

APPENDIX A : USER MANUAL

1. Opening an image

To open an image in an existing window, choose File > Open from the menu. To open an image in a new window, choose File > New followed by File > Open from the menu. A dialog will be provided from which a PPM/PGM image can be chosen from any location.

2. Saving an image

To save an image already opened and/or restored, choose File > Save As from the menu. A dialog will be provided to indicate the location where the image will be saved.

3. Selecting a restoration method

An image needs to be already opened before a method can be chosen from the *Techniques* sub-menu.

4. Tools Window

The *Tools* window (Figure A-1) is available when any method chosen, but some buttons on the window may be disabled depending on the method. All these tools are also available from the *Tools* menu.

5. Identifying noise

This option is available only for the image noise removal and the semi-transparent blotch restoration methods. Three tools are available for this purpose.

(i) Automatic Selection

Select the *Automatic Noise Selector* button from the *Tools* window. Click on any point within a noisy region to select the whole region.

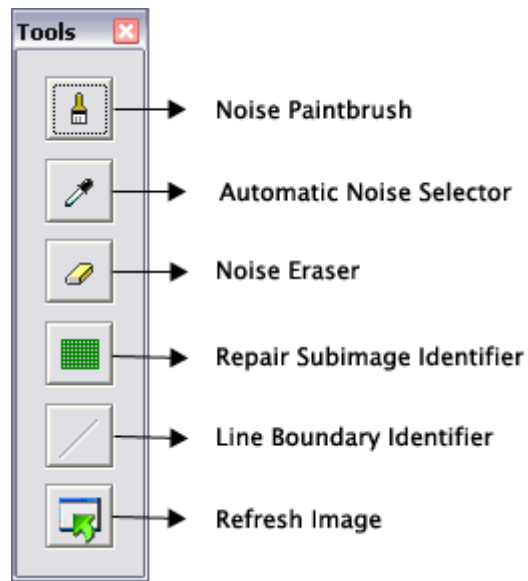


Figure A-1: *The Tools window*

(ii) Paintbrush

Select the *Noise Paintbrush* button from the *Tools* window. Paint on any part of the image to identify the noisy region.

(iii) Eraser

Select the *Noise Eraser* button from the *Tools* window. Paint on any part of the image to deselect any noisy pixels.

To change the brush size for the paintbrush or the eraser tool, select the appropriate size from the *Noise* dialog window (Figure A-2). The *Reset* button on this dialog erases all noise from the image.

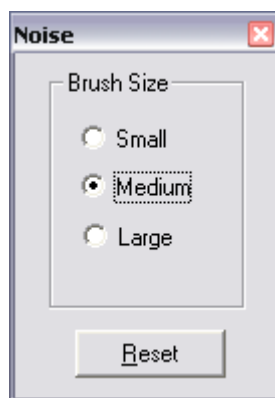


Figure A-2: *Noise Settings Window*

6. Identifying repair and sample subimages

Select the *Repair Subimage Identifier* button from the *Tools* window. The mouse can be moved over the image to see if the size of the subimage is appropriate – the outline of the subimage is shown on the image. Left click to validate the final position of the repair subimage on the image. The location for the sample subimage is chosen in the same way.

The size of the subimage can be adjusted by choosing suitable width and height values from the *Repair Subimage* window (Figure A-3). The *reset* button clears all pairs of subimages already selected.

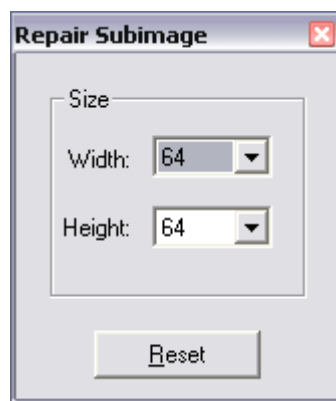


Figure A-3: *Repair Subimage Window*

7. Identifying line boundaries

Select the *Line Boundary Identifier* button from the *Tools* window. Click on the image to locate the first endpoint of the boundary line and release the mouse to validate the location of the second endpoint. The second boundary line is automatically drawn on the image along with the first boundary.

By default, the width of the noisy line is set to 1 pixel. To change this width, the *Width* value in the *Straight Line* window (Figure A-4) needs to be changed.

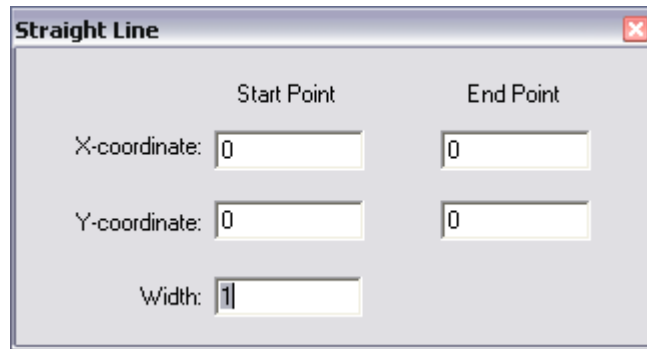


Figure A-4: Straight Line Window

8. Changing method parameters

To change the parameters for either the image noise removal method or the semi-transparent blotch removal method, choose Options > Method Parameters from the menu. Only parameters relevant to the current method chosen are editable in the *Method Parameters* window (Figure A-5).

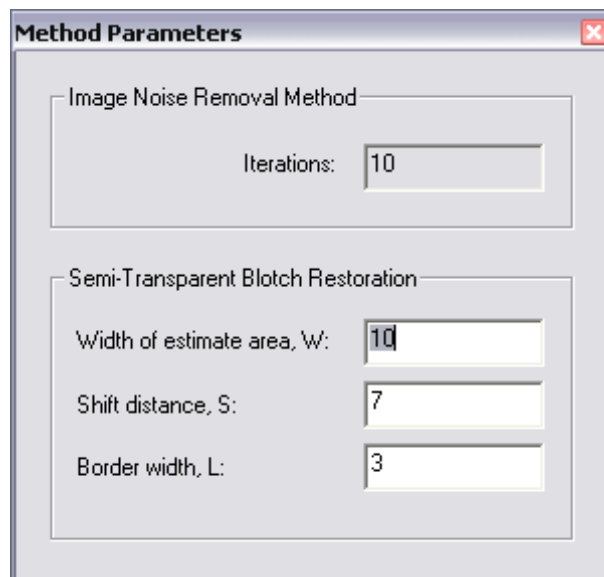


Figure A-5: Method Parameters Window

9. Method execution

To execute a method, choose Techniques > Execute from the menu. If all the parameters required have been rightly input, the restoration process will proceed; otherwise an error message will be displayed. During the execution of any method, a

progress window is displayed to indicate the progress of the execution. Execution details like time of execution are saved to the file 'results.txt'*.

10. More iterations

For the image noise removal method, after execution of any of the three methods, further iterations can be performed using the same noise region and repair and sample subimages already selected. However, to change the noise and/or the repair and sample subimage locations, these parameters need to be reset.

11. Refreshing the image displayed

Select the *Refresh Image* button from the *Tools* window. This option is useful if parts of repair or sample subimages have been erased when using the noise eraser tool.

12. Saving and loading selections

User-selections for noise regions, repair and sample subimages, and for line scratches can be saved to a file†. The saved selections can later be loaded on the same image, and the same or another restoration method can be used. To save selections, choose Options > Save Selections. You will be prompted to provide a filename for the file in which the selections details will be saved and the directory where the file will be saved. To load saved locations, choose Options > Load Selections and choose the appropriate file from the dialog. It should be noted that selections can only be applied on an image with the same size (height and width) as the original image from which the selections were saved.

13. Other menu items

- a. The Tools, Noise, Repair Subimage and Line Scratch windows can be hidden or made visible at any time. This is done from the *Window* menu where each opened window is checked.

* The structure of the results file is explained in Appendix B.

† The structure of the selection file is explained in Appendix B.

- b. The noise region, repair and sample subimages and line boundaries can be hidden or made visible from the *View* menu. Visible items are checked in the menu.
- c. To view corresponding sample and repair subimages, click *View > Subimage Number*. Corresponding pairs of subimages will have the same number displayed at the top left of the subimage.
- d. The color settings for displaying the noise region, the repair and sample subimages and the line scratches can be changed if these selections are not too visible. This is done by choosing *Options > Color Settings*. The *Color Settings* window will be displayed (Figure A-6).

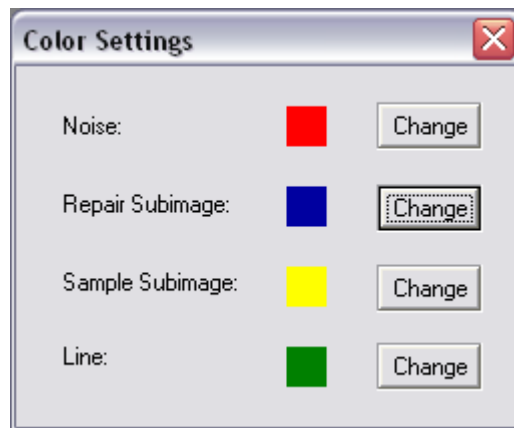


Figure A-6: *Color Settings Window*

APPENDIX B : FILE STRUCTURE

Selections File

- The first line of the file contains the height followed by the width of the original image from which the selection has been changed. These values are used when loading the selections to check whether the selections are being applied to an image of the same size.
- The second line contains the number of noisy pixels. If this number is greater than zero, then the subsequent lines in the file contain the coordinates of the noisy pixels. The y -coordinate is given first, followed by the x -coordinate.
- After the list of noisy pixel coordinates, the number of repair subimages, n , is on the next line. If this number is greater than zero, then each of the n subsequent line contains the following information:
 1. x -coordinate of leftmost pixel
 2. y -coordinate of topmost pixel
 3. width
 4. heightfor each repair subimage and the next n subsequent lines contains the same information for the sample subimages.
- The next line contains the following information about the line scratch:
 1. x -coordinate of starting endpoint
 2. y -coordinate of starting endpoint
 3. x -coordinate of ending endpoint
 4. y -coordinate of ending endpoint
 5. Width of line
 6. Length of line

Results File

After execution of any of the five methods, the following information is stored in the file 'results.txt':

- The image path
- The image type (grayscale or color)
- The image size (height x width)
- The method executed
- The time in seconds that method took to execute
- The number of noise pixels processed (where applicable)

```

180 120
323
56 61 55 61 54 61 53 61 52 61 51 61 50 61 50 60 50 59 50 58 50 57 50 56 50 55 51 55 51
56 51 57 51 58 51 59 51 60 52 60 52 59 52 58 52 57 52 56 52 55 53 55 53 56 53 57 53 58
53 59 53 60 54 60 54 59 54 58 54 57 54 56 54 55 55 55 55 56 55 57 55 58 55 59 55 60 56
60 56 59 56 58 56 57 56 56 56 55 57 55 57 56 57 57 57 58 57 59 57 60 57 61 57 62 56 62
55 62 54 62 53 62 52 62 51 62 50 62 50 63 50 64 50 65 50 66 50 67 50 68 50 69 50 70 50
71 51 71 51 70 51 69 51 68 51 67 51 66 51 65 51 64 51 63 52 63 52 64 52 65 52 66 52 67
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55 64 55 63 56 63 56 64 56 65 56 66 56 67 56 68 56 69 56 70 56 71 57 71 57 70 57 69 57
68 57 67 57 66 57 65 57 64 57 63 58 63 58 62 58 61 58 60 58 59 58 58 58 57 58 56 58 55
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68 66 67 66 66 66 65 66 64 66 63 66 62 66 61 66 60 66 59 66 58 66 57 66 56 66 55 67 55
67 56 67 57 67 58 67 59 67 60 67 61 67 62 67 63 67 64 67 65 67 66 67 67 67 68 67 69 67
70 67 71 68 71 68 70 68 69 68 68 68 67 68 66 68 65 68 64 68 63 68 62 68 61 68 60 68 59
68 58 68 57 68 56 68 55
1
31 20 64 64
21 98 64 64
0 0 0 0 1 0
    
```

Figure B-1: Example of the selection file

```

-----
IMAGE PATH:      D:\Images\image01.ppm
IMAGE TYPE:      color
IMAGE SIZE:      180 x 120
METHOD:          Basic (INRM)
TIME:            0.041 seconds
NOISE SIZE:      323 pixels
-----
    
```

Figure B-2: Example of the results file