User Guide

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Disclaimer for Video-based Automated System for Iris Recognition (VASIR)

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Purpose

This document gives an overview on how to operate VASIR. The documented source-code and information regarding the MBGC dataset can be found in the appendix.

The tool can be used to:

- Detect the eye pair (left and right eyes) within their video data
- Provide the left and right ocular region for ocular image quality analysis
- Identify a person using the iris feature
- Study still- and video-based iris recognition

The system is under development and optimization. Therefore, it is to be understood that the source code produces warnings and is not without bugs. We plan to update each component of VASIR after evaluating its quality and performance.

Please note that we cannot warrant the correctness, usefulness, accuracy, reliability, etc. of the source code. We would, however, appreciate if you could send BUG REPORTS to vasir@<NOSPAM>nist.gov.

Requirements

Configuration

The tool has been tested under following operating systems:

- Microsoft Windows® XP Professional Edition
- Microsoft Windows Server 2008
- Microsoft Windows 7 (x86)

The recommended minimum configurations are as follows:

- A dual core CPU: 2GHz
- RAM: 3GB
- Display resolution: 1280 x 1024 pixels

Prerequisites

- Qt UI framework

Download the latest version at: http://qt.nokia.com/downloads

(e.g., Qt libraries 4.7.3 (exe, ~230MB) would take about 2 hours installation time depending on your system's performance)

- OpenCV Library

Download version 1.0 from http://sourceforge.net/projects/opencvlibrary/files/opencv-win/

(e.g., OpenCV_1.0 (exe, ~18MB) would take about 1-5 minutes installation time)

For the detailed information, see http://opencv.willowgarage.com/wiki/InstallGuide

- Visual Studio Pro 2005 or 2008

After the installation, please update the Microsoft Visual C++ 2005 (or 2008) Redistributable Package (x86).

The user may be required to install the VsQtAddIn_2005 (or 2008).msi to integrate Qt's UI tool into Visual Studio. Please refer to the addin's website at http://mm-werkstatt.informatik.uni-augsburg.de/Volker-Wiendl.html

More recent version of Qt supports the Visual Studio addin out-of-the-box; we did not test the updated Qt addin with this source code. Please have a look at http://qt.nokia.com/.

- VASIR source code (Written in C++)

Download the source code "NIST_VASIR_src_beta_v1.0 (ZIP, ~200KB)" at: http://www.nist.gov/itl/iad/ig/vasir.cfm

** NOTE:* You may choose to use a different operating environment (e.g. Mac and Linux). However, the installation steps might vary depending on your configuration.

Installation

The following steps exemplify the installation with Visual Studio Pro 2005 on Windows XP for the developer:

Qt, OpenCV, and VS2005 on Windows XP

1. Create the folder “C:\Qt”
2. Extract “qt-win-opensource-src-version.zip” into “C:\Qt\”
3. Add QTDIR “..\Qt\bin\” to the “Path” Environment variable:
   System Settings > System > Advanced > Environment variables
4. Open the “Visual Studio Command prompt”
5. Change the path to “C:\Qt\
6. Run “configure –platform win32-msvc2005”
7. Run “nmake”

8. Create the folder “C:\OpenCV\”
9. Run OpenCV_1.0.exe into “C:\OpenCV\”

10. Start Visual Studio 2005
11. Check the path of your Visual Studio version, click “Solution ‘YooIRIS’”, and open “Properties > Common Properties > Debug Source Files”
12. Open “Tools > Options > Projects and Solutions > VC++ Directories”
    12.1 Add the following components into “Include directories”:
    C:\OpenCV\cv\include
    C:\OpenCV\cxcore\include
    C:\OpenCV\cvaux\include
    C:\OpenCV\otherlibs\highgui
    C:\Qt\include
    12.2. Add the following components into "Library files":
    C:\OpenCV\lib
    C:\Qt\lib
    12.3. Add the following components into "Source files":
    C:\OpenCV\cv\src\
    C:\OpenCV\cxcore\src
    C:\OpenCV\cvaux\src
    C:\OpenCV\otherlibs\highgui
13. Click the “YooIRIS” project and change the Qt version from “Properies > C/C++ and Linker”
14. Close Visual Studio 2005

15. Install “VsQtAddIn_2005.msi” to "..\Visual Studio 2005\Addins\"
    e.g., C:\Documents and Settings\User Name\My Documents\Visual Studio 2005\

The following steps exemplify the installation with Visual Studio Pro 2008 on Windows 7 for the developer:

Qt, OpenCV, and VS2008 on Windows 7

1. Create the folder “C:\Qt”
2. Extract “qt-win-opensource-src-version.zip” into “C:\Qt\”
3. Add QTDIR “..\Qt\bin\” to the “Path” Environment variable:
   System Settings > System > Advanced > Environment variables
4. Open the “Visual Studio Command prompt”
5. Change the path to “C:\Qt\
6. Run “configure –platform win32-msvc2008”
7. Run “nmake”

8. Create the folder “C:\OpenCV\”
9. Run OpenCV_1.0.exe into “C:\OpenCV\”

10. Start Visual Studio 2008
11. Check the path of your Visual Studio version, click “Solution ‘YooIRIS’”, and open
    “Properties > Common Properties > Debug Source Files”
    e.g., change “Microsoft Visual Studio 8” to “Microsoft Visual Studio 9”
12. Open “Tools > Options > Projects and Solutions > VC++ Directories”
    12.1 Add the following components into “Include directories”:
    C:\OpenCV\cv\include
    C:\OpenCV\cxcore\include
    C:\OpenCV\cvaux\include
    C:\OpenCV\otherlibs\highgui
    C:\Qt\include
    12.2. Add the following components into "Library files":
    C:\OpenCV\lib
    C:\Qt\lib
    12.3. Add the following components into "Source files":
    C:\OpenCV\cv\src\
    C:\OpenCV\cxcore\src
    C:\OpenCV\cvaux\src
    C:\OpenCV\otherlibs\highgui
13. Click the “YooIRIS” project and change the Qt version from “Properies > C/C++ and
    Linker”
14. Close Visual Studio 2008

15. Install “VsQtAddIn_2008.msi” to "..\Visual Studio 2008\Addins\"
    e.g., C:\Documents and Settings\User Name\My Documents\Visual Studio 2008\

VASIR Source code

1. Unzip “NIST_VASIR_src_beta_v1.0.zip” and open the source code
2. Select “YooIRIS.ui” and”ModeDialog.ui” and open its context menu (right click)
3. Adjust the path “Command Line” in “Properties > “Custom Build Step” to “C:\Qt/bin/uic.exe”
4. Repeat steps 2. and 3. for “ImageWidget.h”, “ModeDialog.h”, and “YooIRIS.h” files
5. Adjust the path “Command Line” in “Properties > “Custom Build Step” to “C:\Qt/bin/moc.exe”
6. Build the source code

**Warning:* this source code is not complete version. Note that you may get a known warning or memory related messages.

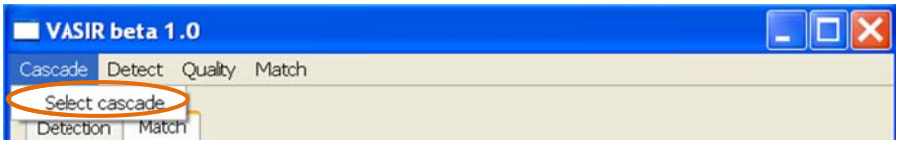
Getting Started

Cascade menu

The “Cascade” menu allows the user to load a Haar-classifier (XML format). This needs to be done before loading a video file. (If you want to load a still image directly, please see Section “Match tab”).

A classifier named “parojosG.xml” can be found in “/bin/cascade/” within the default folder.

Click Pick “Select cascade” and load the “parojosG.xml” classifier.



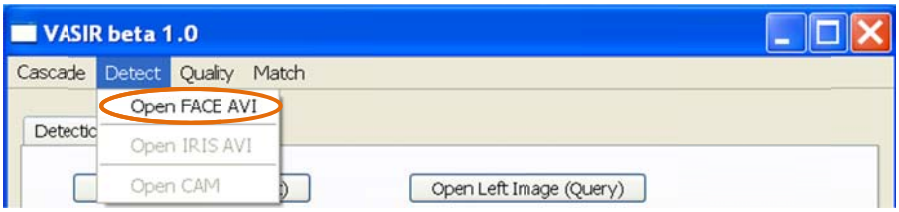
Note that depending on your goal a different, custom classifier can be used.

Detect menu

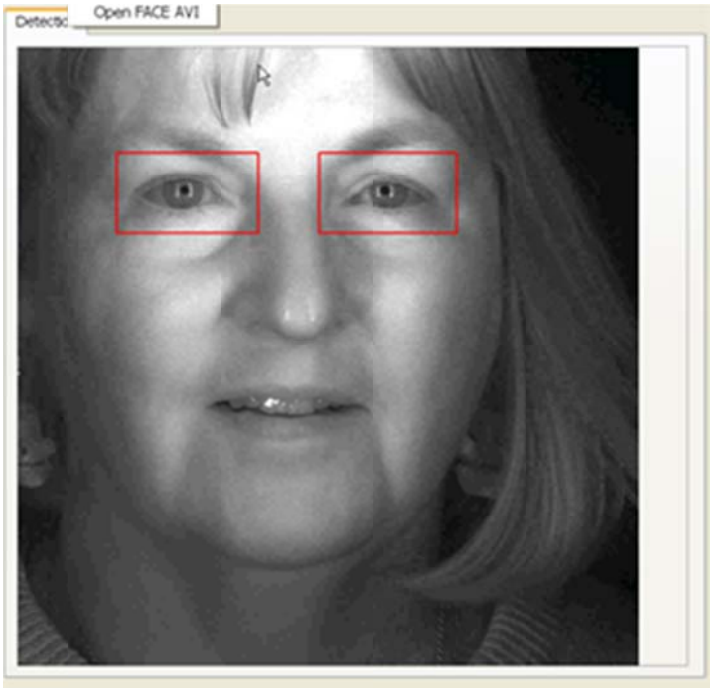
The “Detect” menu allows the user to load a video file in AVI format. Both “Open IRIS AVI” and “Open CAM” are currently disabled.

Depending on the dataset, the installation of additional codecs may be necessary.

Click “Open FACE AVI” and load the face visible video file to start the eye regions detection.

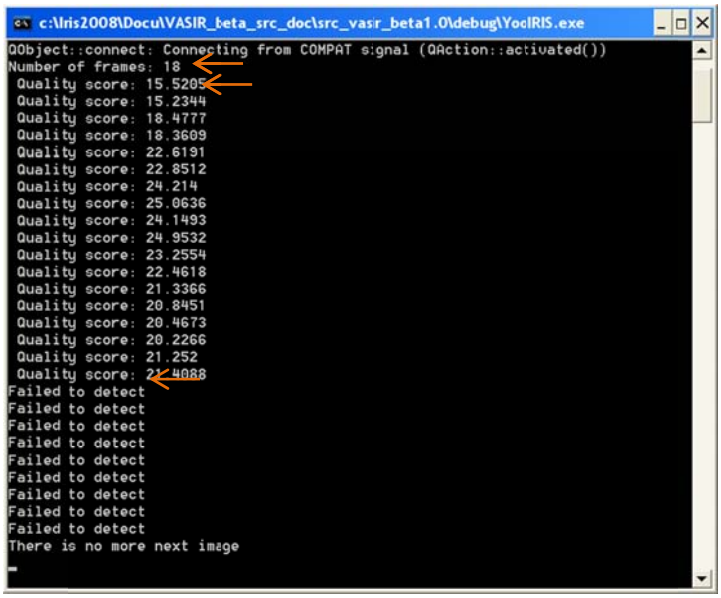


Once the detection is started, the “Detection” tab will display all video frames alongside with the eye region detecting process on Detection tab - as shown in the figure below.

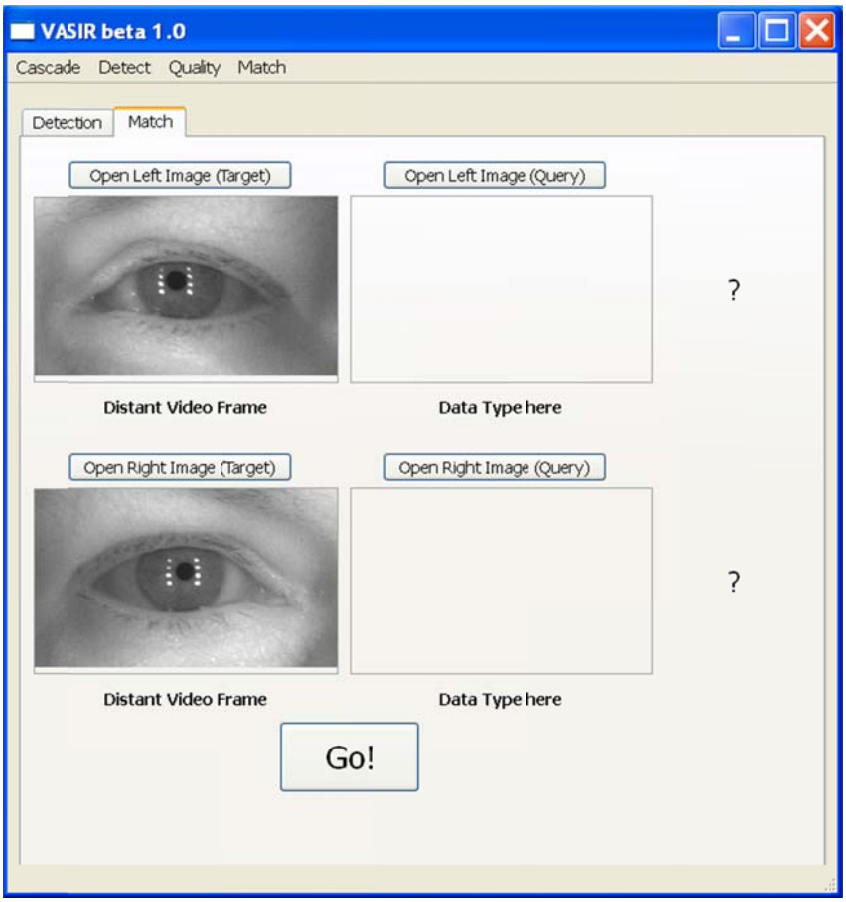


Relevant messages are displayed in the command (= console) window below;

1) Number of total frames in the selected video file
2) Image quality scores for the left and right iris images
3) Failed detection



After a successful run, the system automatically selects the best quality images for the left and right eye based on the calculated quality scores and displays the selected images in the “Match” tab.



The “Data Type here” was changed to “Distant Video Frame” since the imagery was loaded from a video file. See details in Section “Match tab”.

Extracting the eye region image

The system automatically extracts the left and right eye images and saves them to the same folder as the original video file. The naming format is as follows:

“<VideoFileName>_<Frame #>_<L(left)|R(right)><Sequence #>.bmp”

Name	Size	Type
test_video.avi	110,597 KB	IrfanView AVI File
test_video_F1_L1.bmp	301 KB	IrfanView BMP File
test_video_F1_R1.bmp	301 KB	IrfanView BMP File
test_video_F2_L2.bmp	309 KB	IrfanView BMP File
test_video_F2_R2.bmp	309 KB	IrfanView BMP File

Match tab

The “Match” tab is used for iris verification (1:1).

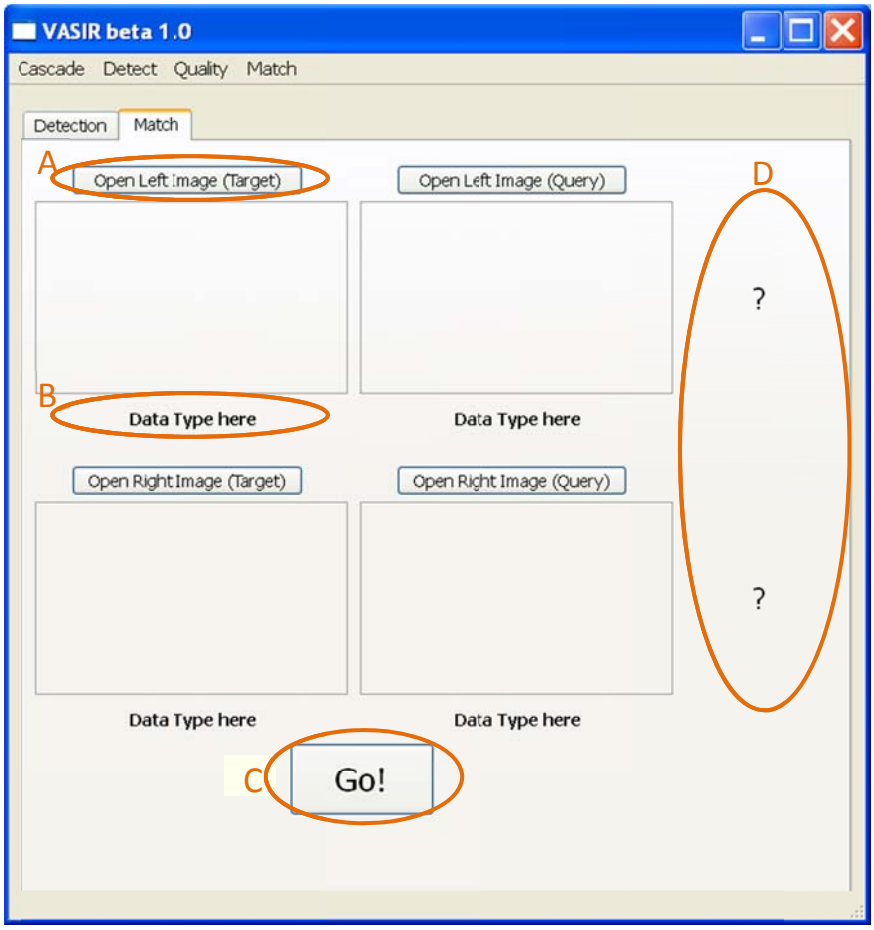
If you would like to match a still image only, you can use this tab without having to load the cascade and the AVI video file firsthand.

VASIR allows multiple scenarios to verify two biometric samples depending on your purpose:

- Distant Video to Distant Video
- Distant Video to Classical Still
- Classical Still to Classical Still
- Classical Still to Distant Video

A quick glance of the screenshot below:

A. Click this button – or any other “Open …” button - to load an iris image. The image will be auto-scaled and displayed within the box below the button.
B. Will display the data type that you selected in the “Select Mode” dialog.
C. Click this button to match the images between the target and the query biometric sample.
D. Will display the matching results for the left and right iris images.

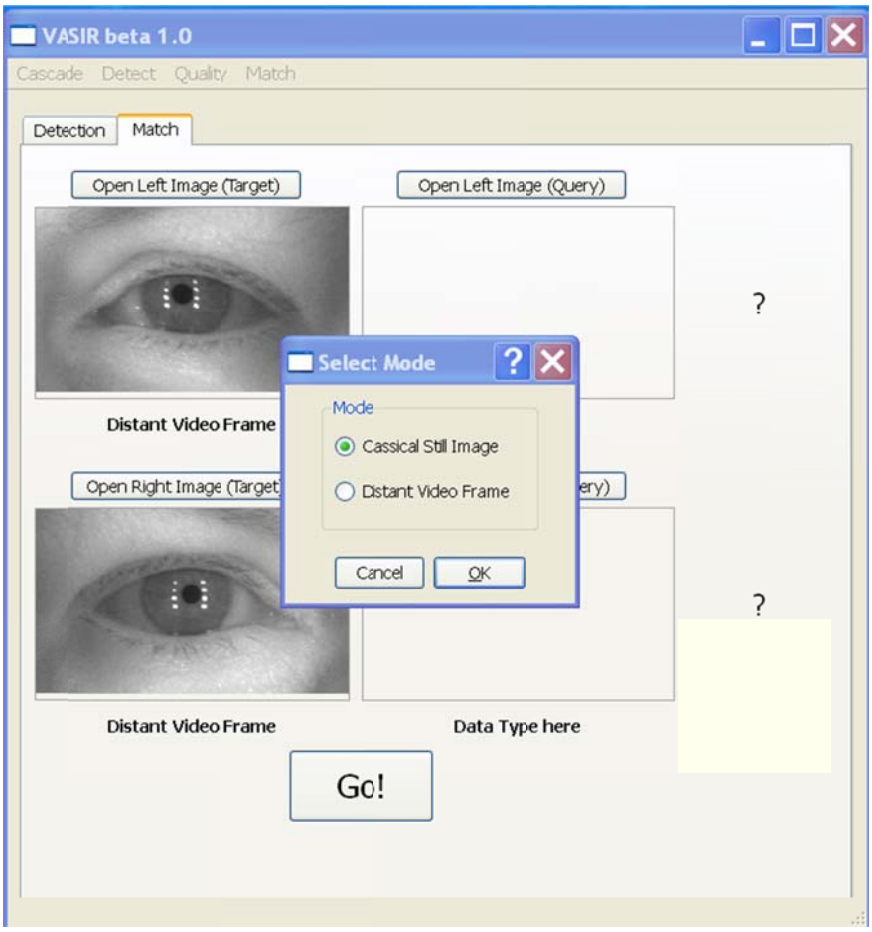


If you click the “Open Left (or Right) Image” button, you will be shown a dialog titled “Select mode” that contains two radio buttons: “Classical Still Image” and “Distant Video frames”.

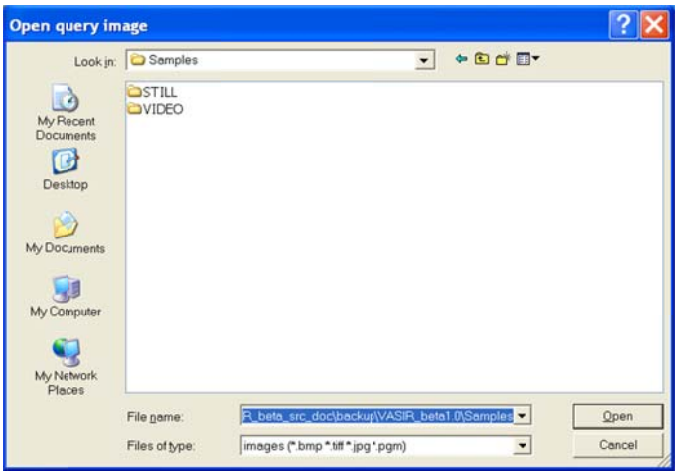
The “Classical Still Image” radio button indicates that the iris image is of decent quality. It was taken by a system akin to an LG2200 or LG4000.

The “Distant Video Frame” indicates the iris image is actually a video frame, captured by the Iris on Move (IOM) system at a certain distance.

Pick the type and then click “OK.”

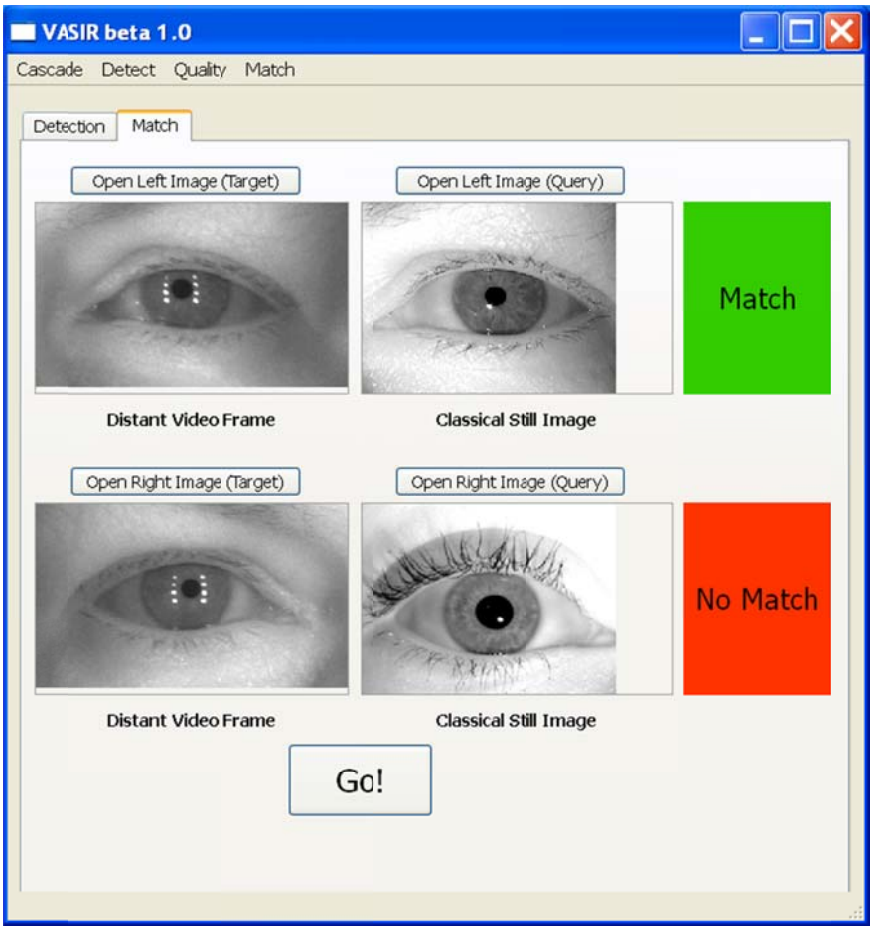


At this point load the iris image; supported formats are BMP, TIFF, JPG, and PGM.



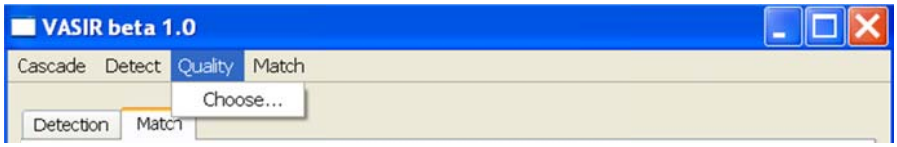
Now, click “Go!” to get the matching results.

The screenshot shows an example of the Distant Video Frame vs Classical Still Image matching scenario. The two iris images for the left eye are from the same person while the two images for the right eye are from a different person.



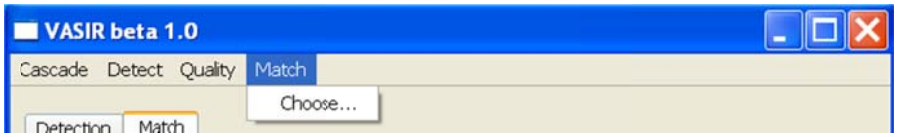
Quality menu

Click the “Choose” menu item to assess the quality of an image. You will see the calculated quality score in the command window.

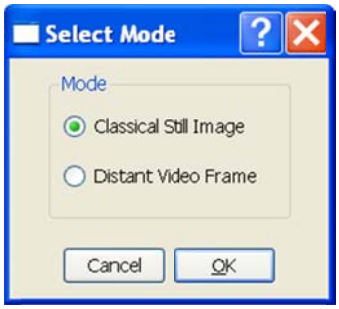


Match menu

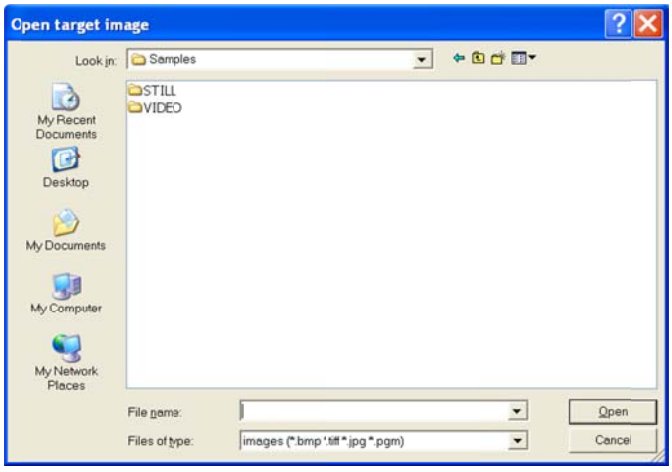
1. Click “Choose” to match a target still image and a query still image.



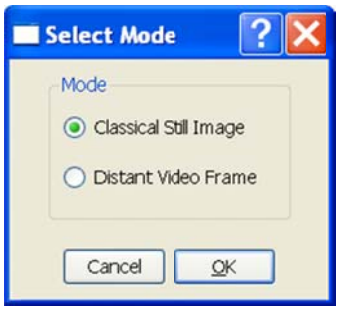
2. Select the mode for the target image.



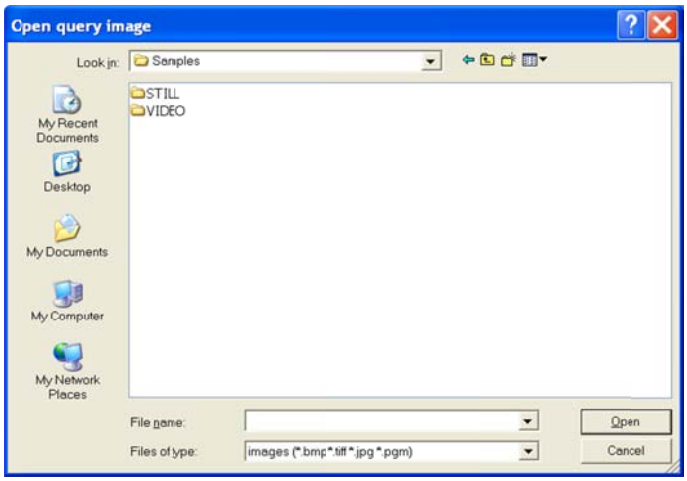
3. Load the target image.



4. Select the mode for the query image.



5. Load the query image.



You will see the matching results in the “Match” tab.

Acknowledgement

We would like to thank Kevin C. Mangold for his valuable comments on this user guide.

Annex A. Doxygen description of source code

Please have a look “VASIR_doxygen_html” file on our website:
http://www.nist.gov/itl/iad/ig/vasir.cfm

Annex B. MBGC (Multiple Biometric Grand Challenges)

The VASIR components were evaluated using the datasets collected by the Multiple Biometric Grand Challenge (MBGC). Two goals of the MBGC are to promote and to advance iris recognition technology. The MBGC dataset consists of eye images of varying illumination conditions, low quality, and off-angle or occluded images in both still and video imagery.

For further information and a downloadable version of the dataset, please refer to the website:
http://face.nist.gov/mbgc/