Python Documentation

version 3.0

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Contents

CASTIRON

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1. Introduction

1.1 General

This module computes:

- The surface of graphite on images of samples that are not attacked,
- The surface of pearlite and graphite on samples attacked,
- The proportion of ferrite
- The proportion of pearlite
- It can combine the calculations done on multiple images to get more reliable results.

Each function corresponds to a window. The name of the active window appears at the bottom left of the module "Cast Iron". In each case the software offers an automated method and a manual method for isolating parts of the image to measure.

1.1.1 Option

This documentation is common to the standard and professional versions of the software Cast Iron - PF. The functions that are not in the std version are marked. These options are subject to change at any time.

1.1.2 Load an image in a window

Choose a window (Nodules, Pearlite / ferrite) by clicking on its name.

Click the Add menu "**Images**" or "**File / Open**" and choose an image file.

Acceptable formats: **bmp, TIFF, JPEG, ddm**.

The file format "**ddm**" is a particular format to 2ISYTEM. The software requires format files "ddm" to save its results. When an image file format "bmp, tiff, jpeg" is open, the software automatically creates a file for each file ddm loaded. The results of the calculations are stored in the ddm file.

To work on an image, select its name in the list.

After opening an image, extraction of data is automatically started. If result is not suitable, it is possible to switch to manual tool. With theses manual tools, thresholds are determined by the operator by using the command «Manual Thresholding"

1.1.2.1 Viewing an image Results

Select a picture by clicking on its name.

The « **statistics** » is a summary of the results for the displayed image.

The result window displays an array of values. Each line corresponds to an object. By clicking on a line of value, the object is designated by an outline. If you click on an object the line is displayed.

Each column header of a table gives the name of the « **characteristic** » displayed. To the right of the name, an icon is used to:

- Sort,

- Individually select a particular value of the list.

1.1.2.2 Work on the list of objects in an image

Select a picture by clicking on its name. Put the right mouse button on the list of objects. Click the right mouse button. A floating menu appears:

- "**Merge**" is used to combine the selected objects in a single object.

- "**Split**" the opposite of merge command.

- "**Delete**" deletes the selected objects. These objects are physically removed from the image. They will no longer appear in the results. But if a new threshold is chosen, they will reappear.

- Export, these commands are used to save data in a standard format.

1.1.2.3 Commands of the image list

The command "**reloads**" image and erases anything that has been done?. It reloads image in its original state. The command "**image**" removes the image from the list (but not the hard disk). The command "**save**" saves the work done in the image.

1.1.2.4 The window "Properties"

This window is used to set the parameters for a window. The following parameters are common to the two windows:

Object Pen: selects the color of the object.

Pen Selection : color of an object selected by the user.

Object Minimum size: objects that are smaller than this value are not counted when calculating objects.

" **Overlay opacity level** ": set the intensity of the transparency of the color in the manual thresholding function.

" **Cumulative images** " : number of images processed.

1.1.3 Manual thresholding

This function is used to manually adjust the limits calculated automatically by the software.

Procedure :

Select the image that we want to change the threshold.

Click on « **Manual Thresholding** » The thresholds calculated by the automatic thresholding are symbolized by two vertical lines. You can take them with the mouse and move them away. These thresholds are the mains thresholds.

The automatic selection is displayed in the form of an outline. The difference between the new and the previous selection is displayed as an area of solid color that the user. Check the box "enable Hysteresis," to switch on this function. The hysteresis is used to extend the selection from the area of main thresholding.

Simply, this feature is a magic wand whose starting points are selected by the software. The user can just set the sensitivity. Specifically, the hysteresis appears as two additional sliders that are positioned outside the sliders. In general, it reduces the area of basic and thresholding on extending the zone hysteresis, which is still outside the core area.

In 2 cases, the parameters "**lower**" and "**upper**" moves the sliders.

1.1.4 Other filters

- "**Fill hole**" filled the holes in the objects
- "**Remove border object**": removes items that touch the edge of the image.
- "**Remove small objects**" removes small objects (see corresponding parameter of the window "properties")
- " **Swap background <> objects.**" Inverse object and background.

2 Window "Nodule"

2.1 Specific properties of Nodule window

Cumulative « Nodules » : total number of nodules found for all images loaded.

3 Window "Pearlite 3 / Ferrite"

" **Pearlite Carbon** ": displays % of the darkest area. This area contains pearlite and graphite.

" **Ferrites** " : displays% of the white area clear. This area contains ferrite.

4. Report

This window provides information synthesis.

4.1 Tab Report

Nodules graphite:

Line 1: Total number of nodules.

Line 2: Surface represented by the nodules

Line 3: Number of images treated for the calculation of nodules

Pearlite:

Line 4 :" % cumulative pearlite + graphite "

Line 5 : Number of images processed

Line 6 : % ferrite;

Export data to Excel: Clicking the right mouse button when the mouse is on the data area.

Excel has to be installed.

Note: these values are displayed on a treaty if at least one image of each type.

4.2 Tab "Nodules" and "Pearlite / ferrite"

These windows display synthesis report for the batch of images.

4.3 Image Quality

For the treatment of the image works well, it is necessary, among other things:

The best contrasts.

Get image with homogeneous background light. These elements depend on the sample preparation and equipment used.

Indices and tables

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