



Image analysis  
Laboratory exercise manual

**Application of Vision Assistant  
for inspection of PCB elements**

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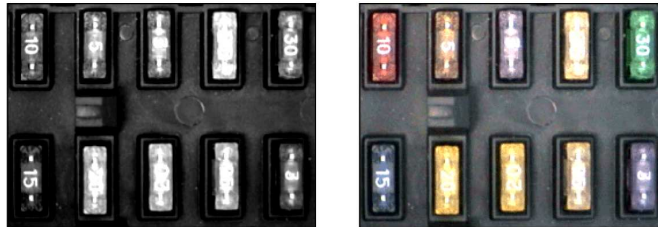


## 1. The purpose of the exercise

The aim of the exercise is to get acquainted with the procedure of extracting from the color image the element defined as a pattern using the Vision Assistant module. The electronic PCB element is the object for analysis.

## 2. The Color Pattern Matching function.

The use of colors makes sense when the gray scale image makes it difficult to distinguish between elements with similar saturation, and the object's color becomes a parameter that uniquely distinguishes the object.



The **Color Pattern Matching** function is used to create patterns of color elements to quickly locate known patterns in a color image. The created pattern is used to locate the element you are looking for, where the Score quality indicator is defined for each location. The result indicates how much the model fits the pattern. It is possible to specify the minimum level of the indicator that the localized element must meet to be considered correctly detected.

Detection can be used for applications:

- measuring, where in further analysis, for example, measurements are made between the elements,
- inspection, where it is possible to determine the missing elements and the place where the error occurred,
- controlling the correct position of the element (orientation).

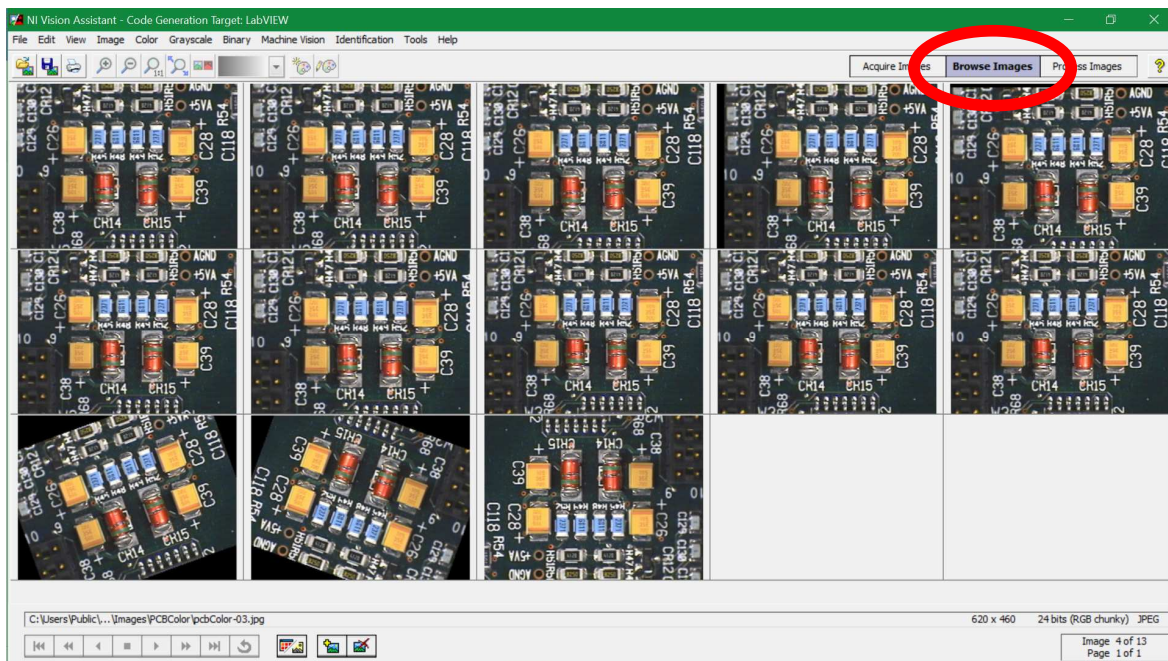
## 3. Image processing script.

Download and unpack the **pcbColor.zip** image package. Start **Vision Assistant**.

Load an image package for inspection: **File / Open Image ...**

Indicate the location of the **pcbColor image** package.

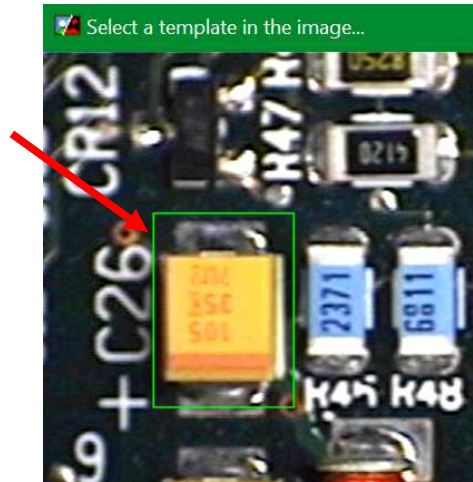
Select the **Select all Files** option and click the **Open** button. In the **Browser** tab of the program you can see all images.



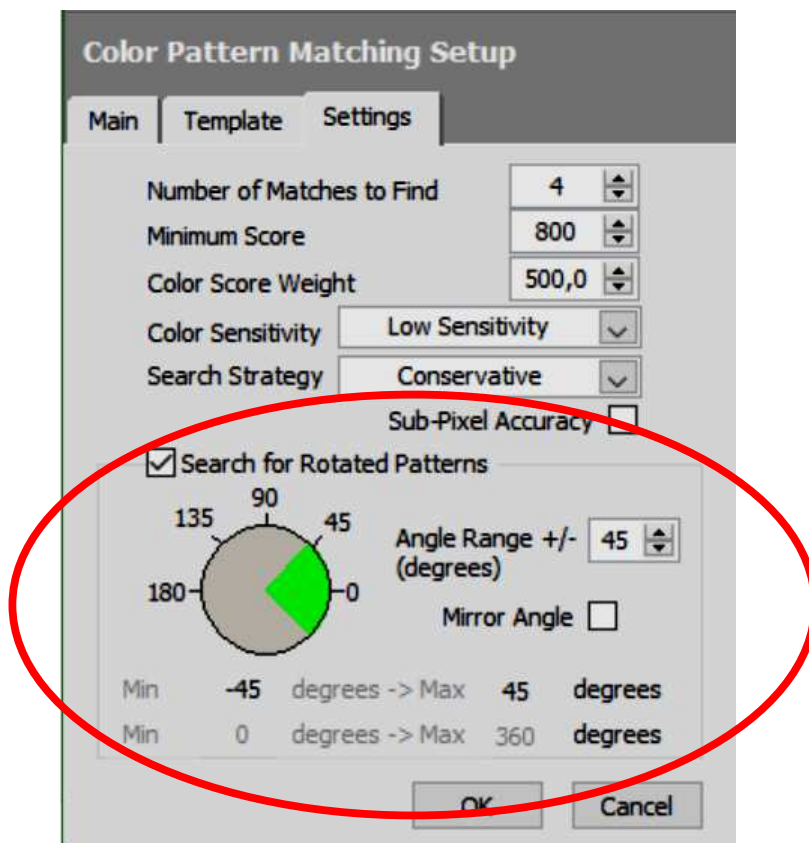
**Double-click on the first image to select it as the active image.**

Creating a script:

1. Insert the **Processing Functions \ Color \ Color Pattern Matching** into the script
2. Activate the **Template** tab and press the **Create Template** button.
3. Select **the yellow element** in the image, it will be the **reference element**.



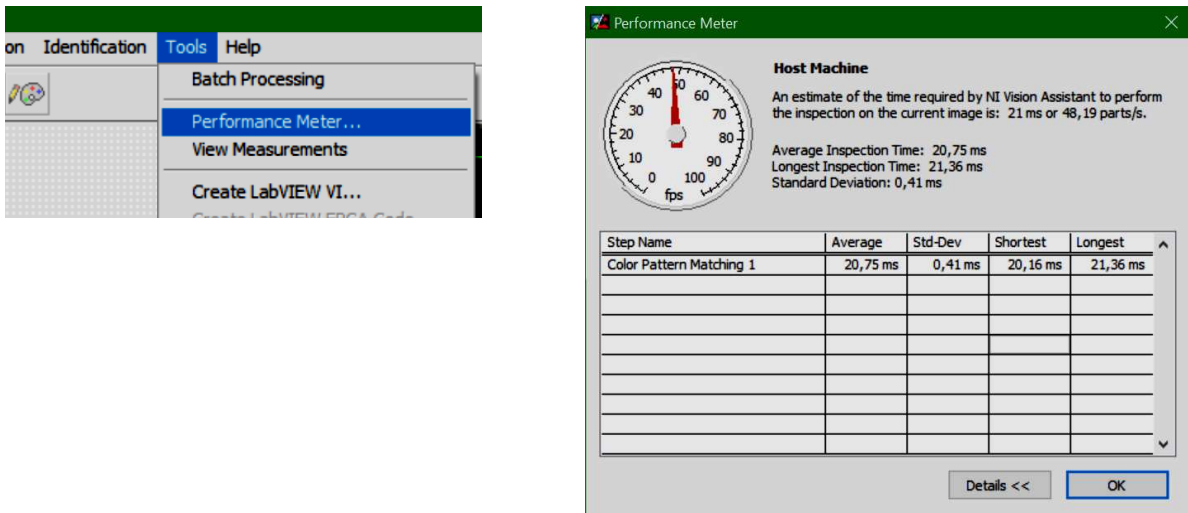
5. Confirm the operation (OK key) and save the pattern as **colortemplate.png**.
6. Activate the **Settings** tab and set the parameters as below:



Pay attention to the effect of parameters on the result of the inspection, observe the result by changing the parameters **Minimum Score**, **Color Score Weight**, **Search for Rotated Patterns**. Confirm the configuration. The function will be inserted into the script.

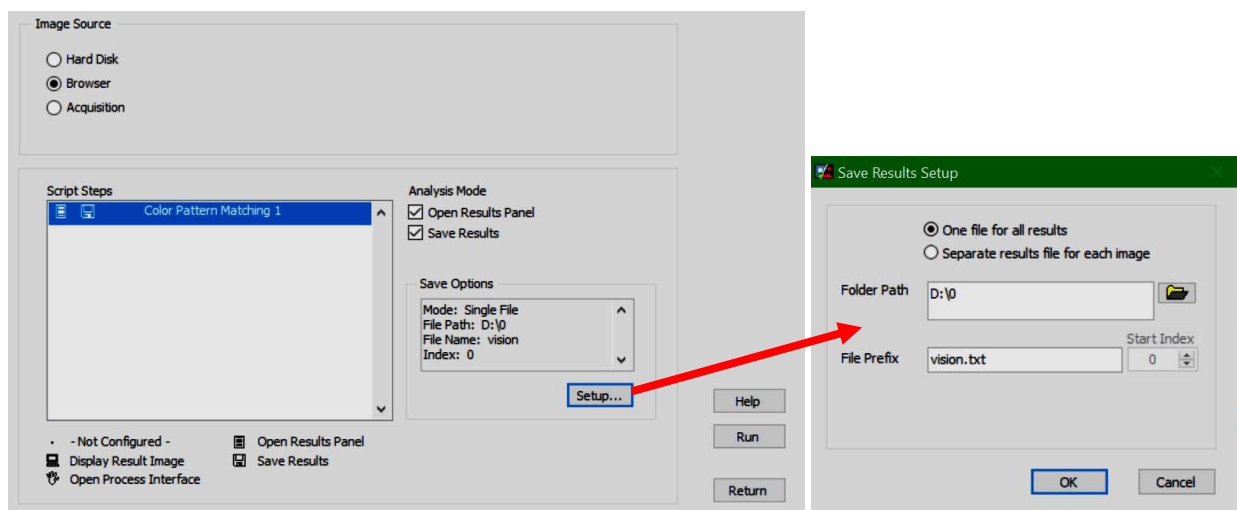
#### 4. Evaluation of performance for processing

Select **Tools / Performance Meter** from the main menu. The option allows you to evaluate the speed of the script.



#### 5. Run the script for the entire set of images.

From the main menu, select **Tools / Batch Processing**. Next, configure the function of the **Color Pattern Matching** function: indicate the source of images (in this case they are stored in the Browser's local browser). The **Open Results Panel** option displays a table with analysis results for each image, the **Save Results** option allows you to **save tables with results to a file**.

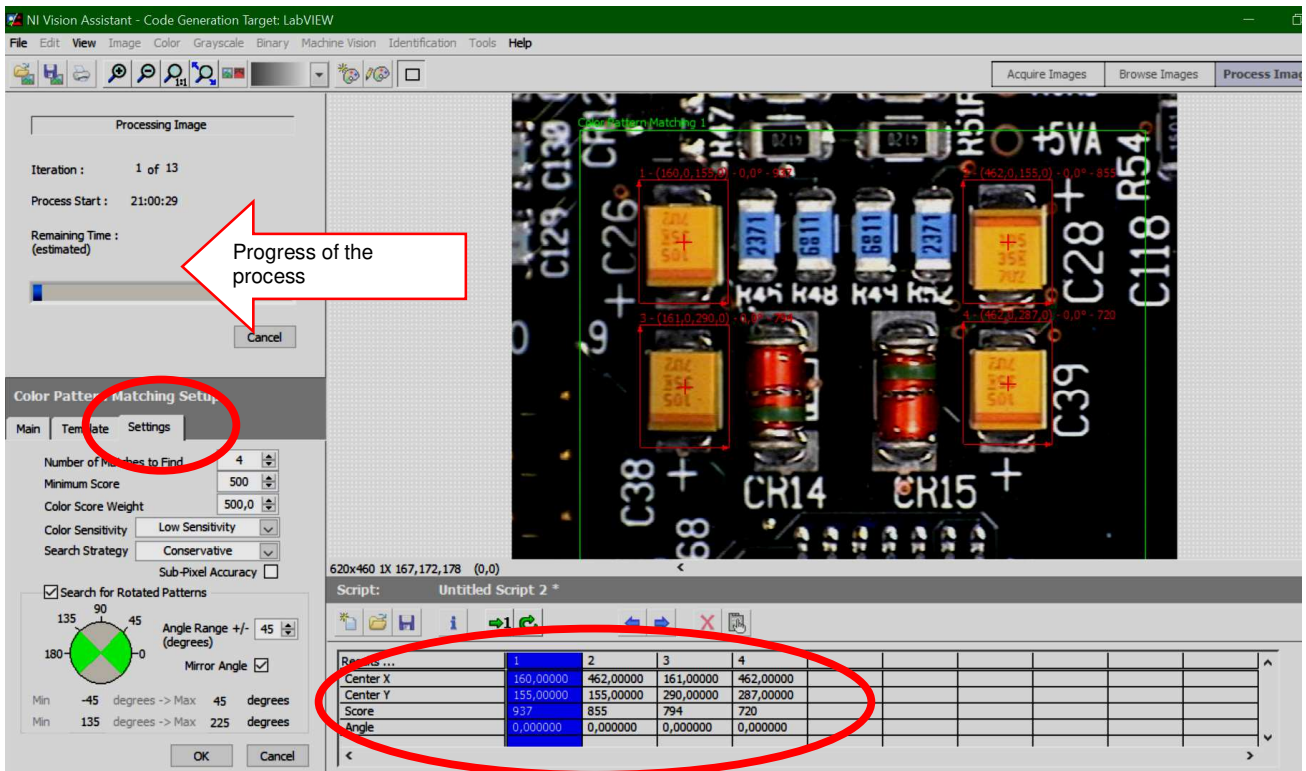


The **Run** key runs the script sequentially for each image. The analysis results are displayed. Access to the **Settings** tab allows for the current correction of the analysis parameters, e.g. **Score values**. The analysis progress indicator for the image package is also visible.

Pressing the **OK** button loads the next image and performs the analysis according to the script.

At the same time, when the **Save Results** option is active, a file with analysis results is created.

If not all objects have been detected, for example, reduce the **Minimum Score** parameter.



## vision.txt — Notatnik

Plik Edycja Format Widok Pomoc

C:\Users\Public\Documents\National Instruments\Vision\Examples\Images\PCBColor\pcbColor-00.jpg 12.12.2018

Object #	Center X	Center Y	Score	Angle
1	160,00000	155,00000	937	0,000000
2	462,00000	155,00000	855	0,000000
3	161,00000	290,00000	794	0,000000
4	462,00000	287,00000	720	0,000000

C:\Users\Public\Documents\National Instruments\Vision\Examples\Images\PCBColor\pcbColor-01.jpg 12.12.2018

Object #	Center X	Center Y	Score	Angle
1	180,00000	155,00000	885	0,000000
2	182,13992	290,03369	855	1,00000
3	482,00000	155,00000	838	0,000000
4	482,00000	286,00000	766	0,000000

C:\Users\Public\Documents\National Instruments\Vision\Examples\Images\PCBColor\pcbColor-02.jpg 12.12.2018

Object #	Center X	Center Y	Score	Angle
1	160,00000	165,00000	893	0,000000
2	161,00000	300,00000	850	0,000000
3	462,00000	165,00000	757	0,000000
4	462,00000	297,00000	748	0,000000