

Scar Inspector v1.0

M. A. (Tony) Barry

Cardiology Research Workshop
Westmead Hospital, Sydney, Australia
tonyb@westgate.wh.usyd.edu.au

18th March 2007

Abstract:-

Scar Inspector is a Macintosh OS X application designed to delineate regions of scarring in scans of Gomori - stained histological slides of myocardium. In Gomori's one-step blue procedure, the collagen and nuclei are stained blue, cytoplasm, erythrocyte and fibrin are stained pink to red.¹

The application allows the scientist to load a scan of the slide, segregate pixels based on their hue, count them and obtain the percentage of pixels stained blue.

The procedure consists of four steps:-

1. select a region of interest (ROI);
2. choose cutoff hues for myocardium (red) and scar (blue);
3. choose cutoff brightness for dark black and white areas;
4. perform the segregation.

The algorithm is as follows:-

1. Obtain a pixel for examination;
2. If the pixel is too light or too dark, ignore it. It is not counted as either scar, myocardium, or other tissue.
3. If the pixel lies within the acceptable grey value range, count it in the overall total pixel count.
4. If the pixel's hue is within the range allocated to myocardium, count it as a pixel of myocardium, and colour it accordingly (red).
5. If the hue is within the range allocated to scar, count it as a pixel of scar and colour it accordingly (blue).
6. If the hue is outside of both of these ranges, leave its colour as it was.

Note that if the user sets an overlap in hues, then a pixel may be counted twice; once as a scar pixel, once as a myocardium pixel. It will be displayed as a green pixel, and counted as a "both pixel". We trust that this situation will not arise except as the scientist expressly intends.

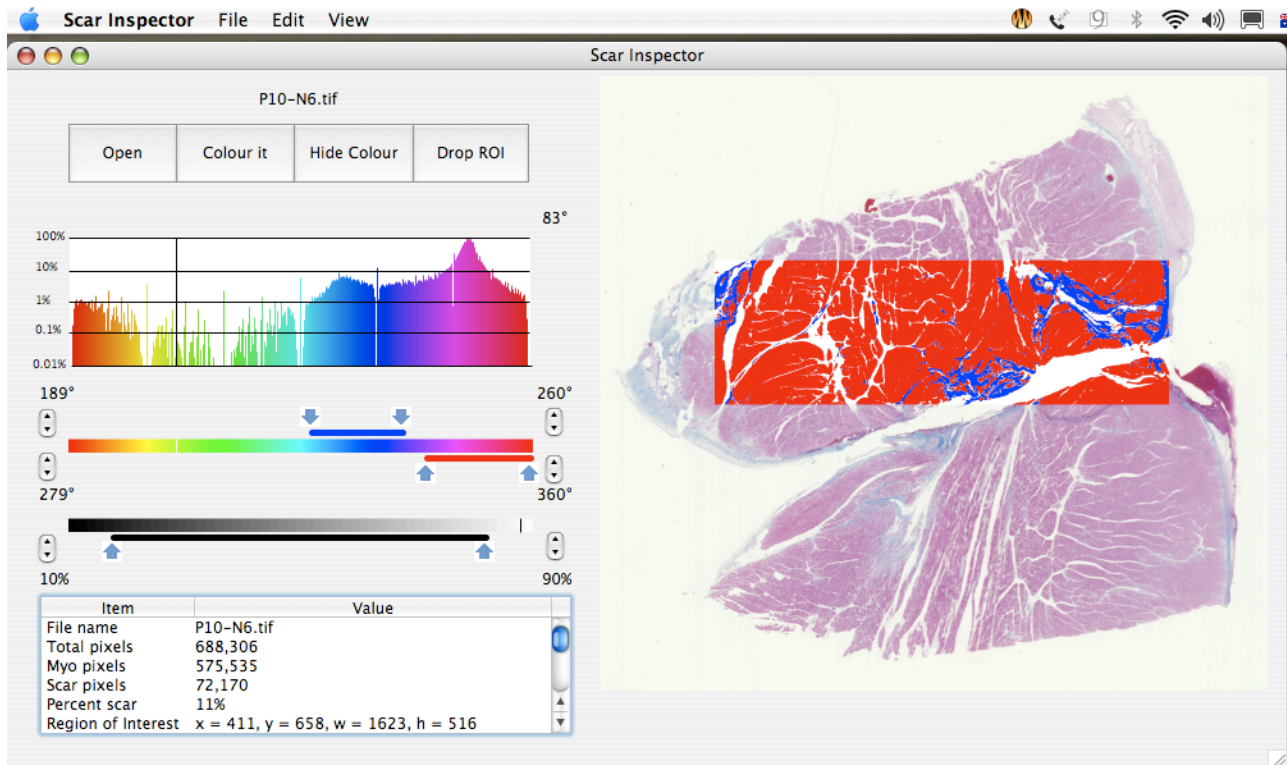
Percent scar is calculated as

$$\%scar = \frac{scarPixels}{scarPixels + myoPixels}$$

Application interface:-

The application uses a single window interface. An image may be conveniently loaded by dragging and dropping on the window right-hand pane, or by the "Open" button on the window. The application accepts any raster image file Quicktime can deal with, including JPEG, TIFF, and PICT. It may take a few seconds to open large images - on a Powerbook G4 1.5GHz, a six megapixel image took four seconds.

Once loaded, the scientist can define a region of interest (ROI) by clicking and dragging on the image. Hue and grey values can also be applied by either dragging the arrows or using the up-down arrows at each end of the spectrum bar.



Clicking on "Colour it" applies the hue values to the ROI. A histogram of hues present in the ROI is shown in the window, and the salient numbers are loaded into the list box on the left hand lower portion of the application window. These numbers may be copied to the clipboard (in tab-delimited format suitable for pasting into a spreadsheet) by the traditional Copy command or its keyboard equivalent. The coloured image may be copied to the clipboard via a menu copy command.

The image may be inspected at greater magnification by clicking at the place of interest. The degree of magnification is chosen via either menu selections or keyboard equivalents.

References:-

1. http://www.dakousa.com/index/prod_search/prod_products.htm?productareaid=17&baseprodidver=A224451004