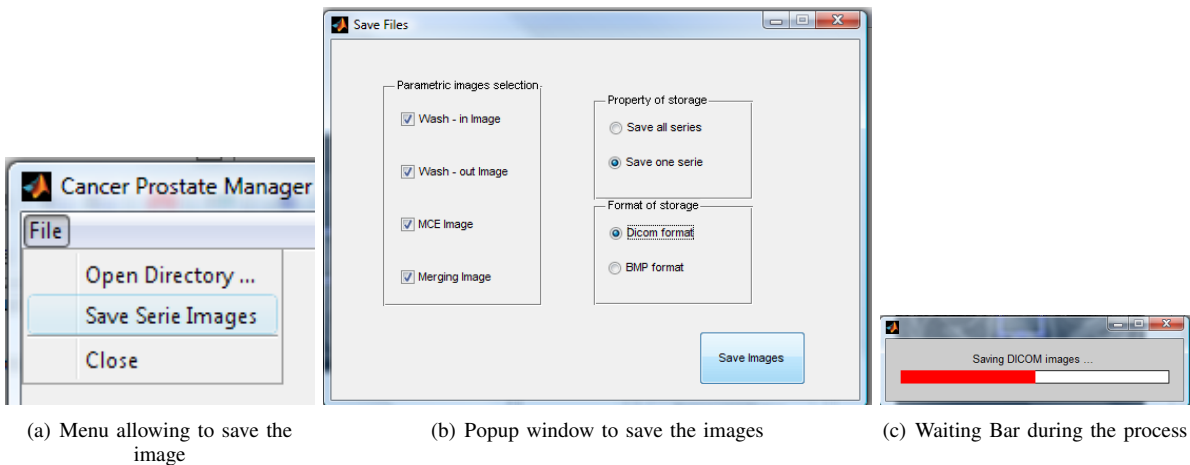


Figure 6. Screenshots showing how to save images

F. Saving the result images

In order to save the result images, the user have to select:

- Select menu *File*
- Select the tab *Save Serie Images ...*

A screenshot is shown in figure 6(a).

A popup window will appear which will give the option to save the different parametric images. A second option gives the choice to the user to save only the first series of slices or all series. The last option corresponds to the format of saving. A screenshot of this popup window is shown on the figure 6(b). The saving process can be followed by the progress bar as shown on figure 6(c). The images are saved in the *root/Results* directory. *root* is the root directory of Matlab.

G. Voxel tool

A tool named *Voxel Tool* is available and allows the user to check the value a pixel of the current slice shown during the time. This tool is available in the toolbox *Voxel Tool* as shown in the figure 7(a). After that the user clicked on the button

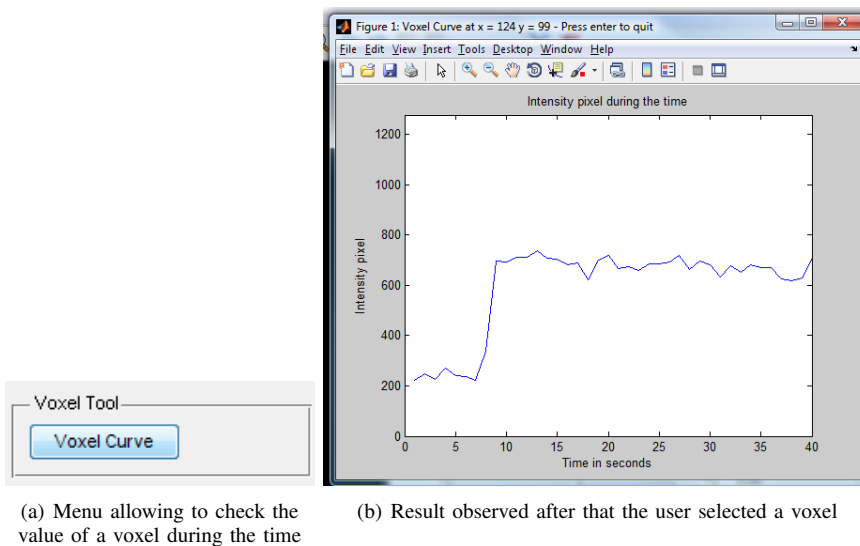


Figure 7. Screenshots showing how to save images

Voxel, a pointer allows to choose a pixel of the current image. A popup window appears as in the figure 7(b) allowing to the evolution of the pixel during the time. In order to close this window, the user avec to press *Enter*.

III. PARAMETRIC IMAGES WINDOW

After processing, a window named *Parametric Images Window* will appear. The data available in this window are the three different parametric images, wash-in, wash-out and maximum contrast enhancement and also a combine image. A screenshot is shown on figure 5(f).

IV. RESULT CANCER PROSTATE

After processing, a window named *Result Cancer Prostate* will appear. The data available in this window are a merging of the parametric images inside the original slices. A screenshot is shown on figure 5(g).

V. CONCLUSION

We presented in this manual the different stages which allow to use the software.