



Image analysis  
Laboratory exercise manual

## **Development of acquisition and image processing path**

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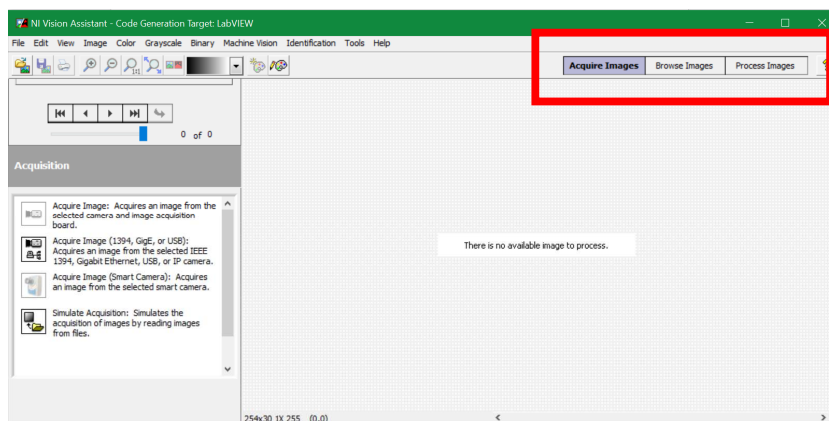
## 1. The purpose of the exercise

The aim of the exercise is to get acquainted with the functionality of the Vision Assistant package. The exercise includes familiarizing with the NI Vision Assistant environment, building the image acquisition track and acquiring the ability to create an image processing script.

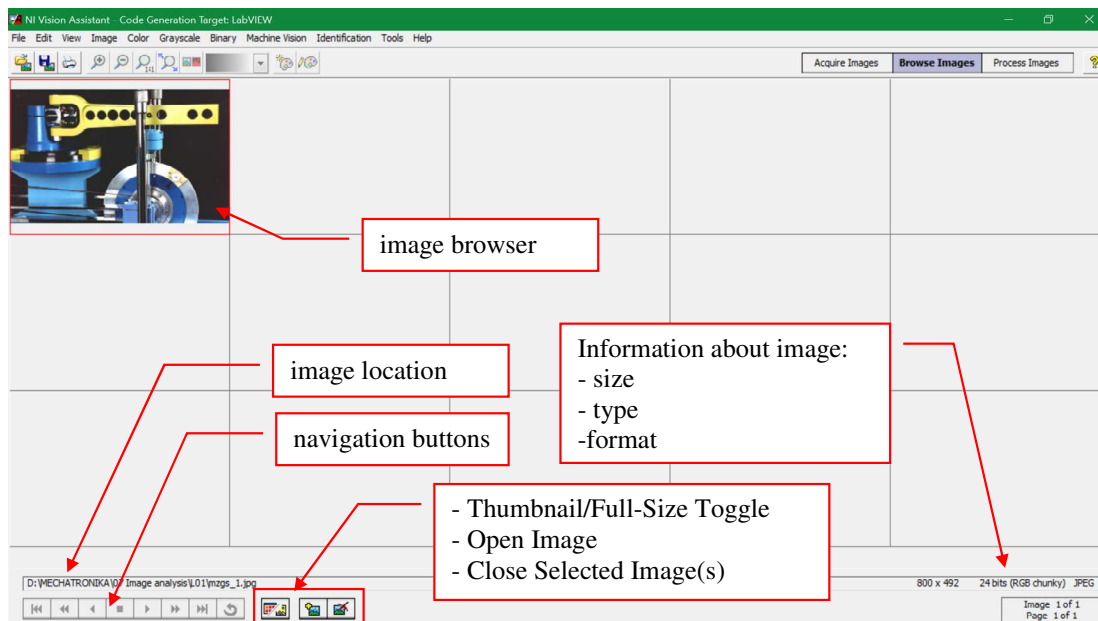
## 2. Vision Assistant environment

The package is launched from the menu Programs / National Instruments / Vision Assistant path. The start window opens, where the individual modules are started using the tabs: **Acquire Image**, **Browse Image**, **Process Image**.

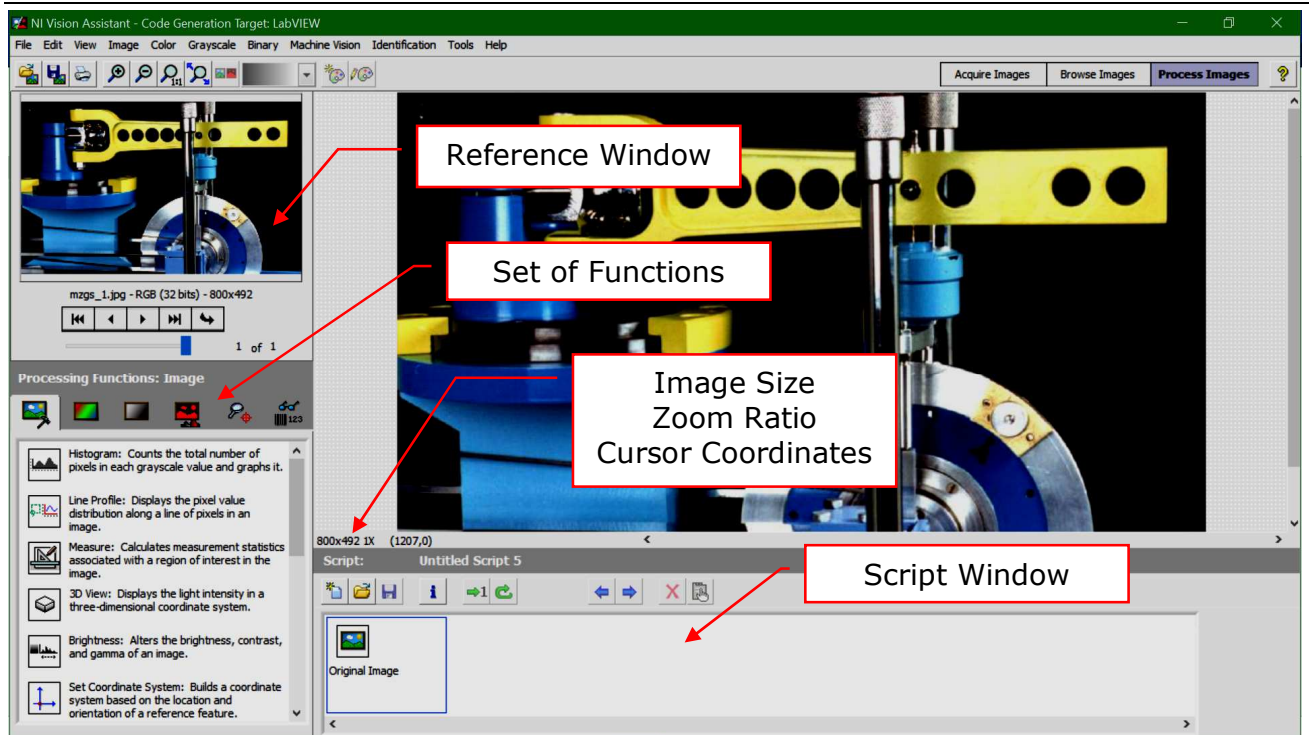
Option **Acquire Image** requires access to the camera. This exercise will focus on image previously acquired and saved.



Switch to **Browse Image** tab and using *Open Image...* option read the image named **mzgs\_1.jpg** (attached to this manual):



It is possible to read more images previously stored. **Browse Images** tab is used only to load files. The main image processing operations from the file can be found in the tab **Process Image**.



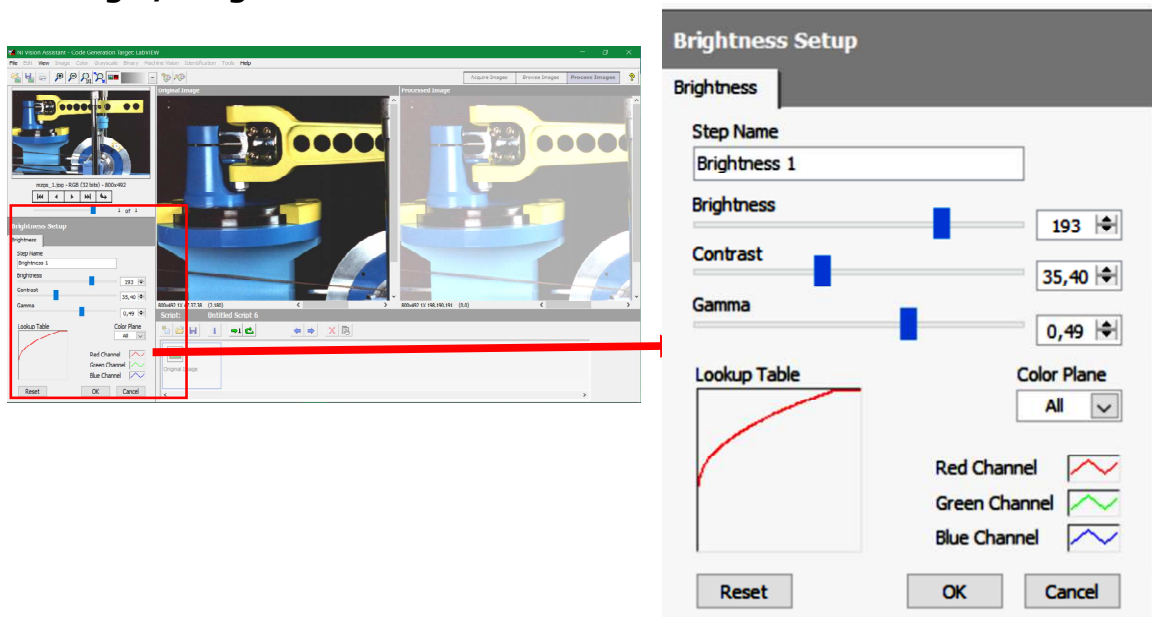
Functions are grouped in palettes: **Image, Color, Greyscale, Binary, Machine Vision, Identification.**

### 3. Creating a script

The package is launched from the menu Programs / National Instruments / Vision Assistant path. The start window opens, where the individual modules are started using the tabs: **Acquire Image, Browse Image, Process Image.**

A script is a series of functions arranged in series, where the analyzed image will be processed by each of the functions in the script according to the order given.

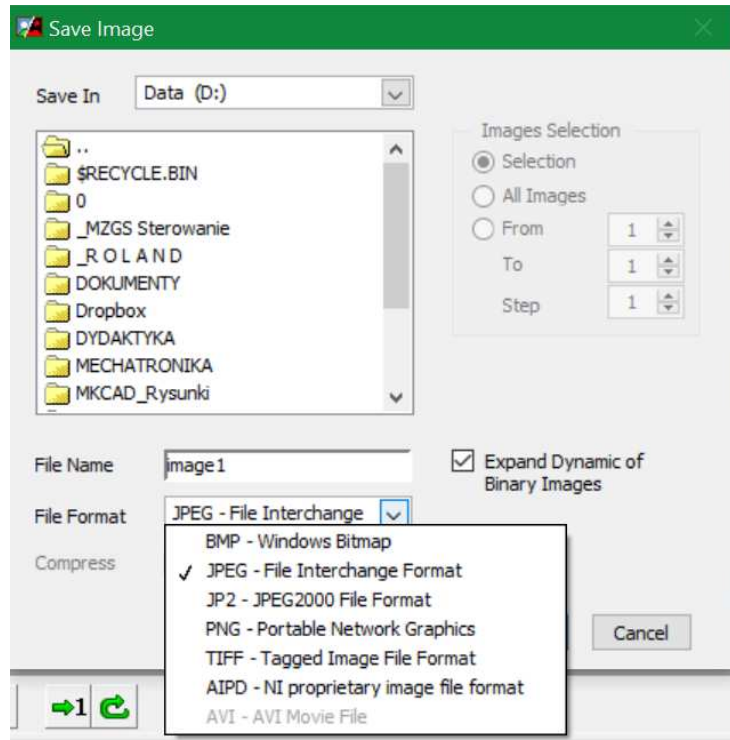
To place a function in a script, search for it in the function set and click. It will be automatically inserted into the script and the function configuration field will open, e.g. for the **Image / Brightness** function:



The user can freely change parameters affecting the processing of the image according to the settings. You can simultaneously observe changes as a result of processing. To confirm result press OK button. Function will be placed in the script.

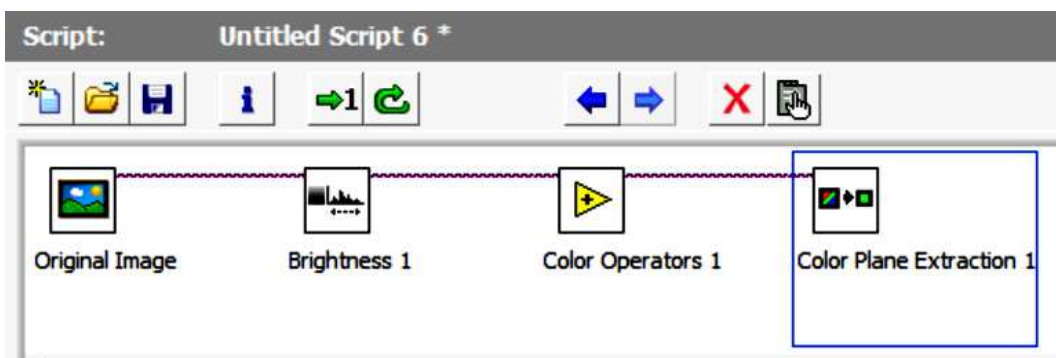
**At any time, you can re-open and edit the function by double-clicking its icon in the script.**

The current state of the processed image can be saved using the **File / Save Image** function from the **Main Menu**.



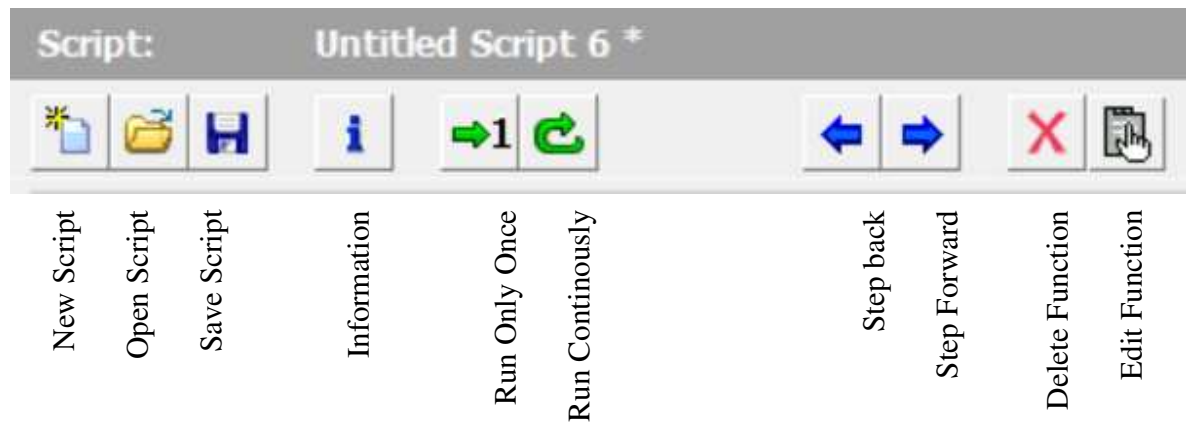
**NOTE !!!**  
**Some function may not work with actual state of image.**  
**e.g. functions in Greyscale palette can process images**  
**in Greyscale only in 8b or 16b type !**

The function inserted as the next processing step will perform operations on the image processed one step earlier.



The completed script can be repeated for other images indicated in the **Browse Image** tab.

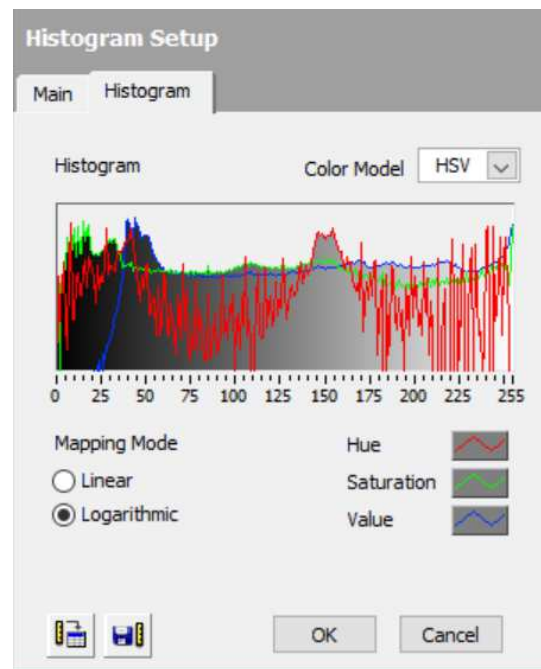
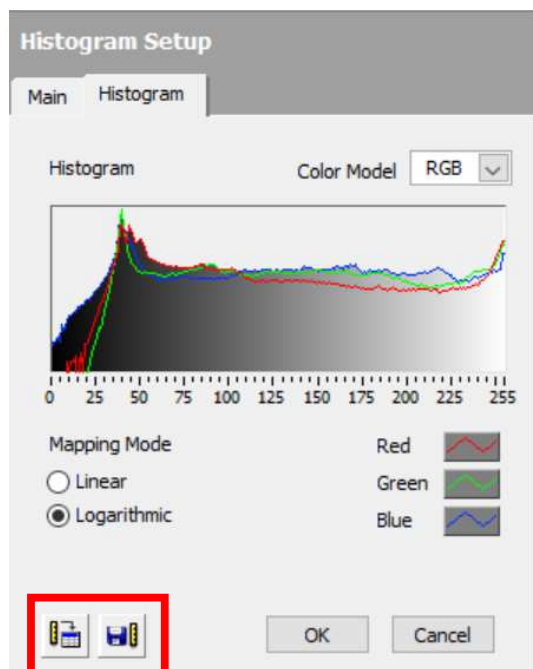
In the script field there are icons for saving / loading the script, launching, etc.



#### 4. Example of processing

Create the following script for the mzgs\_1.jpg image:

Step 1. Function **Image/Histogram**



This function determines the number of pixels for the basic colors for the specific intensity of the color: from dark (0) to the brightest (255) for selected model of colors.

**Using the data storage buttons, you can export charts directly to Excel (if it is installed) or to a text file.**

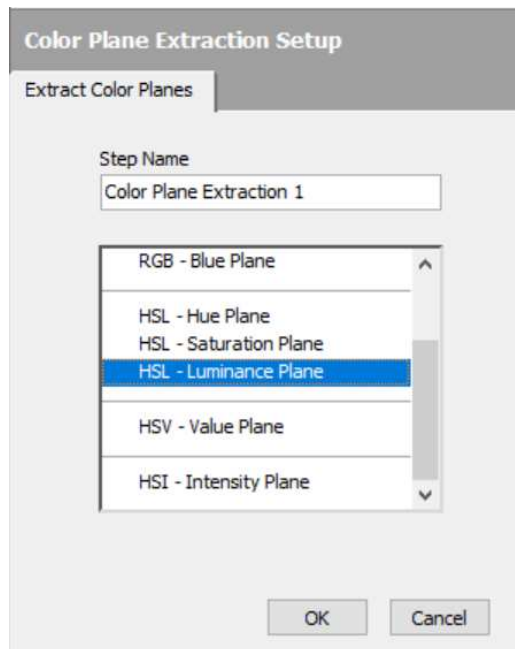
```

L01.txt — Notatnik
Plik  Edycja  Format  Widok  Pomoc
D:\MECHATRONIKA\07 Image analysis\L01\mzgs_1.jpg
Hue
Minimum Value  0,000000
Maximum Value  253,000000
Starting Value  0,000000
Interval Width  1,000000
Mean Value     225,590775
Standard Deviation  59,019032
Area (pixels)  393600,000000

Intensity      # Pixels
0              51838
1              7
2              97
3              291
4              1336
5              25
6              4
7              1324
8              18018
9              30
10             31
11             483

```

## Step 2. Function **Color/Color Plane Extraction**

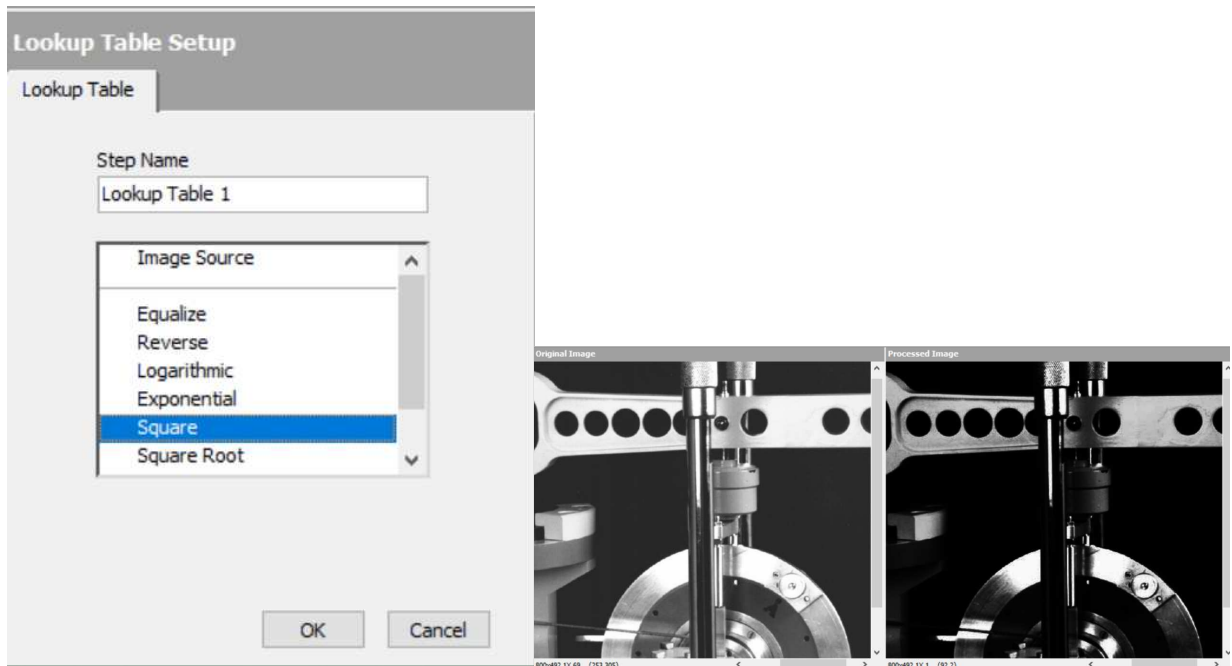


This function allows you to select from the image the selected parameter from the available color models: RGB, HSL, etc.

## Step 3. Function **Greyscale/Lockup table**

This function performs one of the predefined functions for image processing based on contrast and brightness correction.



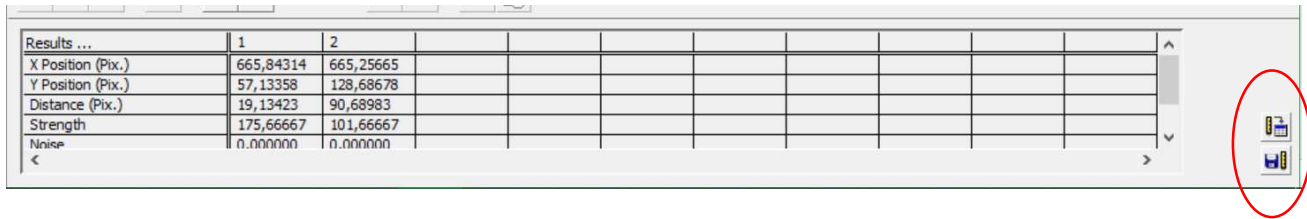


#### Step 4. Function **Machine Vision/Edge Detector**

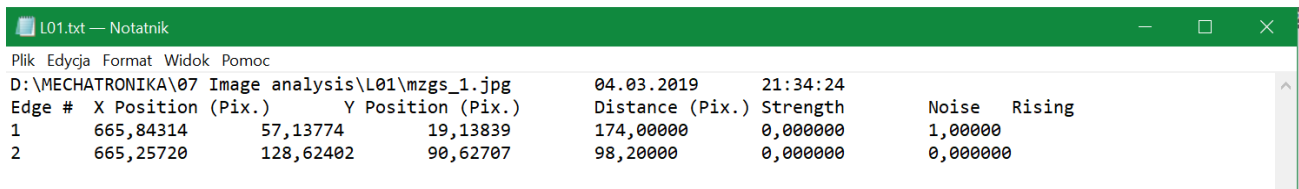
This function detects edges according to user configuration. It is possible to detect one edge or more. Please note the set of factors by which the user can influence the accuracy of the result.

Results ...	1	2
X Position (Pix.)	665,84314	665,25665
Y Position (Pix.)	57,13358	128,68678
Distance (Pix.)	19,13423	90,68983
Strength	175,66667	101,66667
Minusc	n.nnnnnn	n.nnnnnn

Some of the functions generate results in the form of tables. By using the data storage buttons, the user can send these results to Excel or save them to a text file.



Results ...	1	2							
X Position (Pix.)	665,84314	665,25665							
Y Position (Pix.)	57,13358	128,68678							
Distance (Pix.)	19,13423	90,68983							
Strength	175,66667	101,66667							
Noise	0,000000	0,000000							



```

Plik Edycja Format Widok Pomoc
D:\MECHATRONIKA\07 Image analysis\L01\mzgs_1.jpg      04.03.2019      21:34:24
Edge # X Position (Pix.)      Y Position (Pix.)      Distance (Pix.) Strength      Noise      Rising
1      665,84314      57,13774      19,13839      174,00000      0,000000      1,00000
2      665,25720      128,62402      90,62707      98,20000      0,000000      0,000000

```

## 5. Summary

The sample task presents the most frequently appearing elements when creating a script that processes and analyzes the image. Depending on the chosen function, the image can only be processed or the ounce can provide data in the form of graphs (e.g. Histogram). Other functions generate the results of the analysis in the form of tables.

**It is important to remember these basic functionalities of the system, as they will be used in subsequent exercises without a detailed description.**

Follow the check list and verify your skills:

1. Do you know how to load an image for analysis?
2. Do you know how to switch between image loading and processing modules?
3. Do you know where to look for image processing and analysis functions.
4. Do you know how to insert a function into the script?
5. Do you know how to change the parameters of the function (parameter edition)?
6. Do you know how to possibly save the results generated by the functions?