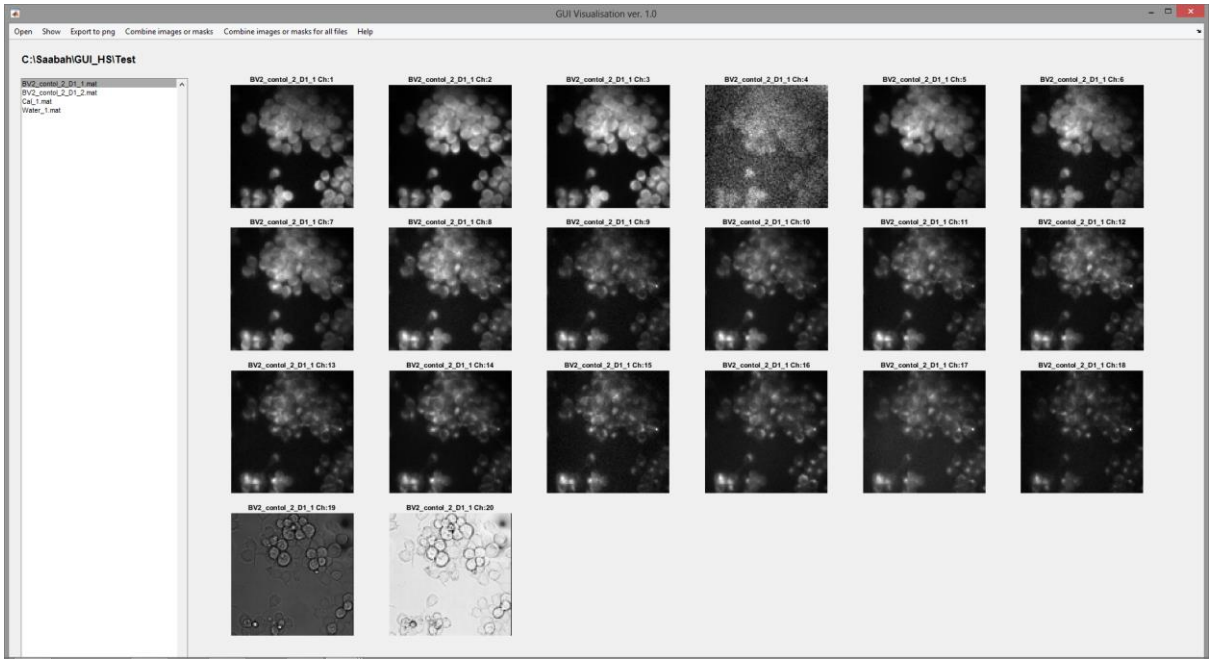
Part 2: GUI Visual Inspection

2.1 Background

All the hyperspectral images were stored in a special Matlab file data file (*.mat). As such, a custom made Graphical User Interface (GUI Visualization ver 1.0) has been developed to inspect the taken images and to extract other information.

At a first glance, this GUI represents an overview of all images across all the channels; like the image shown below.



One can use this program to visualize the autofluorescence signal from the samples with all channels (including the phase contrast channels). It can also combine the images of different channels to form one single image to create a new HSI image file, then this new single channel HSI image could be used for image segmentation. The combination function is also applied to masks. It also allows us to export all images from a HSI files into PNG files (each channel is exported as a separated PNG file).

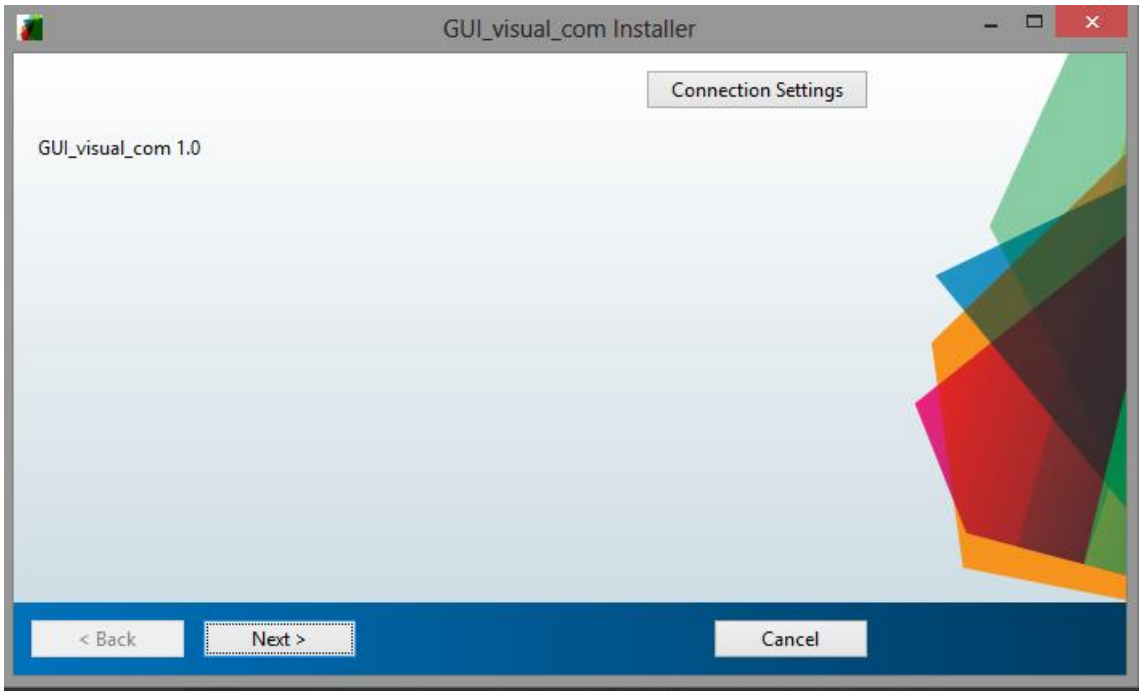
2.2 Install the software

An application (GUI_visual_com.exe, size 639 MB) file has been made available for installing this GUI. The operating platform (e.g. pc or laptop) does not need any special software. All the

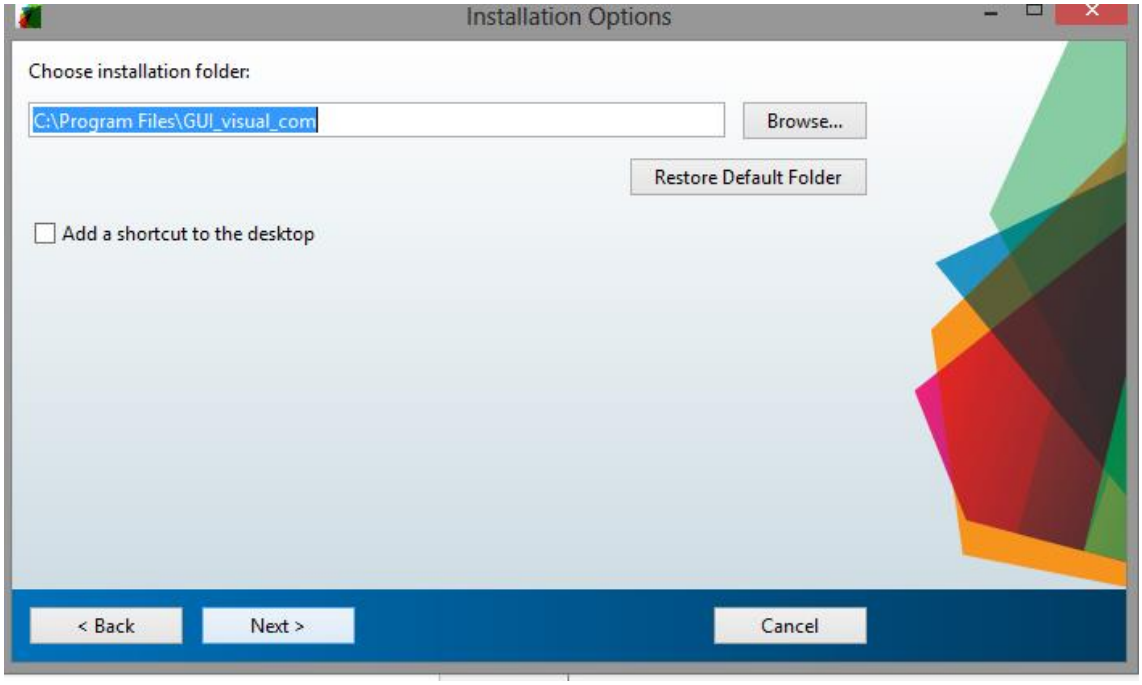
necessary files are already included in this package, so the user does not need any internet connection at all.

2.2.1 Installation Process:

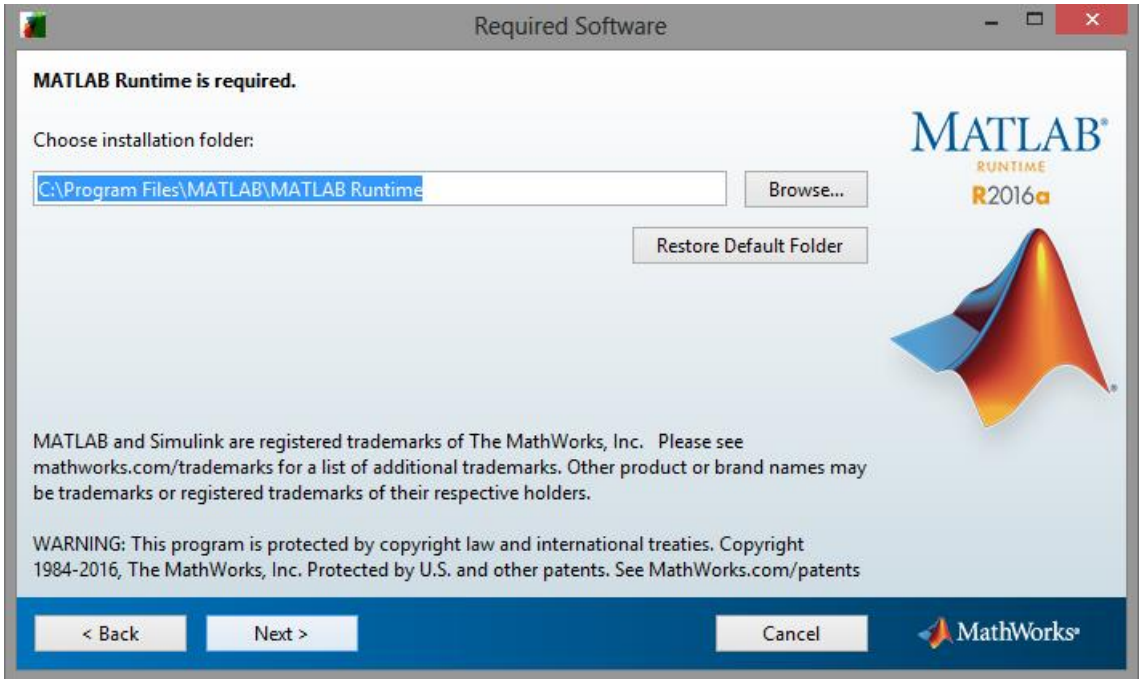
- Minimum requirement to use the GUI. → Processor: i3, Ram: 4GB, free space: 2 GB and operating system: windows 8 or higher with x64-based processor.
- Double Click on the GUI_visual_com.exe
- It will ask for the user's permission through the User Account Control window to allow the following program. Choose the option for YES
- After few second, a popup window GUI_visual_com Installer will appear. Click Next.



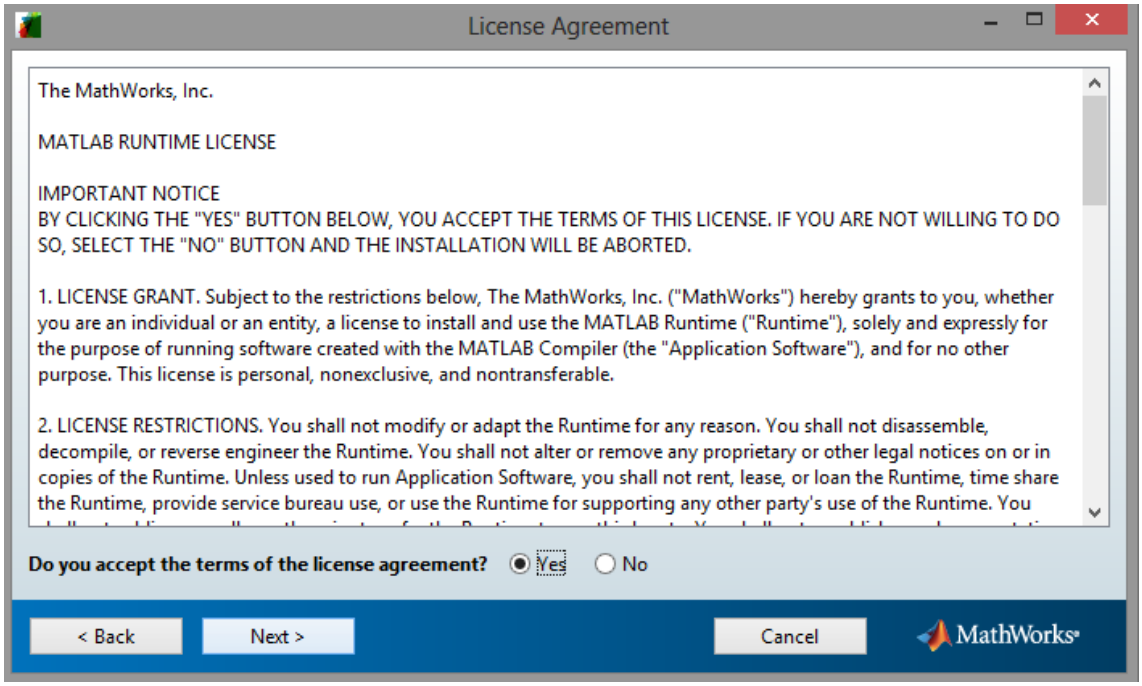
- Choose the installation folder and make sure you have at least 1GB free space to operate the GUI.
- Additionally you can add a desktop shortcut for the GUI.



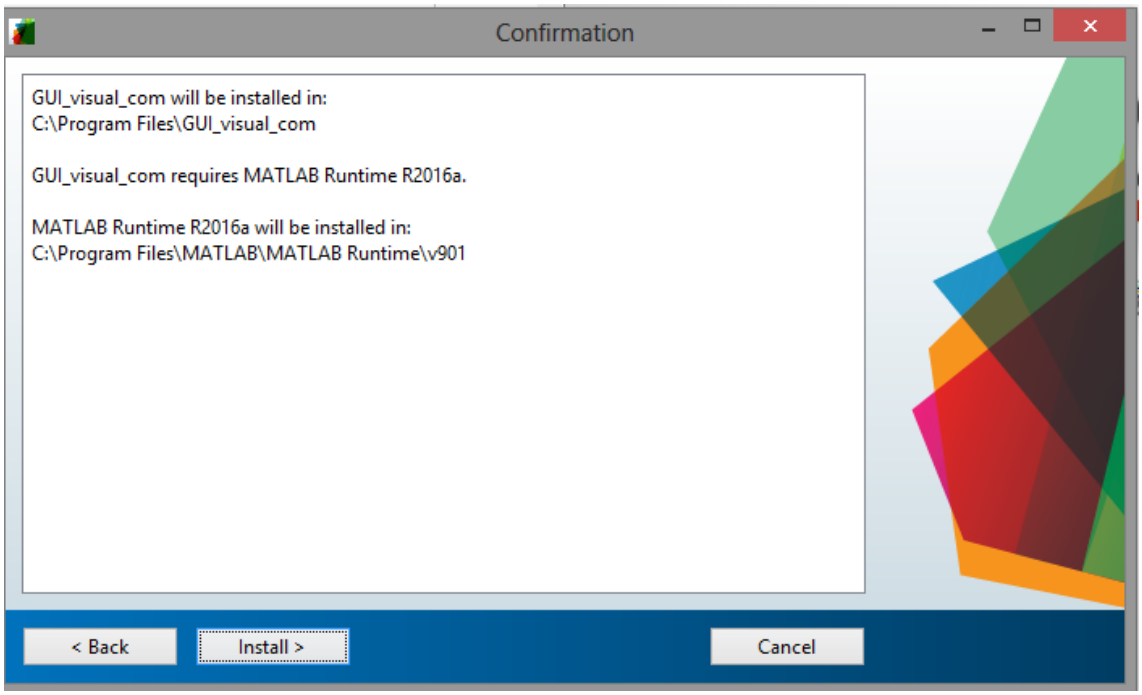
- After selecting 'Next', another popup window Required Software will appear which will notify the requirement of Matlab Runtime. But it is already installed in the package. So, the user can simply choose the Next option.



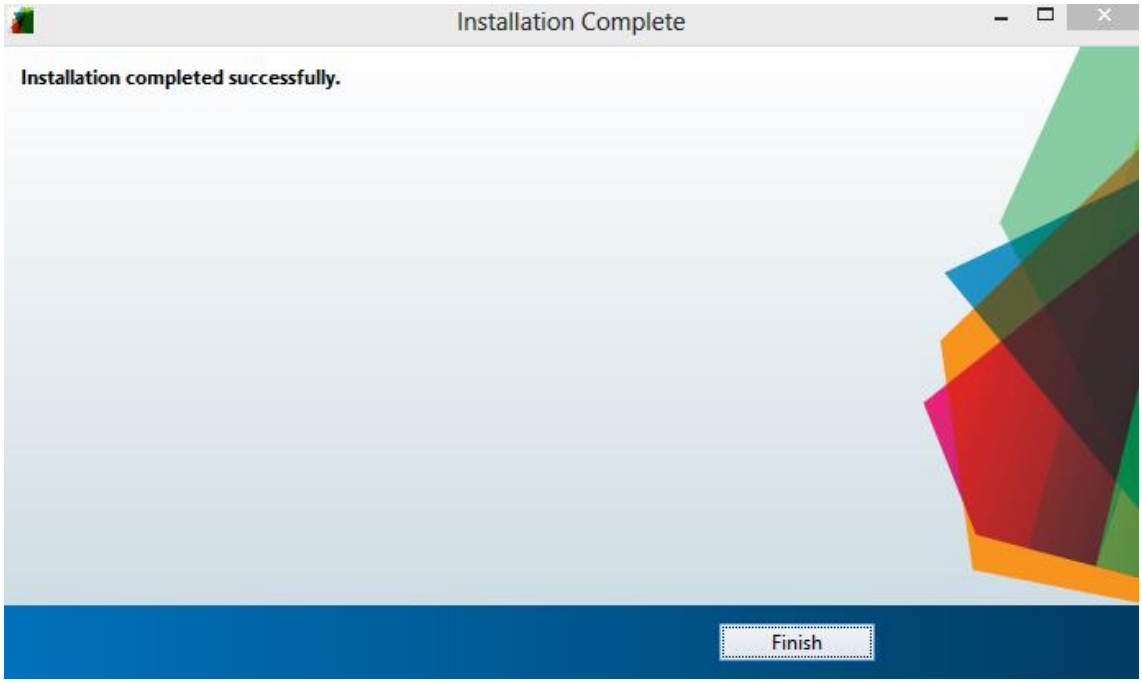
- But, if the user has a problem with downloading the Windows 64-bit version of the MATLAB Runtime for R2016a, it is recommended to visit the MathWorks Web site by navigating http://www.mathworks.com/products/compiler/mcr/index.html
- The user needs to agree to licence agreement with Mathworks.



- After that confirmation is needed to start installation of the GUI.

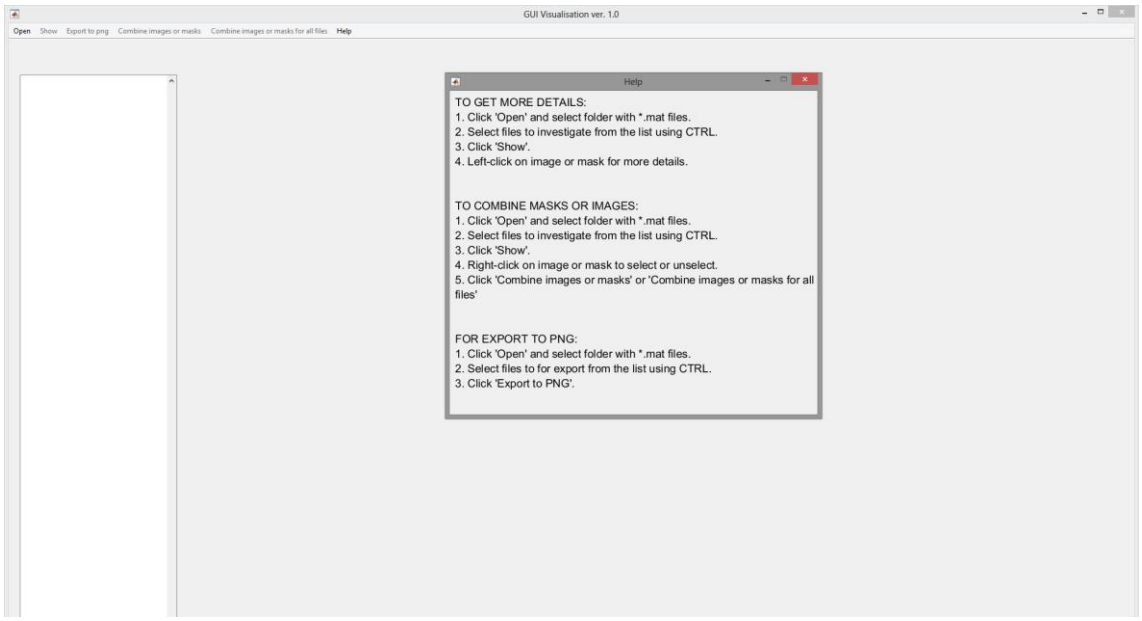


- Installation time may vary from two minutes to 10 minutes depending on the performance of the user's computer.

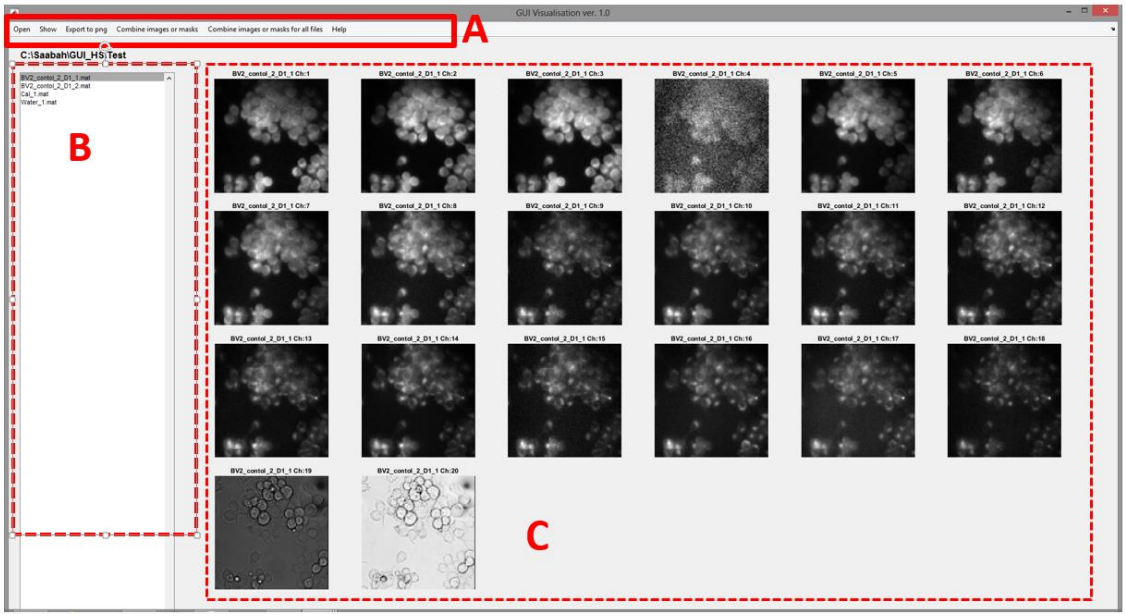


2.3 How to open GUI Visualization

1. Open the GUI_visual_com. It will start with a popup GUI interface like this,



2. Cross the help window
3. Click “Open” and select folder with *.mat files.'
4. Select files to investigate from the list using CTRL.'
5. Click “Show”. And it will show the all images like below.



6. For the discussion of details we will divide the whole window into three different parts or sections. Left-click on image or mask for more details.

2.3.1 Section A: Menu Bar

1) Open: It is used to open the folder that contains HSI files, all files opened will display in section B.
2) Show: Highlight the file in Section B, then click this button, then images of this files will be shown in Section C.
3) Export to png: The images of the chosen file will be export to png files, each channel will be a single file on its own.
4) Combine images or masks: The chosen channels of a chosen file will be merged together to form a new HSI file

   NOTE: Right click on the image of the channel in Section C to choose the channels that need to be merged.

5) Combine images or masks for all files: This function is used to combine the chosen channels to form new HSI images for each original image separately.

2.3.2 Section B: File list

It shows all the opened files. Highlight one file at a time which needs to be opened.

2.3.3 Section C: Image preview

It shows the image that is opened.

2.4 How to use GUI Visualization ver 1.0

2.4.1 Open files

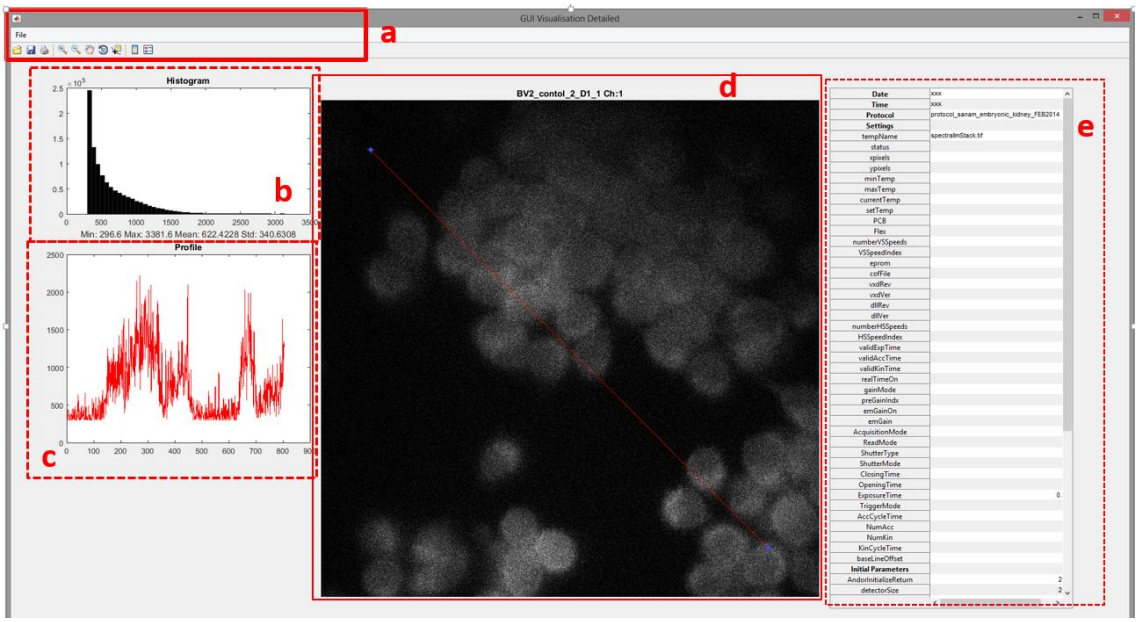
Use Open to select a folder, the program will automatic open all the HSI images in it.

2.4.2 Show a files

Highlight a file by left clicking on the file on Section B, and click Show, then all images for this file will be shown in Section C.

2.4.3 Investigate a single channel on a HSI image

- Double click on a channel of interest, and it will show as per Figure 4.



- **Section a** provide you all the tools for changing the layout of the data and image, and for labelling them.
- **Section b** is the histogram of the intensity for every pixel across the whole image. Here the unit is in photon count.
- **Section c** shows the intensity changes across the red line in section D, the line can be moved by changing the position of the end of the line.
- **Section d** show the name and image of a certain channel.
- **Section e** shows the parameters when the image is taken.

2.4.4 Combine images or mask for single files

This function allows you to combine different channels from the same HSI image file into one new single channel image. Right click on the channel you want to combine, and it will be highlighted, after the selection use combine image or mask, then new files will be created in a subfolder named combined in the folder of the original files.

2.4.5 Combine images or masks for all files

Similar to the function above. Right click on the channel you want to combine, and it will be highlighted, after the selection use combine image or mask for all, then it will repeat the same procedure for all the HSI files that has opened in the GUI_Visualization.

2.4.6 Export to png

In the windows of Figure 3, chose the HSI image you want to export in Section B (use Crtl when choosing multiple files). Then click Export to PNG, the export PNG files will be created in a subfolder called images.