HD VISION
high dimensional vision systems

LumiScan Annotation Framework

User Guide

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Imprint

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1 Introduction

1.1 About This Manual

This document contains important information about the installation and operation of the LumiScan Annotation Framework. Please read the manual carefully before using this software.

1.2 Formatting Convention

This guide uses special formatting to highlight certain words and phrases:

- Keywords/important information and buttons are highlighted in bold (e.g. Select the **Settings**).
- Links and references are highlighted in green (e.g. info@hdvisionsystems.com).
- File and path names are highlighted in a special font (e.g. `crop`, `img_lab`, and `raw`).

1.3 Disclaimer

NOTE: By accessing or using these commercial software products, you expressly agree to the following terms and conditions.

Any attempt to use a debugger to examine, analyze, or tamper with the software provided by HD Vision Systems is strictly prohibited and may have immediate and irreversible consequences.

If the software detects the presence of a debugger, security protocols will be activated to protect the intellectual property, functionality and stability of the software. This may result in, among other things, immediate suspension of the associated Software license, loss of data, and, in extreme cases, forced termination of all instances of the Software operating under the same license, as well as legal consequences.

By using the Software, you acknowledge that you have read, understood and accepted the terms of this Disclaimer (see also General Disclaimer).

If you have any problems or questions about the product, please contact HD Vision Systems Customer Support at +49 6221 6721905
or by e-mail: customer.success@hdvisionsystems.com

2 LumiScan Annotation Framework

2.1 Description

LumiScan Annotation Framework is the software that allows you to annotate objects in an image, providing data for training and retraining Neural Network Models that are later used in tasks such as object detection or quality inspection.

The software allows any number of users, customization of annotation settings, and an unlimited number of annotations.

LumiScan Annotation Framework provides seamless data exchange with other HD Vision Systems applications and doesn't require any AI knowledge.

2.2 Requirements

- Windows 10 or higher

2.3 Before Installation

NOTE: Before installing the LumiScan Annotation Framework software, refer to the LumiScan^{X} manual or the documentation that came with the camera you are using for information on network settings, Windows Firewall, and virus protection.

2.3.1 Installing the CodeMeter Runtime Environment

To license your LumiScan software, you must install the CodeMeter® Runtime Environment. A CodeMeter Runtime Kit installer for Windows 64-bit is available at the following link:
https://www.wibu.com/de/support/anwendersoftware/anwendersoftware.html

Before installing, please check your version of CodeMeter Runtime (version 7.60c or higher).

Follow the manufacturer's instructions for installation:

1. Connect the CmDongle to a free USB port on your PC.
2. The LED on the CmDongle will alternate between red and green for about 1-2 seconds. Your PC reports that a new USB device has been found.

2.4 Installing LumiScan Annotation on Windows

1. Close all open applications on your computer.
2. Navigate to the location of the LumiScan installer.
3. Double-click on the file: `Installer_LumiScan_Annotation_va_b_c_d.exe`*.
4. The installation is prepared and the license agreement window opens.
5. Accept the license terms by clicking on **Accept**.
6. If you want to change the default installation location, click **Browse**.
7. Navigate to the desired storage location.
8. Press **OK** to confirm your selection.
9. Otherwise, click the **Next** button to continue.
10. If desired, select the **Start Menu** folder for the program links.
11. If you do not want to create shortcuts, select the **Do not create links** option.
12. Then click on **Install**.
13. When the installation is complete, you will see a dialog box.
14. Click **OK**.
15. Click **Finish**.

* where **a**, **b**, **c**, **d** are variables that depend on the version of the software.

2.5 User Interface

When you start LumiScan Annotation for the first time, an empty window opens (Fig.1).

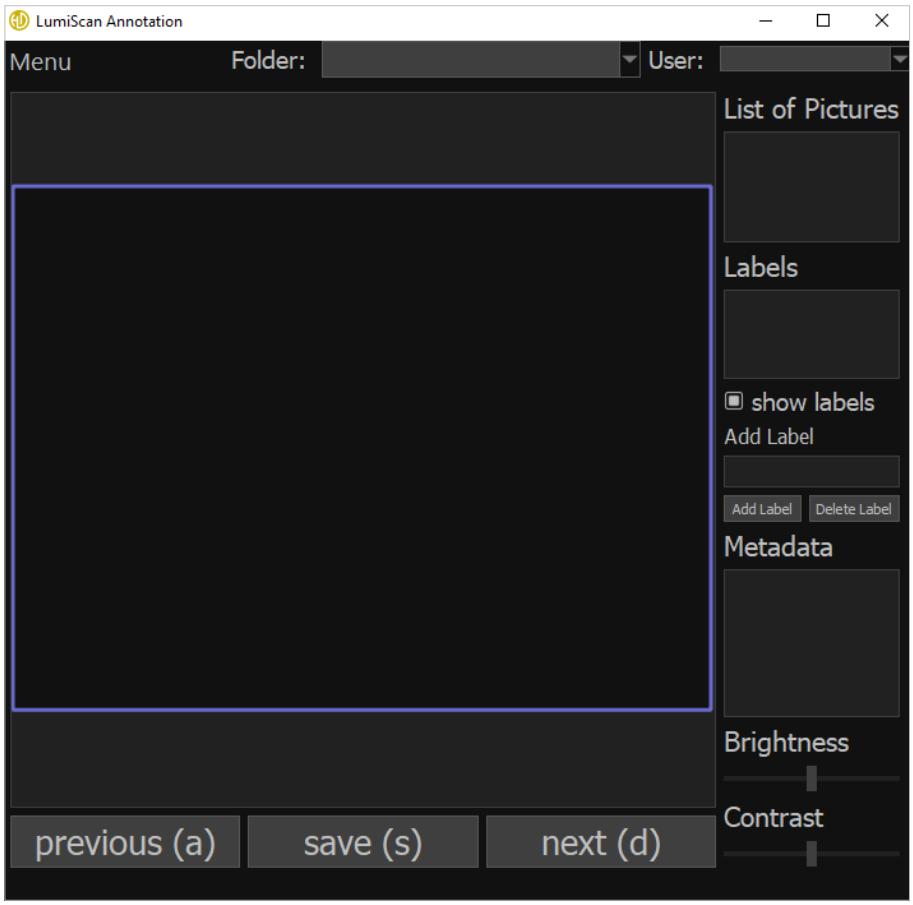


Fig. 1: LumiScan Annotation Framework: Standard user interface

To start the program:

1. Click on **Menu**.
2. Select the **Settings**.
3. Specify the **Data directory** in the **Settings** window.

The various elements of the user interface are annotated in Fig. 2 and explained in Table 1.

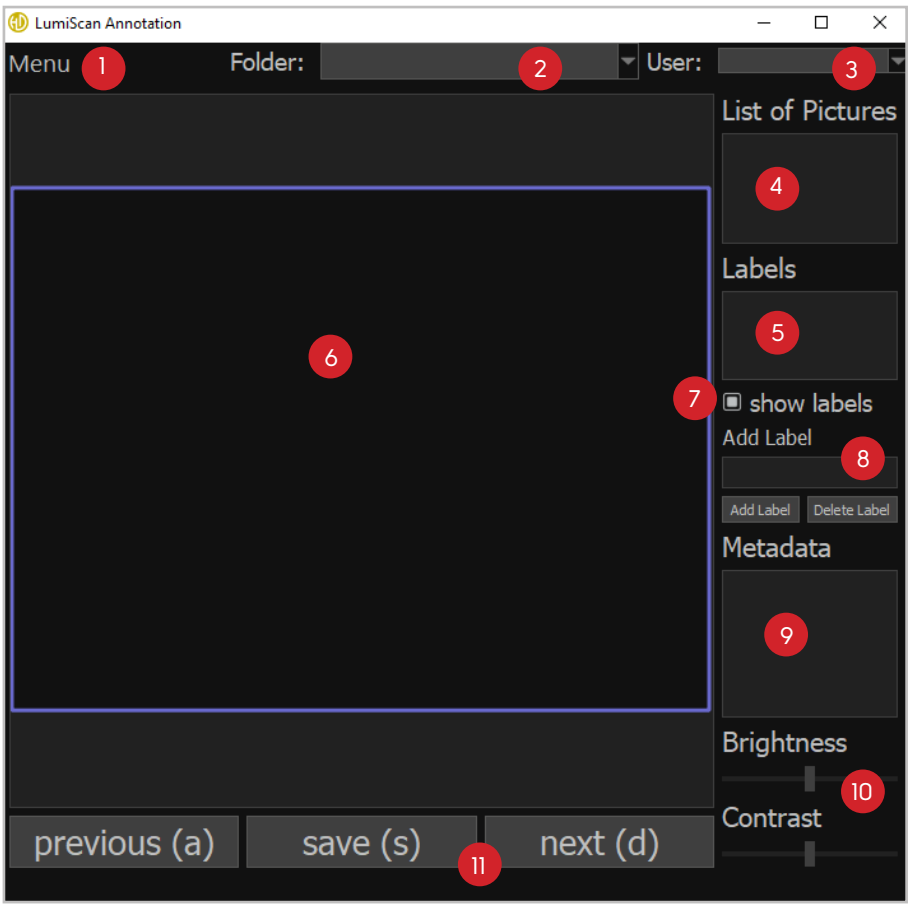


Fig. 2: LumiScan Annotation Framework: User Interface Description

Table 1: LumiScan Annotation Framework: User Interface Description

Nr.	Description
1	Menu: Access to ROI settings, program settings and help.
2	Folder: Combobox for folder selection.
3	User: Combobox for user selection. • Selected user is saved when changes are made.
4	List of images from the selected folder. • When a new class is saved, the changed image is highlighted. • The highlighting disappears when you change the folder (see **2** in this table) or reload the program.
5	List of all available labels in the selected folder.
6	Central view with display of the currently selected image and labels.
7	Shows the selected labels.

Nr.	Description
8	Adds a new label.
9	Text field for displaying the metadata. • If no metadata is found, null is displayed.
10	Adjusting the brightness and contrast of the image.
11	Navigation menu (see also Navigation).

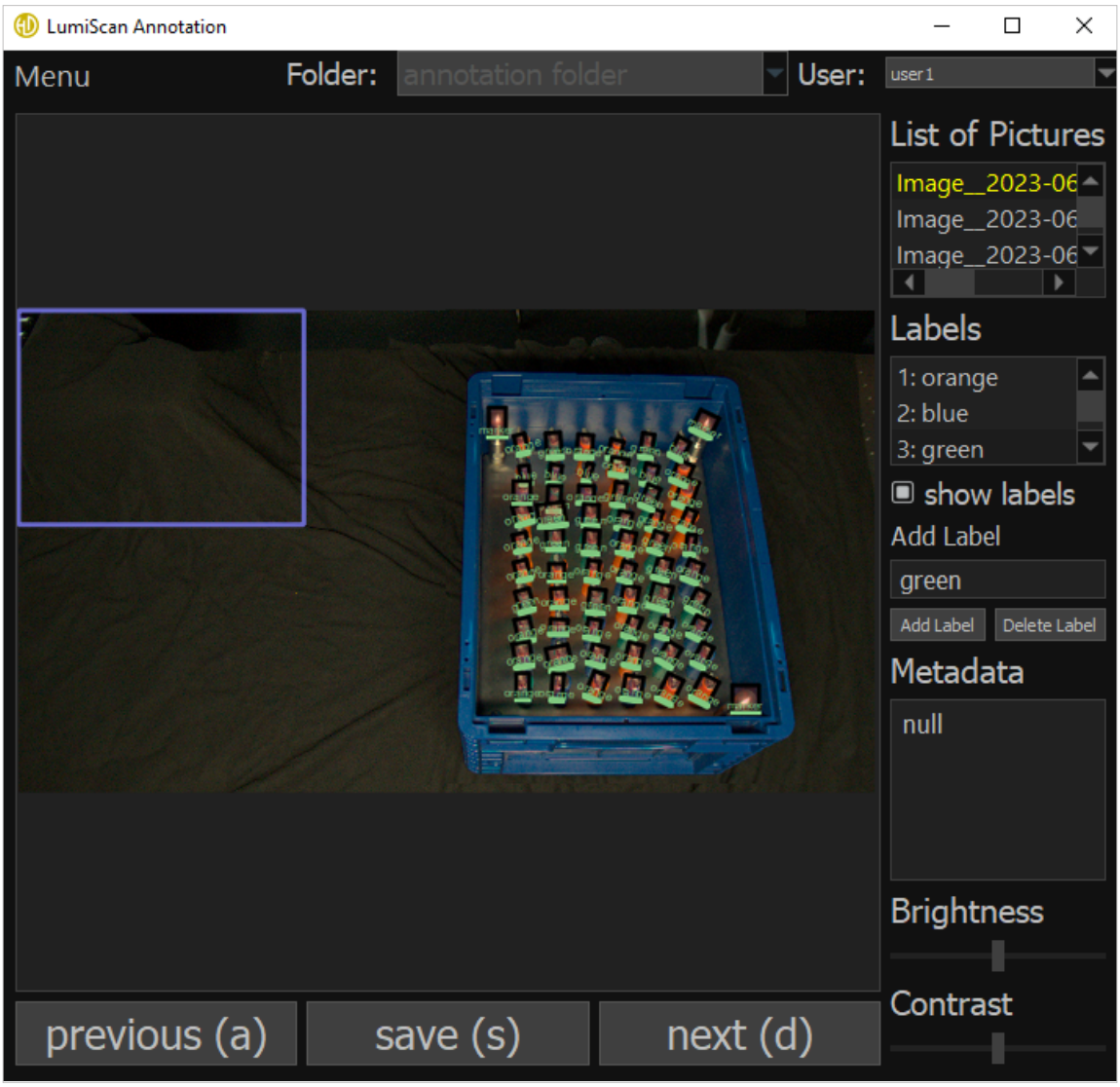


Fig. 3: LumiScan Annotation Framework: Example

2.6 Menu

You can select ROI Settings, Settings, and Help from the menu.

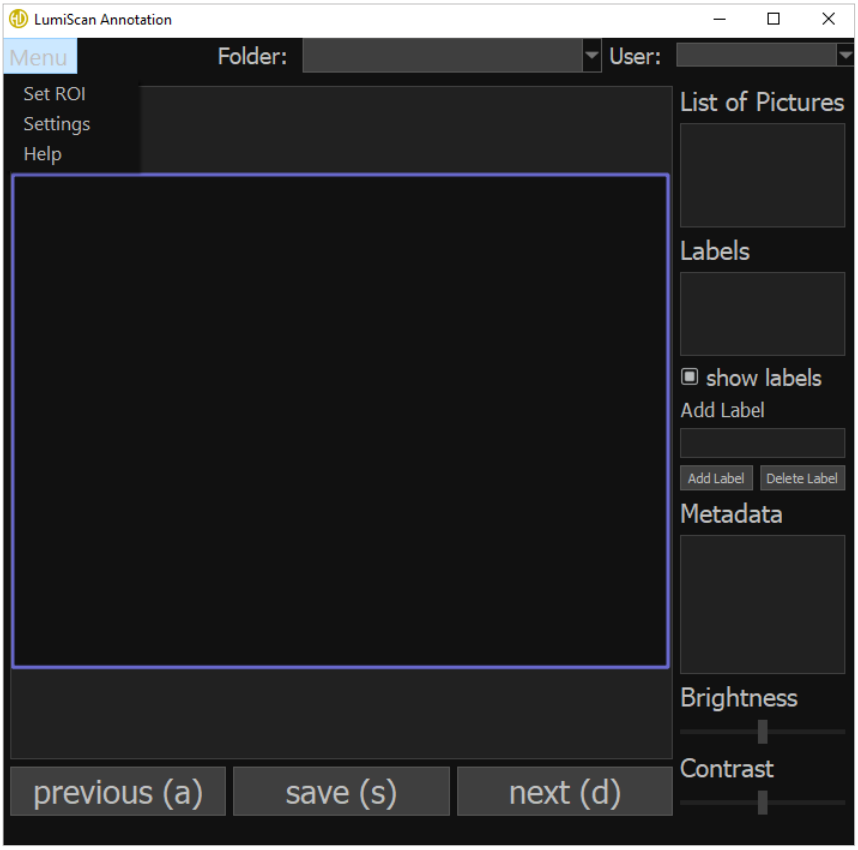


Fig. 4: LumiScan Annotation Framework: Menu

2.6.1 ROI Settings

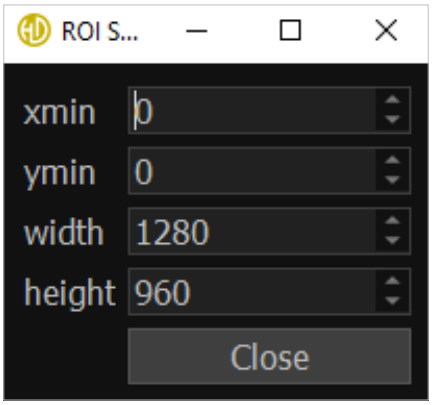


Fig. 5: LumiScan Annotation Framework: ROI-Settings

In this setting window, you can define the region of interest (ROI) for training the neural network. The ROI defines the part of the captured image in which the network will search for markers. By default, the ROI is set to the entire image size. In the center view, the borders of the ROI are colored blue.

2.6.2 Settings

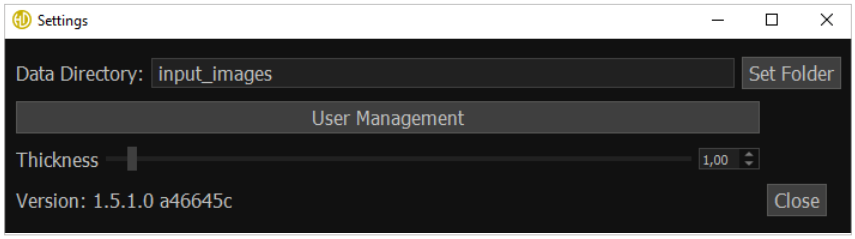


Fig. 6: LumiScan Annotation Framework: Settings

In this settings window you can:

- Specify the directory from which the marker should load images.
- Open the User Management window.
- Modify the Thickness slider to set the thickness of the bounding box frame.

To specify an input folder, click **Set Folder** and select the folder that contains the images.

2.6.2.1 User Management

After you click the User Management button, the Users window opens, where you can add new users or delete existing ones.

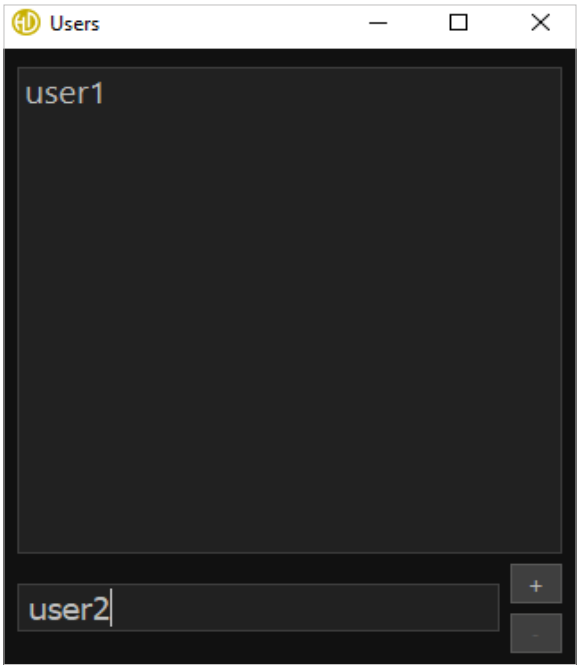


Fig. 7: LumiScan Annotation Framework: User Management

To add a new user, type the desired name in the lower edit box, then click +. To delete an existing user, select the user in the list and click -.

2.7 Annotating images

Oriented bounding boxes can be manually changed or added in the central view (6 in Fig. 2):

Adding new boxes: There are three steps to adding new boxes:

1. First, double-click with the left mouse button on the position where you want the bottom edge of the bounding box to be. This border will always be green (Fig. 3).
2. Without holding down the mouse button, click with the left mouse button on the upper edge of the object to set the height of the bounding box.
3. To determine the width of the bounding box, click on any side point of the object with the left mouse button, again without holding down the mouse button.

The box label corresponds to the active class in the list (5 in Fig. 2).

Selecting a bounding box: Existing boxes can be selected with a simple left-click. A selected box is highlighted by a slightly different color and four yellow, circular corner handles (Fig. 3).

Modification of existing boxes: AAs long as a bounding box is selected, you can change its label by selecting another label from the label overview or by typing a new label.

Correcting the bounding box: A selected box can be manipulated in several ways:

- Drag the inside of an active box to move it.
- Dragging the edges of an active box changes its size in that direction.
- Drag the corners of an active box to rotate it around its center.

Deleting the bounding box: Right-click an active box to remove it.

After each saved annotation, the LumiScan Annotation Framework also writes the following information to a JSON file:

- User name
- Unix timestamp
- Image name (PNG)
- Save file name (CSV)

The JSON file is saved in the raw directory under the name of the saved image. Sequential comments are appended so you can track who made a change and when.

2.8 Shortcuts for Common Operations

To perform typical bounding box manipulations, such as rotating, moving, expanding, or extruding, you can use the keyboard shortcuts described in the following table.

Table 2: Keyboard shortcuts for common operations.

Keyboard shortcut	Operation
Ctrl/Shift + i/j/k/l	Move current box one/ten pixels in the corresponding direction
Ctrl/Shift + u/o	Rotate current box one/ten degrees counter/clockwise
Ctrl/Shift + v/b	Increase/decrease current box height by one/ten pixels
Ctrl/Shift + n/m	Increase/decrease current box width by one/ten pixels

2.9 Navigation

To view the previous or next image, or to save your changes, you can use the button in the navigation menu (11 in Fig. 2) or the shortcut keys.

Table 3: Navigation Keys

Button	Keyboard shortcut	Operation
previous	a	Switch to previous image.
save	s	Save image.
next	d	Switch to next image.
Speichern & Kopieren	alt + s	Save and copy labels to next image. Useful when content changes little between images.
	1-9	Set label for selected region. This option can also be used to change the label of the bounding box. After selecting the desired box (left mouse button), the name can be changed by entering the desired label number (1 - 9).

This table can also be accessed via **Menu** > **Help** (Fig. 8).

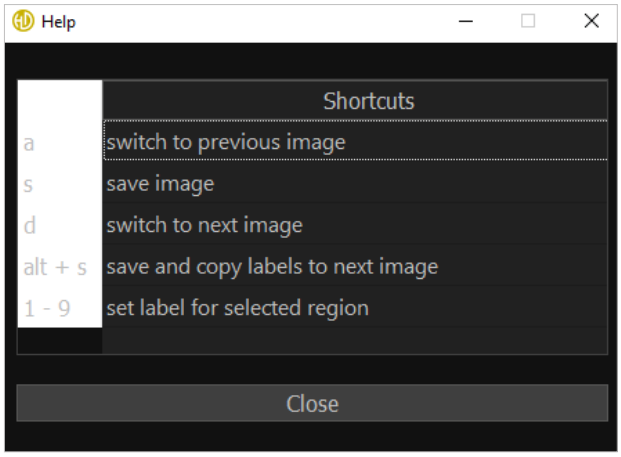
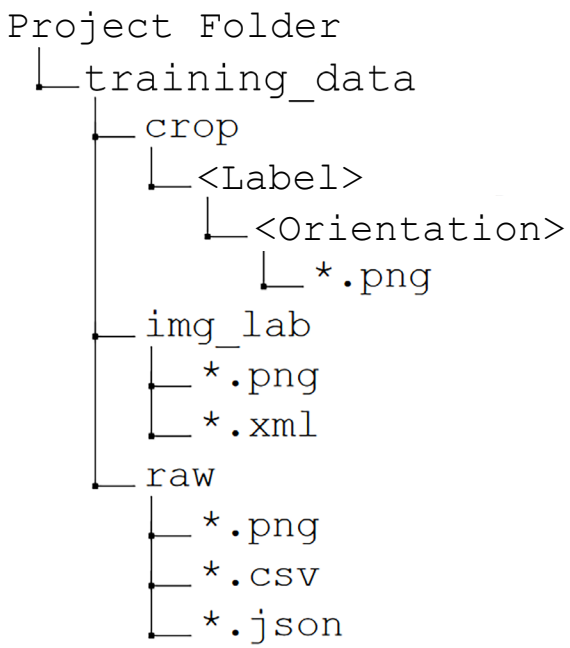


Fig. 8: LumiScan Annotation Framework: Help window

2.10 Folder Structure

To load multiple folders of images, the images must be located on your hard disk in the following folder structure:



To annotate a single folder of images, the folder with the subfolders `crop`, `img_lab`, and `raw` can be loaded directly.

3 General Disclaimer

1. The manufacturer is not liable for damage to life, body or health or damage to property resulting from improper use. Please note that operating and/or connection errors are beyond our control. We cannot accept any liability for damage resulting from this.
2. Any damage caused by unauthorized debugging activities to inspect, analyze or manipulate the software provided by HD Vision Systems is the sole responsibility of the user. Any attempt to use a debugger is strictly prohibited and may result in irreversible consequences such as loss of data, interruption of service, and even legal action. The manufacturers, developers and distributors of the software are not liable for any damage or loss resulting from the user's failure to comply with this warning.
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4. Recourse claims in the sense of §12 of the Product Liability Act (Produkthaftungsgesetz) are excluded, unless the party entitled to recourse proves that the defect was caused by HD Vision Systems GmbH and was due to at least gross negligence.
5. If any provision of this Agreement is or becomes invalid or unenforceable, the validity of the remaining provisions shall not be affected. The invalid or unenforceable provision shall be replaced by a valid and enforceable provision whose effects come as close as possible to the economic purpose pursued by the parties with the invalid or unenforceable provision. The foregoing provisions shall apply mutatis mutandis in the event that the contract proves to be incomplete. German courts shall have exclusive jurisdiction over all disputes arising in connection with this disclaimer.
6. For more information about the warranty, please contact the manufacturer of the product.

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