

Code Reader

Plug-In



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Version 6.2.4
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Introduction

About NeuroCheck plug-in DLLs in general

A plug-in DLL is a .NET assembly that serves to enhance NeuroCheck with user-defined image processing functionality. The NeuroCheck Plug-In Interface offers the opportunity to integrate user-defined check functions for image processing and data handling. A Plug-In can contain an arbitrary number of self-developed check functions.

These check functions have full access to the NeuroCheck runtime data objects such as Images, ROI Lists or Measurement Lists. The Plug-In check function can be added to a check as well as the built-in standard check functions of NeuroCheck.

Please note that for integration of a plug-in check function into your check routine, a Premium license is required. The completed check routine then can be run with any NeuroCheck license (except the Demo Version).

About this Plug-In [PI_CodeReader.NET]

This plug-in DLL implements the identification of several 1D barcodes and 2D code types.

Since the CodeReader algorithm is based on an external library, please read the sections on [Installation](#) and [Licensing](#) carefully.

Below is a list of the supported code types:

Supported 2D code types:

- Data Matrix
- Maxi Code
- Micro PDF 417
- PDF 417
- QR Code

Supported 1D code types:

- BC 412
- Codabar
- Code 128
- Code 39
- Code 93
- Composite Code
- EAN 8
- EAN 13
- Interleaved 2/5
- Pharmacode
- Planet
- Postnet
- UPC-A
- UPC-E

System Requirements

The NeuroCheck software system requirements and guidelines apply.

The Matrox MIL library does not have further requirements.

Please note the special limitations about operating systems:

Element	Description
Operating system	Microsoft® Windows® 7 with SP1 (32 bit and 64 bit), Microsoft® Windows® 8 (32 bit and 64 bit), Microsoft® Windows® 8.1 (32 bit and 64 bit) Microsoft® Windows® 10 (32 bit and 64 bit)

Installation

Installation

1. First of all please check which Windows operating system is used (32-bit or 64-bit). There are different installers as well as different Plug-In files for the operating systems.
2. Install the Matrox Imaging Library Version 10.0 by executing the MIL10-0_Redist_32Bit.exe or MIL10-0_Redist_64Bit.exe from the folder \installer\ of the zip archive.
3. Copy the following files from the zip archive to the plug-in directory within the desired NeuroCheck project (e.g. 'C:\Users\Public\Documents\NeuroCheck\6.2\Default\Software Extensions\PlugIns\').
 - All files inside the `Binaries` directory
 - All *.chm files inside the `Documentation` directory

Loading a Plug-In

In order to use a Plug-In the Plug-In assembly must be loaded in NeuroCheck. The management of Plug-Ins takes place within the Software Settings dialog. The Software Settings dialog can be found in the System menu of NeuroCheck.

Please note that it is impossible to load or unload a Plug-In as long as a check routine is opened, that contains the Plug-In check functions. If the currently opened check routine contains Plug-In check functions, close the check routine first.

Within the Software Settings dialog please select the node Plug-Ins and the sub-node Plug-In in the tree to the left. The loaded Plug-In assemblies are shown in the List of Plug-Ins. Press the Add button to open a file selection dialog in order to select a further Plug-In assembly.

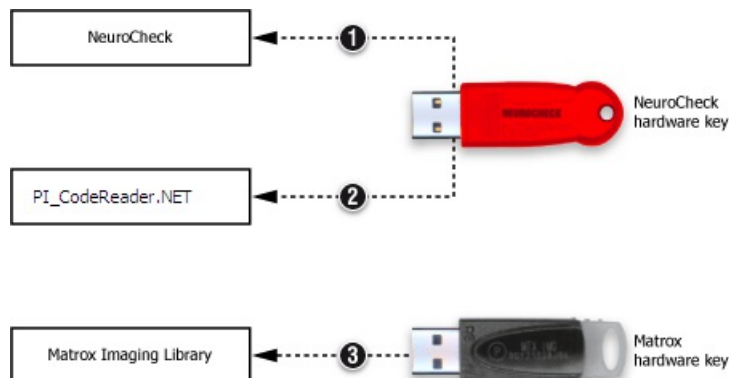
Inserting a Plug-In check function to a check routine

A Plug-In check function is inserted using the Check Function Select dialog. All check functions of loaded Plug-Ins are listed in the Plug-In category of the Check Function Select dialog. Within the Plug-In category the check functions are ordered in sub-categories, where each sub-category represents the check functions of one Plug-In.

Besides the category the user will hardly notice any difference between the usage of Plug-In check functions and built-in check functions.

Licensing

This section describes the licensing mechanism for the NeuroCheck Plug-In **PI_CodeReader.NET**.



1. Protection of NeuroCheck

NeuroCheck requires a valid license which is provided as hardware security key (dongle). USB and LPT dongles are available. Please note that for integration of a plug-in check function into your check routine, a Premium license is required. The completed check routine then can be run with any NeuroCheck license (except the Demo Version).

You obtain the standard NeuroCheck license when you purchase the software from your local NeuroCheck partner.

2. Protection of PI_CodeReader.NET

In addition to the standard NeuroCheck license, also a license for the NeuroCheck Plug-In **PI_CodeReader.NET** is required. The protection of the Plug-In is stored as special flag in the same dongle as for the NeuroCheck license. If the Plug-In cannot detect the special flag, the check function **Identify Code** will not be executed in NeuroChecks automatic mode. For the purpose of evaluation it is possible to execute the check function **Identify Code** in manual mode. In this case a message box that informs about the missing license is shown every ten executions.

In order to get the license for the **PI_CodeReader.NET**, please contact your local NeuroCheck partner. The plug-in license can be added to a standard NeuroCheck license by remote-programming of the dongle. The remote-programming works in the same way as a NeuroCheck update. In addition to the update of your dongle, you also will obtain the MIL license, see below.

3. Protection of Matrox Imaging Library

Code reader uses an external library, the "Matrox Imaging Library" (MIL), which requires extra licensing. The MIL license is provided as extra hardware key (dongle), either LPT or USB.

The MIL license will be provided when you purchase the **PI_CodeReader.NET** license from your local NeuroCheck partner. So the license for the **PI_CodeReader.NET** in fact comprises both the extension of the NeuroCheck dongle and the MIL dongle.

Matrox provides a 30 days evaluation license to run **PI_CodeReader.NET** in an **evaluation version** that can be ordered at Matrox. You can register online to get that license at Matrox.

Troubleshooting

Hibernate and standby modes

- MIL does not support the hibernate and standby/sleep modes under Windows.
The MIL application prevents the system from entering the hibernate or standby mode or the MIL application detects when the operating system enters the hibernate or sleep mode. Once the system comes out of these modes, it will prompt the user to restart the system for proper functionality of the application.

No plug-in check function in NeuroCheck Select Check Function Dialog

- Please check the installation of the file `Matrox.MatroxImagingLibrary.dll` in the NeuroCheck project directory.

Identify Code: Introduction

Function


This function identifies the specified 1D barcode or 2D Code in the input ROIs.


The read result is shown on screen and provided as result in the NeuroCheck data registers for further processing or verification.


Additional feature values for the input ROIs are created that show the qualities of code reading. Append check function Screen ROIs to see that feature values in a list view.

Properties

 Check function group Plug-In

 The check function generates feature information. See section [Features](#) for a list of features computed by this check function.

 The check function has a [Parameter Dialog](#).

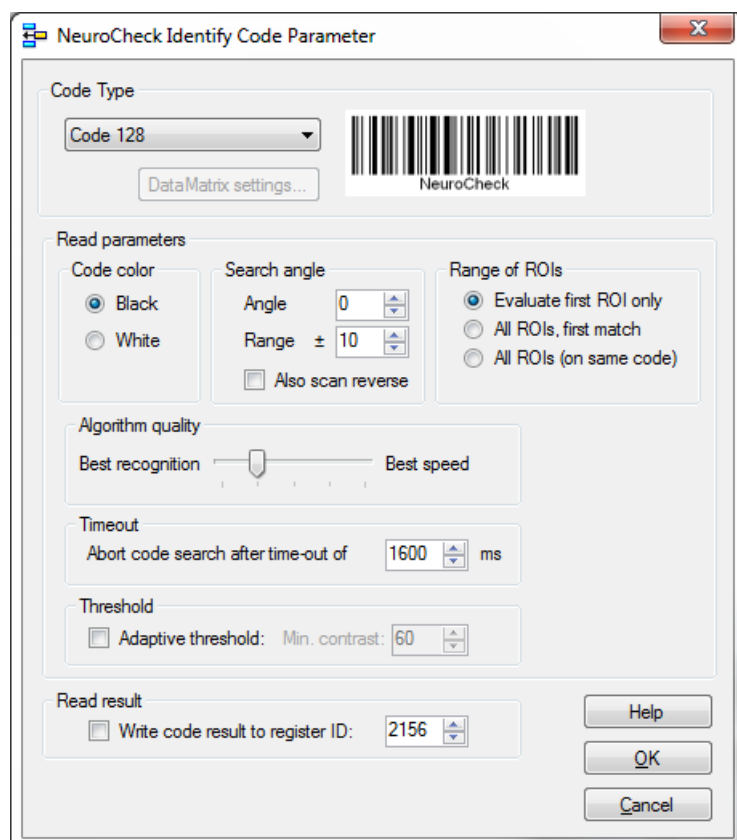
 The check function has own result [Visualizations](#).

Input / Output data

Input	Image
	List of regions of interest
Output	None

Identify Code: Parameter Dialog

☑ Screenshot of Parameter Dialog



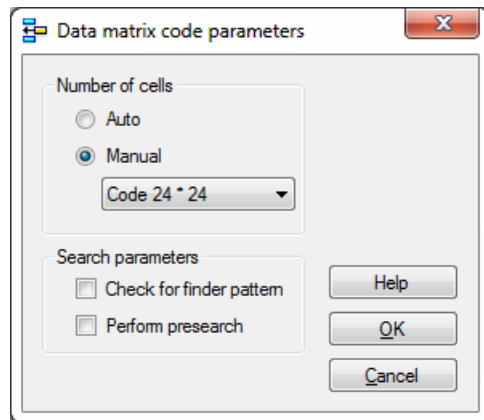
This plug-in check function has a **Parameter** dialog. The **Parameter** dialog contains the following elements:

Element	Description
Code Type	Here you can choose the code type you want to identify. Several 1D barcodes and 2D Codes are supported. See page Introduction for a list of supported codes.
DataMatrix settings	Here you find special optional parameters for DataMatrix codes. See DataMatrix settings below.
Code color	Color (black or white) of the Code (color of the bars or dots).
Search angle	The search is performed in the specified range. For Data Matrix codes the null angle is the "L" position. For the PDF417, Maxicode, and Data Matrix codes, the angular range does not affect the speed of the operation.

Element	Description
Range of ROIs	<p>Specify here how to treat multiple ROIs in input list of ROIs.</p> <ul style="list-style-type: none"> • Evaluate first ROI only: If this option is selected, only the first ROI in the input list of ROIs will be searched for a code. Activating this option might have a better performance if the ROI is much smaller than the input image because only the region of the ROI will be transferred. In the simple case you only use one ROI, use this read mode then. • All ROIs, first match: All ROIs will be searched until a valid code is detected. The function stops upon the first detected code, so if more than one (bar) code is present in the image, it only will read the first. • All ROIs (on same code): All ROIs will be searched for a code and the function tries to read all codes. But only the first detected code is shown in the result view. If other codes with different content are detected afterwards the are rated as not readable. <p>All input ROIs gets a feature value flag if the code was read in that ROI. This feature value can be used to create a quality information (how many of the code sections (ROIs) were successfully read), if multiple ROIs are placed on one barcode. Use "Compute Feature Statistics" to sum up this feature values.</p>
Algorithm quality	<p>Sets the search speed. The faster the search speed, the less robust the read operation and vice versa. Choose the best speed option if you have good image quality and you require a fast performance. Choose best recognition, if the code identification is difficult due to bad image quality.</p>
Timeout	<p>Max. time to search and decode a code. If no code was found after the time limit the check function aborts with error.</p>
Threshold	<p>Imagine that if the background is darker than the code in some places but lighter in others, a simple binarization will not separate the code from the background. In this case, you should use the adaptive threshold mode before performing the read operation so that the background is strictly darker or strictly lighter than the code.</p> <ul style="list-style-type: none"> • Minimun contrast: Sets the minimum contrast between the foreground and background in the target image for 1D codes when using the adaptive threshold. Increasing the minimum contrast will typically improve read operations, particularly in the presence of noise and non-uniform lighting. However, if the minimum contrast is higher than the contrast of a code, the code will not be read correctly.
Read result	<p>The result of the read operation can be written into a string register for further processing or data output. In difference to NeuroCheck standard check functions the target register is configured in the plug-in parameter dialog.</p> <p>The target register has to be created before in the Data Register Manager.</p> <p>If the code content is a numerical value you can also write to an integer register cell, but please note that this 32-bit data register cell can only get a 9-digit number at maximum.</p>

DataMatrix Code Settings

☑ Screenshot of DataMatrix Parameter Dialog



The **Parameter** dialog for DataMatrix settings contains the following elements:

Element	Description
Number of cells	Specifies the number of cells of a 2D code in the X and Y direction. In auto mode any code size is searched.
Check for finder pattern	Sets whether the check for a false DataMatrix pattern is enabled. Sets whether the check for a false DataMatrix pattern is enabled. This value should only be enabled if it is possible parts of your image could falsely be read as a DataMatrix code. If this value is enabled, the read will be more robust, and false DataMatrix codes will not be read.
Perform presearch	Sets whether the localization operation is performed prior to the decoding step.

Identify Code: Features

This section describes the features computed by the plug-in check function Identify Code. The features can be used for further processing by functions like **Sort ROIs**, **Screen ROIs** and **Classify ROIs**, e.g. to check if a given quality grade was reached.

If you need a quality grade inside the NeuroCheck Data Register you can use check function **Convert Features to Measurements** or and data output.

The following features are computed and added to the features of every region of interest that was used to find and decode the code. Please note that not all quality grades are available for all code types.

Element	Description
Score	<p>The confidence score of a read operation. It depends on the code type how this value is calculated:</p> <ul style="list-style-type: none"> For linear 1D and RSS code types, the score is based on: <ul style="list-style-type: none"> a) The number of redundant scan lines. Redundant scan lines can be omitted from a code, while still yielding the same result. b) The difference between the actual code and theoretical code model. For 1D Planet and Postnet code types, the score is 1 if the code was read and 0 if it was not. For 2D code types, the score is calculated using: $((\text{Number of errors} + \text{Number of erasures}) / (\text{Number of codewords}))$. If the code could not be decoded successfully, the score is 0. For composite codes, the score is the score of either the 1D part or the 2D part; whichever was lower. <p>[All code types]</p>
Overall symbol grade	<p>It depends on the code type how this value is calculated:</p> <ul style="list-style-type: none"> For 1D code types, the overall symbol grade is the average grade of the scan reflectance profile. For composite code types, the overall symbol grade is the worst grade overall, obtained when analyzing either the 1D or the 2D portions. For 2D code types, the overall symbol grade is the worst of all the returned grades. For cross-row codes, the overall symbol grade is the worst of all possible grades. <p>[All code types]</p>
Symbol contrast grade	[All codes except the MicroPDF417]
Axial nonuniformity grade	<p>Retrieves the grade for the axial nonuniformity of the code. The axial nonuniformity is a measure of how spacing between sampling points differs from one axis to another (width to height). [DataMatrix, QR code, and Maxicode code types]</p>
Unused error correction grade	[DataMatrix, QR code, and Maxicode code types]
Edge determination grade	<p>Retrieves the grade for whether the code has an appropriate number of bars and spaces. The edge determination examines the number of bars and spaces in your code. [1D barcodes, composite codes, RSS codes and PDF417]</p>
Minimum edge contrast grade	[1D barcodes, composite codes, RSS codes and PDF417]
Modulation grade	[1D barcodes, composite codes, RSS codes and PDF417]
Defects grade	[1D barcodes, composite codes, RSS codes and PDF417]
Decodability grade	[1D barcodes, composite codes, RSS codes and PDF417]

Identify Code: Visualization

This section describes the result visualizations the check function [Identify Code](#) provides.

Element	Description
Read result	Displays the textual read result of the read operation or an error message in case of a failure. If the code was read successfully the frame color is green, if not the frame is red.
Search ROIs	Displays the input ROIs (the enclosing rectangle) of the check function. The rectangle is green if the code was read successfully and red if not. That can be a helpful visualization if you try to find and decode the code in multiple ROIs, so you can see in which ROIs the read operation was successfully.

Support Services

For technical support, please contact your local NeuroCheck partner or NeuroCheck GmbH:

Phone: +49 (0) 7146 - 89 56-40

E-Mail: support@neurocheck.com

Web: www.neurocheck.com

Before contacting us, please provide some important information about your system:

Information about your NeuroCheck installation and your PC setup:

- Use the NeuroCheck Diagnostics tool to check your installation and computer configuration.
- The NeuroCheck Diagnostics is installed in the "Tools" folder within your NeuroCheck installation.

Log file information:

- Logging for NeuroCheck can be activated in **System > Software Settings > Diagnosis > Logging**.

