

FlatFieldTest: Very short manual

The main form is given in figure 1. The buttons on this form are explained below.

The screenshot shows the 'Flat Field Test' software window. It has a title bar with the text 'Flat Field Test' and standard window controls. Below the title bar are two tabs: 'Settings' and 'DICOM Tags'. The 'Settings' tab is active and contains several input fields and checkboxes. The 'Area' section has four input fields labeled A, B, C, and D with values 0, 2293, 0, and 1913 respectively. The 'Pixel Representation' section has an 'Inverted' checkbox. The 'Box dimension' section has a '1' cm input. The 'Deviating ROI's' section has a '5' % From Mean input. The 'Pixel Offset' section has a '0' input. The 'Deviating Pixels' section has a checked checkbox and a '20' % From Mean input. On the right side, there are buttons for 'About', 'Open DICOM File', 'Output File', and 'Calculate'.

- About:** Will give a “standard” aboutbox.
Open DICOM File: Opens a DICOM file as input for the flat field test
Output File: Gives the possibility to set the name of the file for output of the flat field test
Calculate: Starts the flat field test

If a DICOM-file has been loaded the tabsheets “Settings” and “DICOM Tags” will become active. The two tabsheets are discussed briefly.

Settings

In this tabsheet it is possible to give some parameters for the flat field test

Area: Sets the area that should be evaluated.

- A – First row
- B – Last row
- C – First Column
- D – Last Column

When a DICOM-file is loaded this area is set to the entire image

Box dimension: Sets the dimension of the analysing ROI. This is a square. You can give the dimension in centimetres

Pixel offset: Some images do have an offset. This means that at zero dose on the detector the resulting value isn’t zero. If this is the case you can put down here a offset which will be subtracted from the pixel values before the flat field test is performed

Pixel Representation: Some images have inverted pixel values. This means that the pixel values are lower at higher doses. If this box is checked the pixel values are first inverted before the flat field test is performed. The software will try to detect itself if pixel values are inverted (tag:0028,1041).

Remark: If pixel offset is not zero and pixel values are inverted, then the pixel values are firstly inverted and secondly the pixel offset is subtracted.

Deviating ROI's: A ROI is called deviating if the mean value or the SNR of a ROI deviates more than this percentage from the mean in the image resp. the mean SNR in the ROI's.

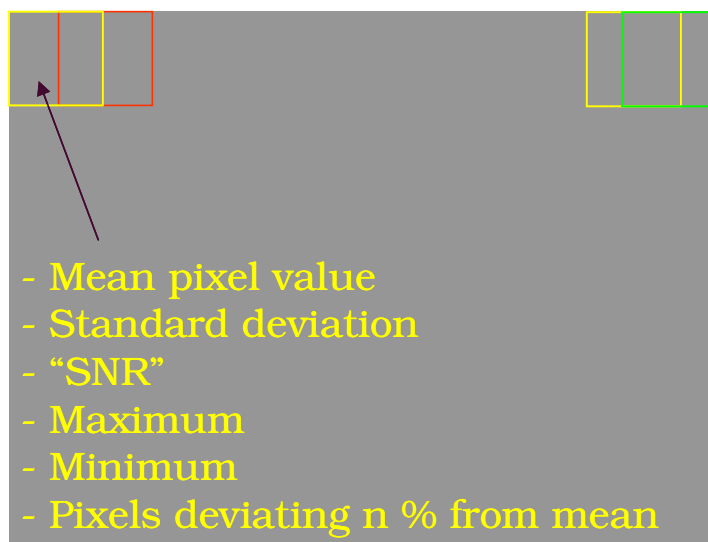
Deviating Pixels: A Pixel is called deviating if the pixel value deviates more than this percentage from the mean in the ROI. If the checkbox isn't checked deviating pixels won't be calculated.

DICOM Tags

In this tabsheet the DICOM tags can be seen. There is a small DICOM-library in the software. Tags that aren't recognised are read as text. This explains why some tags have strange characters.

Flat field test calculations:

In figure 2 you can see the flat field test presented schematically.



The image (of a homogenous object) is analysed by calculating the mean, maximum and minimum pixel value and the standard deviation (SD) in a ROI. Also the mean pixel value divided by the standard deviation is calculated. In the end pixels deviating more than a certain percentage from the mean in a ROI are determined.

The ROI is a square moving over the image with a half dimension overlap (at the end of a row (or column) the ROI is moved less than half a dimension)

When all ROIs are calculated the mean pixel value and the average of the mean over SD in each ROI are calculated.

ROI's deviating more than a certain percentage from the mean or mean over SD are determined.

Output

The output-file will contain the overall mean pixel value and pixel value over SD. All the parameters per ROI. The average mean pixel value over SD in each ROI. All deviating ROI's and their position and all deviating pixels and their position.

Dicomdictionary

In the software is a small DICOM dictionary. If you want to use your own dictionary, place a file called 'dicomlibrary.txt' in the same directory as FlatFieldTest.exe.

Each line of the dictionary should look like this:

ttttttt=VRAttributename

Explanation:

ttttttt : Tag (without a ',' and without brackets)

= : The '=' sign

VR : VR code (If you don't know the VR code, type a non-existing VR-code. The software will try to read the tag as if it was text).

Attributename : The attribute name of the tag (or any other explanation you like)

- Spaces are only allowed in the attribute name.

Examples:

00080020=DASStudyDate

00080020=DASStudy Date

FFFEE000=naItem (a non-existing VR-code 'na' (Not Applicable) is used)