# EyeDentity v1.3.7

## User Guide

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# 1 Introduction

The software EyeDentity is a desktop application, which serves for automatic searching of digital image data for the purpose of localization, identification and verification of persons. The application processes images and videos in various formats, resolution and quality, it detects faces in them and applies advanced recognition functions.

This software enables above all:

- localize the faces in video files and photographs
- estimate age and gender of detected person
- identify faces from the input data with the faces in the internal person database
- search for the faces from the internal person database in the input data

The part of the software is a SQL database containing the images and identification data of the persons of interest. The software contains the user interface for data administration of the database. The user can add and remove the persons, edit identification data and notes, add and remove the attached pictures.

The analytical core of the system is based on the advanced recognition algorithms, which are created using the statistical methods of the automatic learning on large training sets. It is necessary to assess the quality of the detection and recognition features on the basis of the statistical evaluation of the larger number of samples.

This manual is written for the operating system Microsoft Windows 10, 64b, in English, in the default settings. Some of the described procedures and legends of the control elements of the operating system can differ for other operating systems.

# 2 Hardware requirements

## 2.1 Minimal requirements

- Processor: Intel® Core™ i5, 2 cores (4 logical processors)
- RAM: 16 GB
- Hard disk: 256 GB (optional SSD)
- Operating system: Microsoft Windows 10, 64b

## 2.2 Recommended requirements

- Processor: Intel® Core™ i7, 4 cores (8 logical processors)
- RAM: 16 GB
- Hard disk: 512 GB, SSD
- GPU (optional): NVIDIA® GeForce® GTX 1050 Ti, 4GB GDDR5
- Operating system: Microsoft Windows 10, 64b

## 2.3 Advanced requirements

- Processor: Intel® Core™ i7, 6 cores (12 logical processors)
- RAM: 32 GB
- Hard disk: 1 TB, SSD
- GPU: NVIDIA GeForce GTX 1060, 6GB GGDR5
  Optional: NVIDIA® GeForce® GTX 1080 Ti, 11GB GDDR5X
- Operating system: Microsoft Windows 10, 64b

# 3 Version history

## EyeDentity 1.3.7

Released: 02/20/2025

List of major changes:

- Fixed descriptor recomputation for manual detections
- Updated Sentinel license protection system to the latest version (10.11)
- Updated PostgreSQL (15.11), fixed installation conditions

## EyeDentity 1.3.6

Released: 03/25/2024

List of major changes:

- Fixed PostgreSQL backup and restore
- Added a link to the track's source photo / video file to the person detail dialog
- Updated Sentinel license protection system to the latest version (9.12)

## EyeDentity 1.3.5

Released: 04/25/2023

List of major changes:

- Updated PostgreSQL to the latest version (15.2)

## EyeDentity 1.3.4

Released: 01/17/2022

List of major changes:

- Supported more image formats
- Fixed application stability during new project processing

## EyeDentity 1.3.3

Released: 12/20/2021

List of major changes:

- New version of the face detector: EyeFace SDK 4.6.0912

## EyeDentity 1.3.2

Released: 01/31/2019

List of major changes:

- Manual detection of tracks in source file
- Fixed video playback speed

## EyeDentity 1.3.1

Released: 10/30/2018

List of major changes:

- New project file format (single h5 file)
- Conversion of old project format (XML file + extra folder) into new h5 file format
- Faster video file processing

## EyeDentity 1.3.0

Released: 06/29/2018

List of major changes:

- Whole new algorithm for face recognition
  Binary model: CNN_FACE_IDENTITY_BGR_NONE_EXP35
  (**need to perform descriptor recomputation**)
- New version of the face detector: EyeFace SDK 4.5.0430
- Support for multi-user access to a database
- New options for the installation package
  - Selection of installation components
  - License server installation from the command line
- Added detailed import to a database log
- Support for GPU computation
- Improved import to database functionality

## EyeDentity 1.2.1

Released: 01/19/2018

List of major changes:

- Manual detection for pictures, where detector fails
- Support for Microsoft SQL Server and Active Directory access

- Small modifications to the user interface

## EyeDentity 1.2.0

Released: 01/29/2016

List of major changes:

- Whole new algorithm for face recognition
  (**need to perform descriptor recomputation**)
- Person import can be done using regular expressions
- New and more efficient communication with the database
- Small modifications in the user interface

## EyeDentity 1.1.5

Released: 06/25/2015

List of major changes:

- New computational model for face recognition
  (**need to perform descriptor recomputation**)
- Small modifications in the user interface

## EyeDentity 1.1.4

Released: 06/04/2015

List of major changes:

- New computational model for face recognition
  (**need to perform descriptor recomputation**)
- Projects structure updated
  (**projects from previous application versions must be recreated**)
- New projects require less storage space
- Small modifications in the user interface
- Better performance and higher stability

## EyeDentity 1.1.3

Released: 04/16/2015

List of major changes:

- New computational model for face recognition
  (**need to perform descriptor recomputation**)

- Faster computation of face descriptor
- Backup and restore functionality in application
- Storing image data to database
- New version of PostgreSQL 9.4
- Small modifications in the user interface
- Better performance and higher stability

## EyeDentity 1.1.2

Released: 11/14/2014

List of major changes:

- A possibility of manual import to database added
- Possibilities of adding of faces from a photograph directly in a person card
- A field Date taken in Track added
- Current file name in a project is displayed
- Cosmetic adjustments of a user interface
- Icons modified

## EyeDentity 1.1.1

Released: 10/31/2014

List of major changes:

- A translation in English language added
- A possibility of switching languages added
- A field Province removed from a person card and from searching

## EyeDentity 1.1.0

Released: 10/08/2014

This version brings a fundamental change in a form of a new algorithm for a computation and comparing of face descriptors. A success of comparing increases considerably at the cost of a higher demands of the descriptor computation. Projects created in the previous version of the application EyeDentity are not compatible with the version 1.1.0 and it is necessary to create them again. It is possible to use a database of persons and tracks from the previous version, but it is necessary to recompute the descriptors in the whole database.

List of major changes:

- New panel for matching of found tracks with the database of persons

- New algorithm for the computation of the face descriptors
- The possibility of the recomputing of the descriptors in the whole database
- Import of the persons and image data to the database from the CSV file
- Export of the persons from the database to the CSV file
- Use of a cached storage for a faster work with the database
- A field UID added to the person card
- A column with photographs added to the persons database
- Time of video is displayed in the whole application instead of a frame number
- Full-text searching in the persons database without diacritics
- New possibilities of the export of the matching results to PDF
- The project Picture Folder reads EXIF GPS for each file separately
- Minor bug fixes

## EyeDentity 1.0.0

Released: 09/01/2014

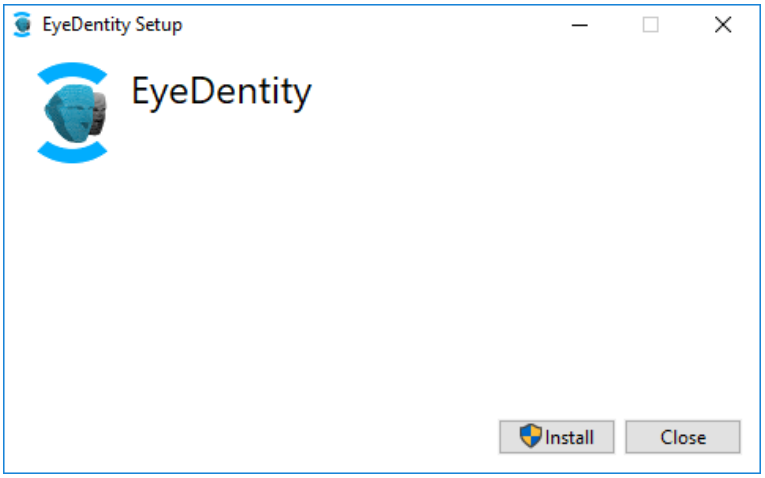
- First release of the application

# 4 Installation and uninstallation

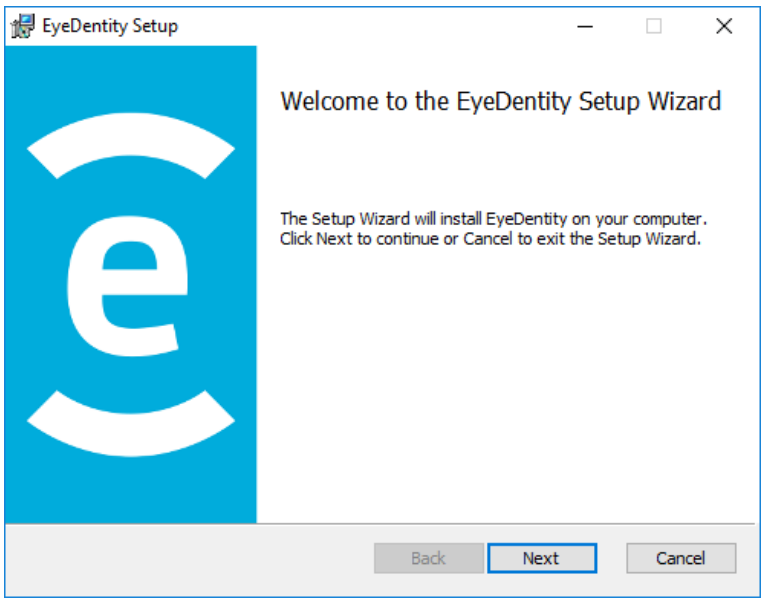
## 4.1 Installation of the application

If you have installed the previous version of the application EyeDentity, proceed in the same way as in the case of the first installation. Updating of all necessary files takes place during the installation. Data created in the previous version remain saved. **Nevertheless, we strongly recommend performing their backup along with the backup of the database (see chapter 6.1).**

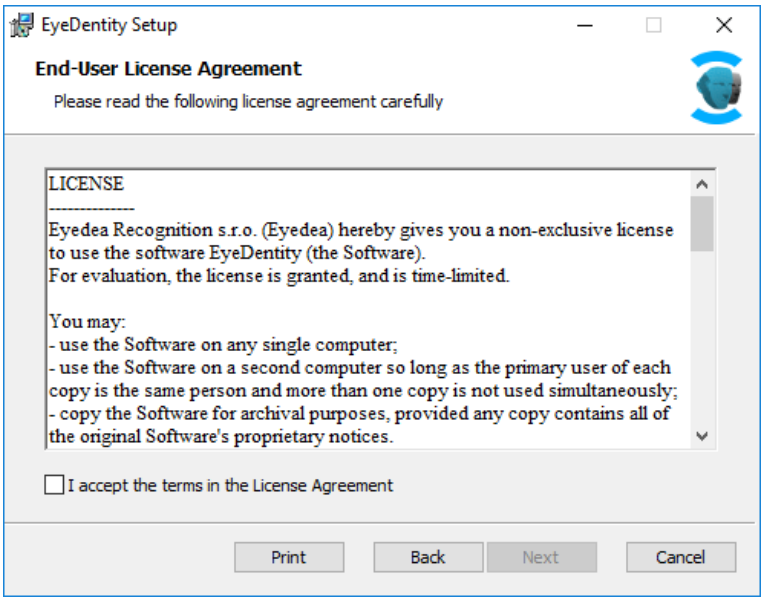
Installation of the application starts using file EyedentitySetup64.exe in the installation package. The following window is displayed after the start, it informs about initiation of an installation process.



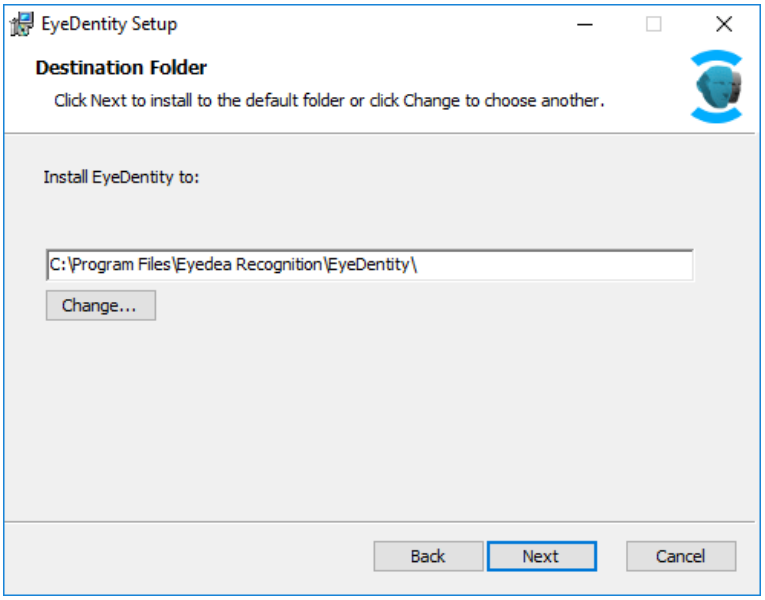

After pressing Install button, the installation of important libraries for running EyeDentity and PostgreSQL takes place, then the following window appears.



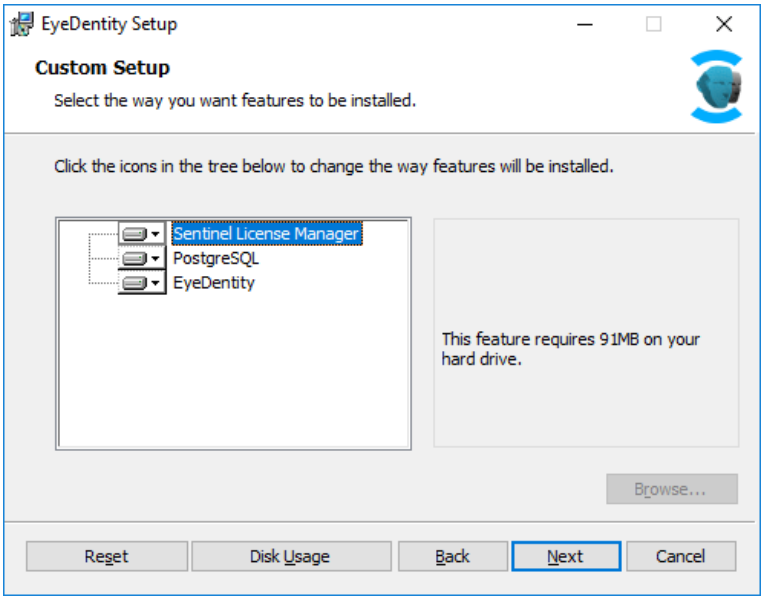
Clicking the Next button, the License Agreement is displayed.



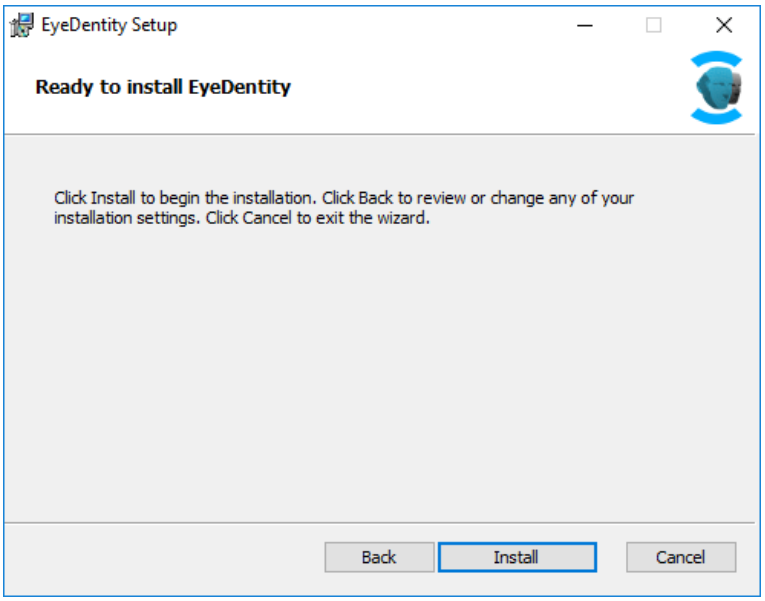

After reading of the License Agreement and confirmation using the choice I accept the terms in the licence agreement it is possible to continue to the next step using the Next button.



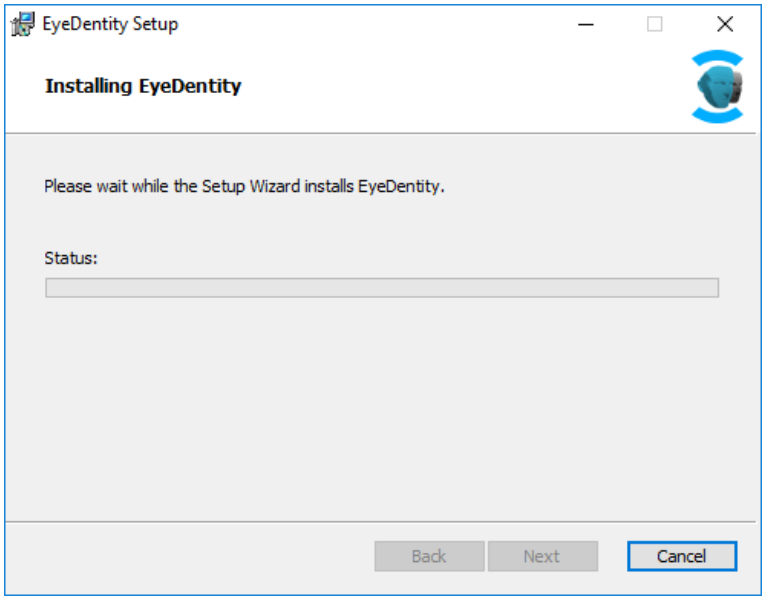

In this window, it is possible to change the folder alternatively, where the program is installed, and using the Next button to continue to the penultimate page before installation itself.



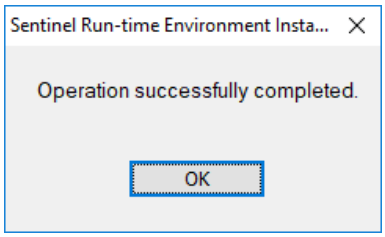

Default installation contains all components that are needed for using the application. If only the installation of license server is required, select Sentinel License Server option only. If the PostgreSQL database is not needed or is already installed, feel free to select and install EyeDentity and Sentinel License Server only. The Next button confirms our selection and proceeds to the last page before the installation.



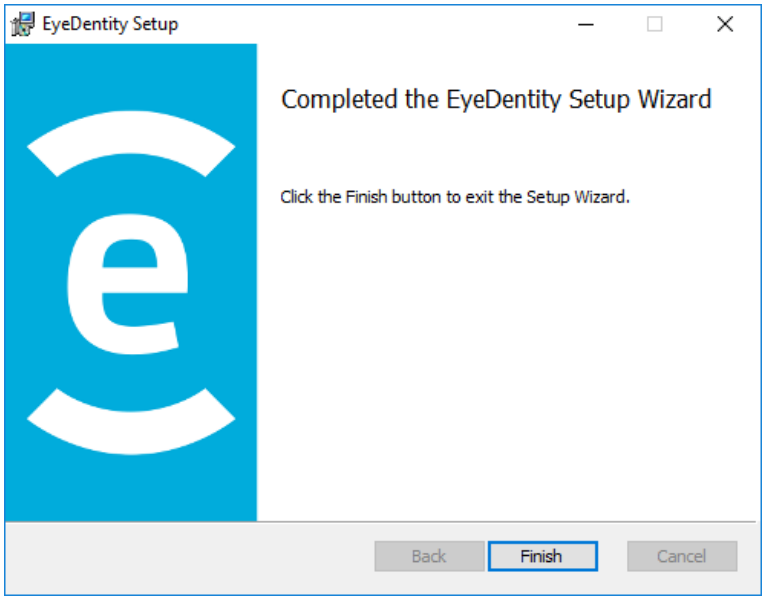

Now it is possible to start the installation itself using the Install button. This installation copies all necessary files and if required, it also installs the database PostgreSQL 15 and a driver of Sentinel hardware key.




The installation of the database server and the driver of the hardware key takes place automatically, but it can require confirming a report on finishing the installation.



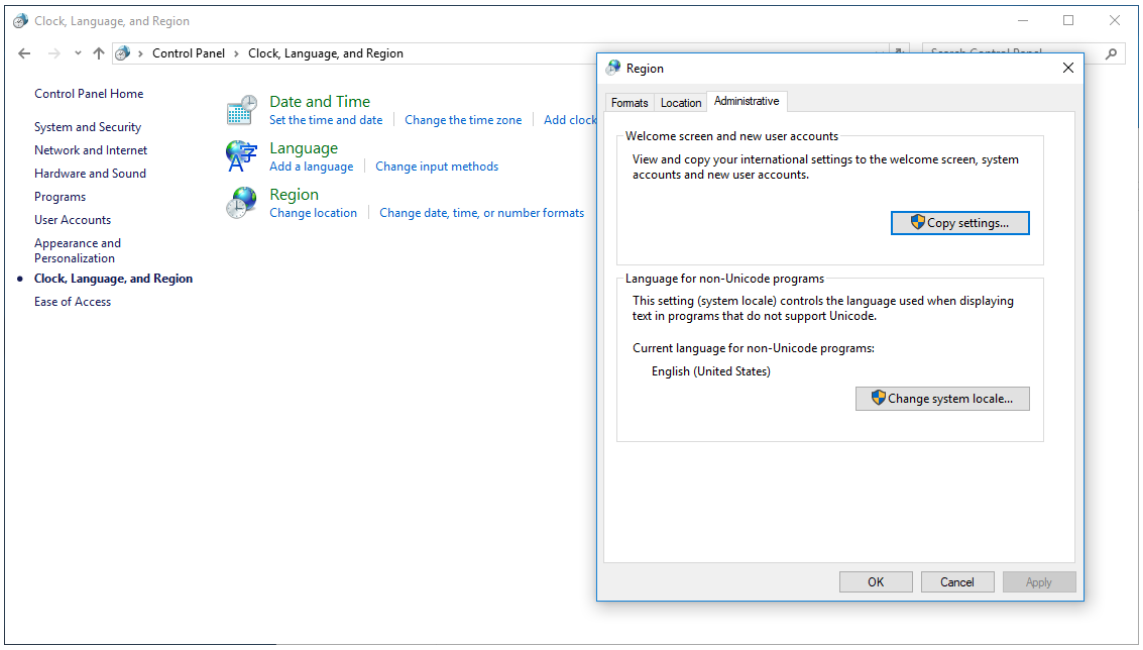

The installer displays the following window after finishing the installation and it is possible to end the installer using the Finish button.



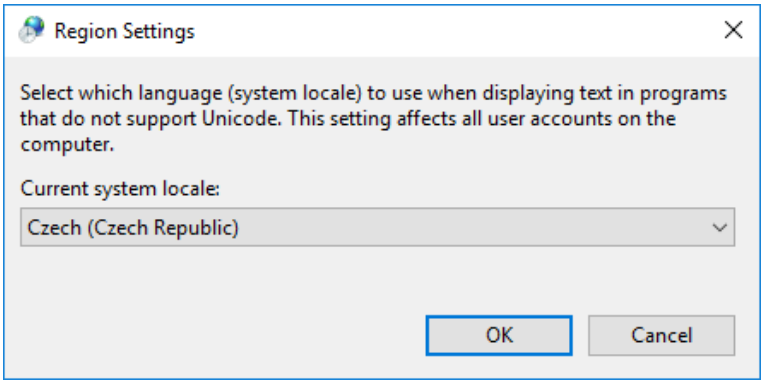

Now the application is installed and prepared for use.

### *Local setting of the system*

For the correct function of the program, it is necessary to have correctly set the Language for the programs which do not support the Unicode in the Windows. In the English version of the Windows is in the default setting set English. To change this setting to your language, open Start Menu, search for and open Control panel → Clock, Language, and Region → Region and Language.




In this dialog on the tab Administrative click the Change system locale button, which opens the following dialog.




Here set Current system locale to your preferred language.

## 4.2 Network license setting

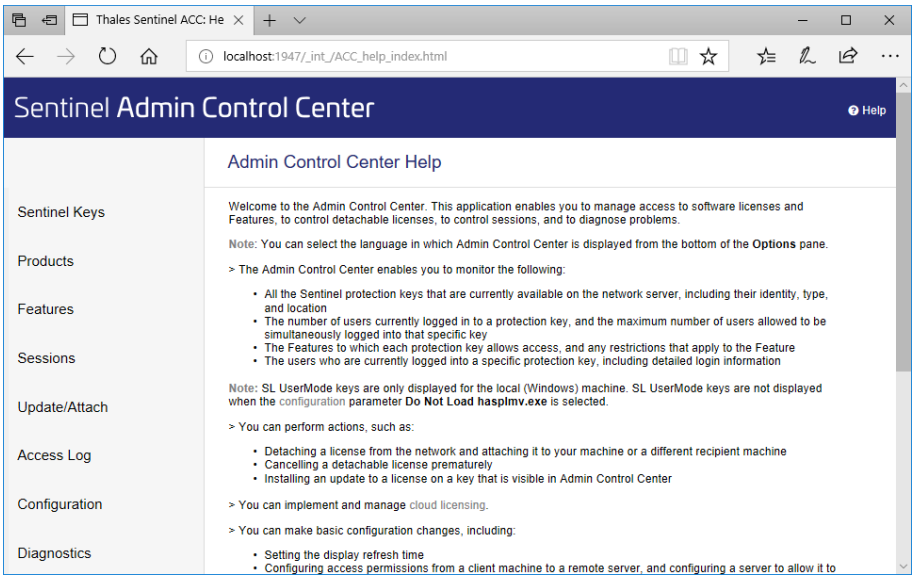
### 4.2.1 License server installation

If an advanced user wants to install the license server only, the setup with command line parameters /passive LICENSESERVERONLY="yes" can be run. The only required input from the user is to confirm the report of the license server installation. Install the license server using command line:

EyedentitySetup64.exe /passive LICENSESERVERONLY="yes"

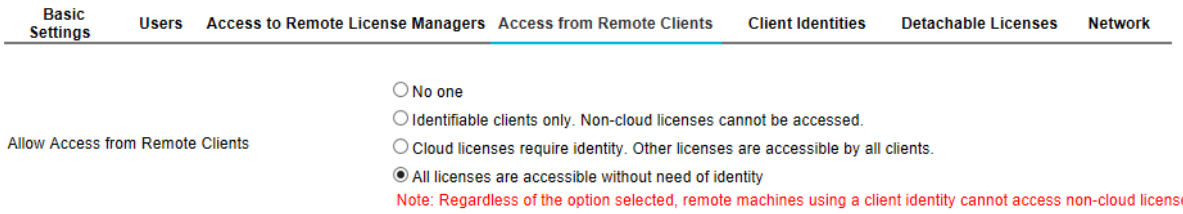
### 4.2.2 License server settings

After a successful Sentinel License Server installation, open the address http://localhost:1947 in a web browser and check whether the license server is running. If the Sentinel Admin Control Center web application is displayed, the license server is running. License server can be configured to allow to connect clients to use available licenses (configured as a server) or it can connect to another license server (configured as a client).



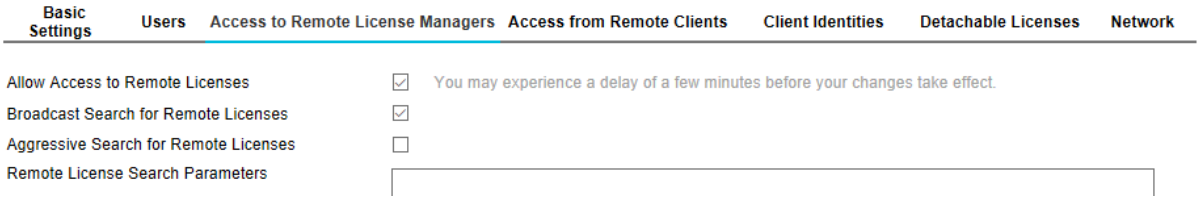

#### *Server configuration*

To set the license server as a license provider, plase open the address in your web browser http://localhost:1947/_int_/config_from.html and choose the option Allow Access from Remote Clients. This option allows other clients to connect to the network license key plugged in the server.



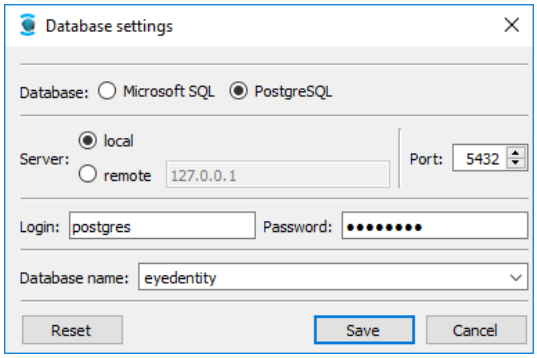
### *Client configuration*

To set the license server as a client, open the address http://localhost:1947/_int_/config_to.html in a web browser and choose the Allow Access to Remote Licenses option. If the license provider is in another network than the computer, put the server's IP address into the field Remote License Search Parameters.




## 4.3 First start of the application

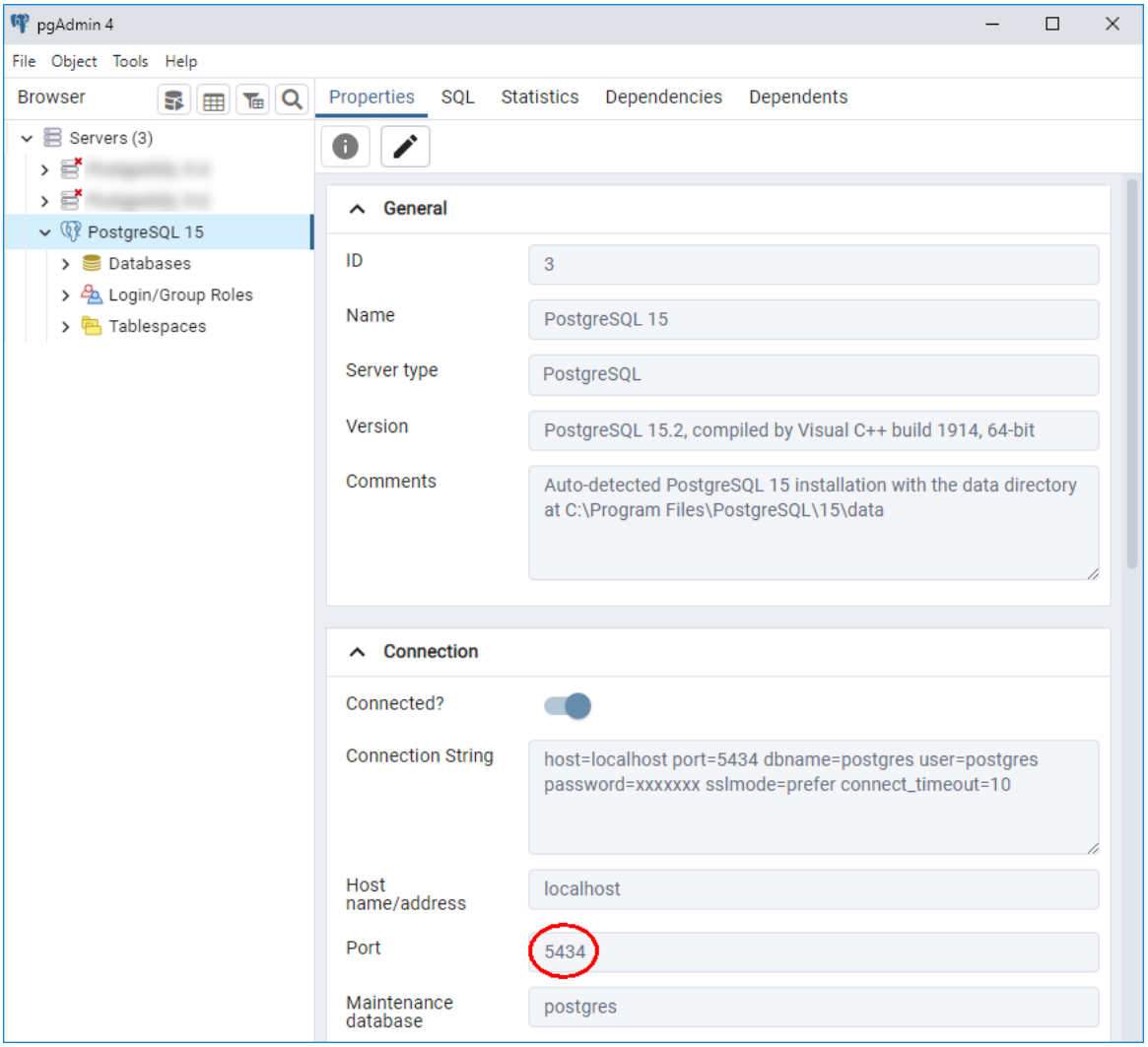
It is necessary to fill login data to the database during the first start of the application. The dialog Database settings is displayed after the application starts.




Here can be set connection information to the database server and the Database name. In the standard installation filled-in can be used to connect to the default database. In case of problems, check on which port runs the database server (see paragraph 4.3.1 ). You can also find more information about Database settings in the chapter Settings 9.3 .

### 4.3.1 Find database server port

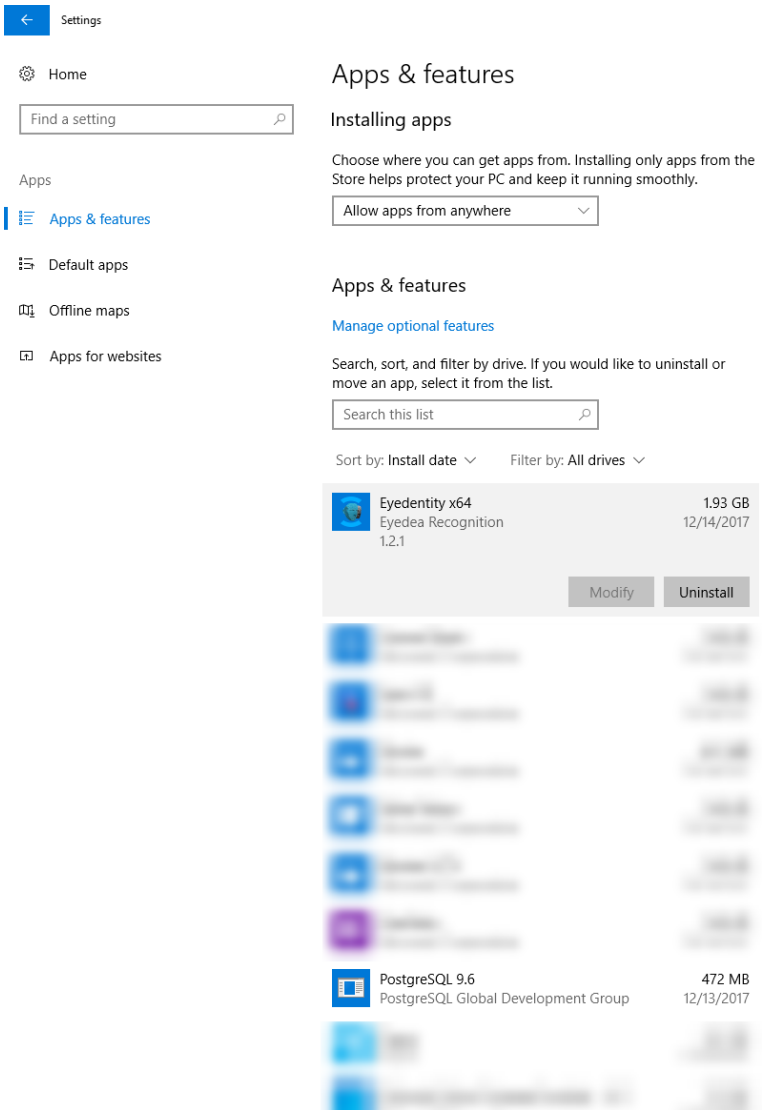
In the case that was another version of the database PostgreSQL already installed on the computer before the installation of the application EyeDentity, the newly installed database server Postgres 15 probably runs on other port than is standard 5432. In this case it is necessary to find this port using the program pgAdmin 4. It can be started via the menu Start: Start Menu → P → PostgreSQL 15 → pgAdmin 4.




In this window, after you connect to server (double click on it) and select the tab Properties, it is possible to find the database port, under the section Connection. The port 5434 is stated in the picture above.

## 4.4 Uninstallation

It is possible to uninstall the application EyeDentity via Settings (Start Menu → Settings → Apps). The PostgreSQL database (PostgreSQL 15) does not uninstall during uninstallation of the application, because it can be used also by other applications. If you still want to uninstall it, you can do it via the Settings (Start Menu → Settings → Apps).



# 5 Application use cases

Two typical use cases of the application EyeDentity are described in this chapter. The goal of the first task is to find the selected persons from the internal database in the input data. In the second task the goal is to find the person from the input photograph in the internal persons database.

Of course, the possibility of application use is wider. Both mentioned examples serve primarily for a quick familiarization of the user with the basic functions of the application EyeDentity.

The tasks are demonstrated on the testing database of the persons EyeDentity, which is created and filled up with the testing data automatically at the first start of the application.

## 5.1 Example 1. Searching of persons in input video sequence and photographs

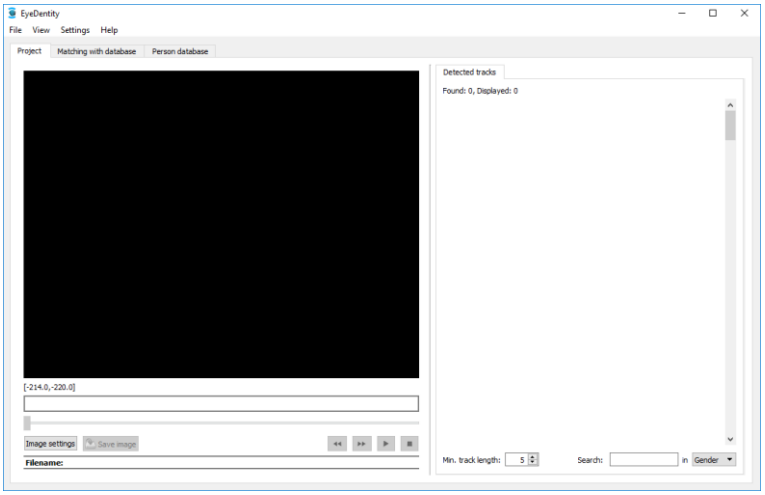
### 5.1.1 Task description

The user has a video record and the task is to verify if the selected person/persons from the internal persons database appears in the record. The procedure is same for the tasks, where it is necessary to use photos as an input source instead of video sequences.

### 5.1.2 Task solution

#### *Step 1: Application start*

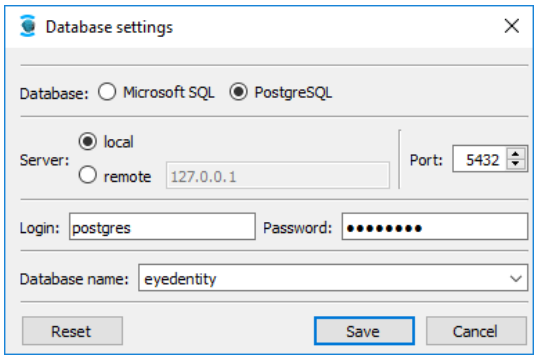
The application starts using the icon EyeDentity, which is on the desktop or in the Windows Start Menu under the tabs E → Eyedea Recognition → EyeDentity. The main application window is displayed after starting.




#### *Step 2: Check database connection*

In this demonstration we work with the testing database of the persons eyedentity, which was

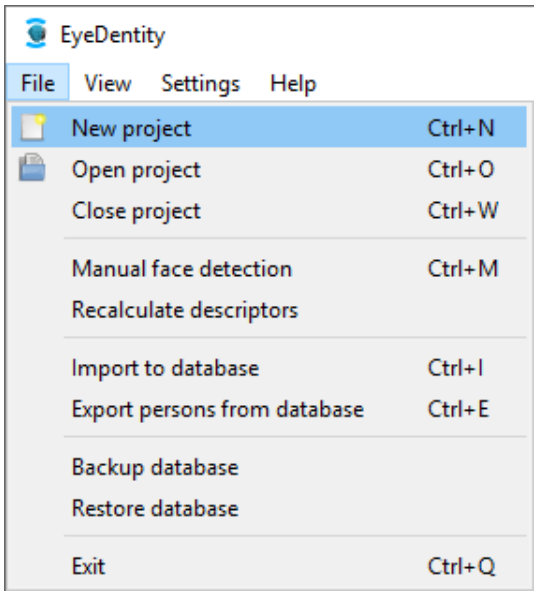
created at the first start of the application, see chapter 4.3 . Verify, that the application is connected to the testing database eyedentity using the menu Settings → Database settings. The window is displayed:



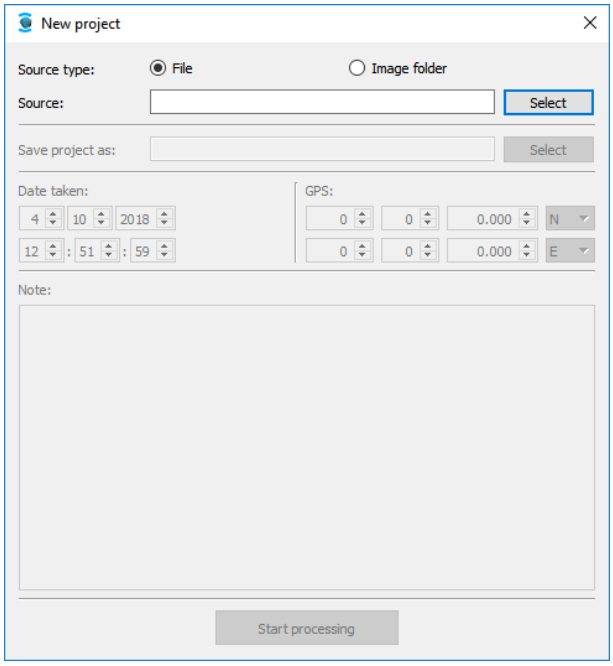

If the Database name is correct, click the Cancel button and continue with the step 3: Create a new project and select input data. Otherwise create the new database (see chapter 9.3 ) and fill it up with the testing data.

### *Step 3: Create a new project and select input data*

First of all, it is necessary to create a new project for each video sequence, image or image folder, which you want to analyse. We perform setting up of the new project using the main menu entry File → New project.

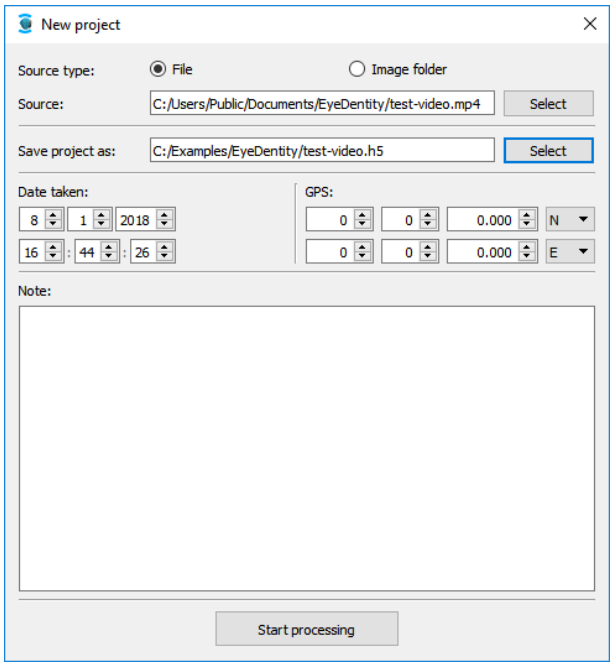


New project window is opened:




Select File as the Source type and press Select button in the Source section. In open dialog window select C:\Users\Public\Documents\EyeDentity\test-video.mp4 testing video sequence.

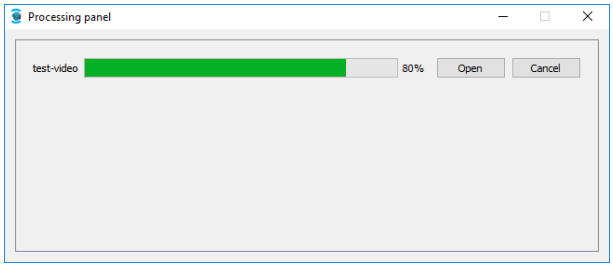
After the source selection, the remaining fields are prefilled from the source metadata – project file name and path, date and GPS coordinates and a note field. Press Select button in the Save project as section to change the name and path of new project file. For the remaining fields, we use default values.



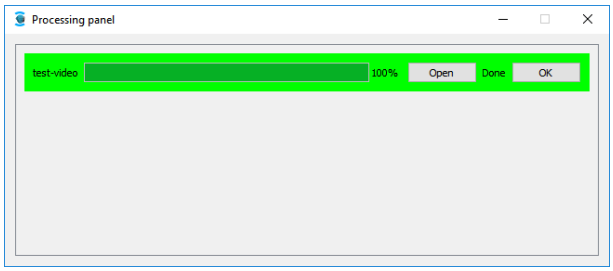
### *Step 4: Processing of input data*

By the processing of the input data is meant localization of the faces in the input data and the computation of their descriptors. The result is so called tracks. The track contains the detected face of the person with the appropriate descriptor. In the case of processing of the video sequences, one track can contain the time sequence of cut-outs of the faces, i.e. more time consequent cut-outs of the relevant face.

We start the processing of the input data using the Start processing button in the window New project. The Processing panel, which displays the progress of an analysis, is opened.



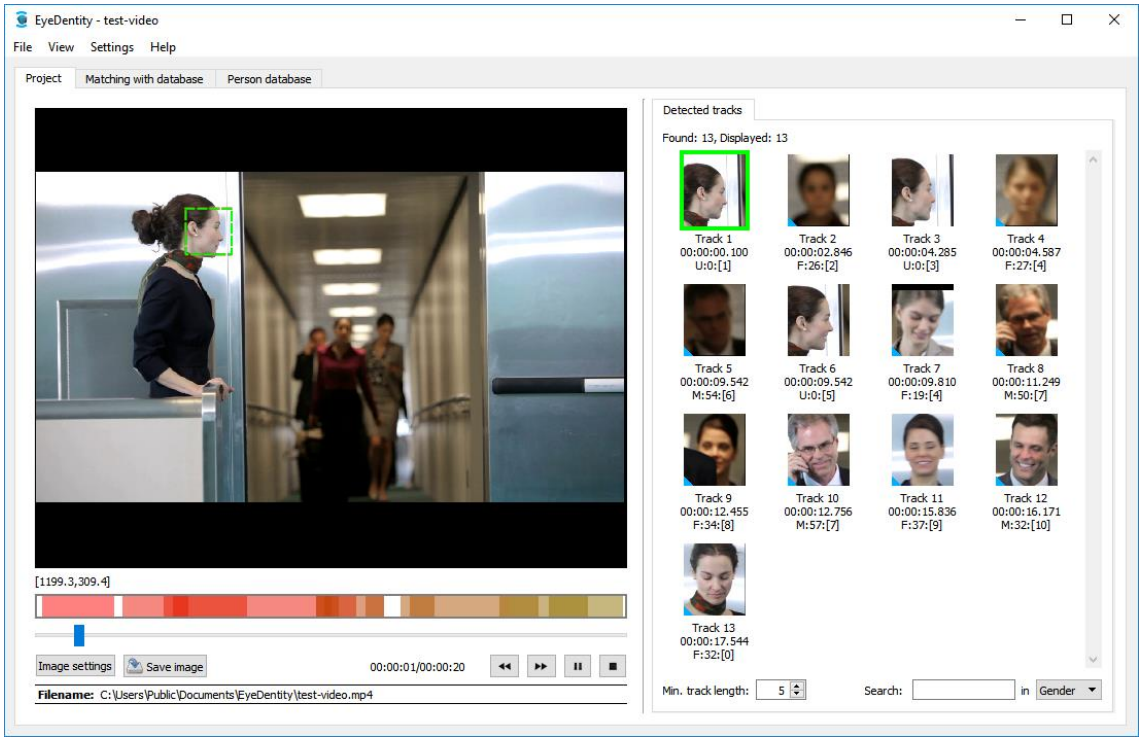

The application allows to process more projects (videos/photographs) simultaneously. The user simply sets up another new project and starts processing. The partial results of the processing can be displayed already during the analysis using the Open button.



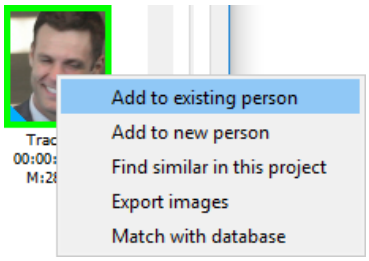

In this example we are going to process only one video sequence, so we wait until processing is finished and press Open button to open the project in the main window.

### *Step 5: Display detected tracks*

In the left part of the main window, frames around detected faces are rendered in the video. The tracks are drawn in the right part of the main window in the Detected tracks tab. Each track is described with the face cut-out, an integer identifier of the track, time of the first image in the sequence and estimation of gender and age of the detected face. The last entry in the square brackets is an identifier of the face – if there is a face on several tracks according to the program, all these tracks have the same identifier (e.g. Tracks 8 and 10).




Left-click the given track automatically plays the corresponding sequence of the video; selected face is marked with a green rectangle. Right-click the selected track unfolds the drop-down menu

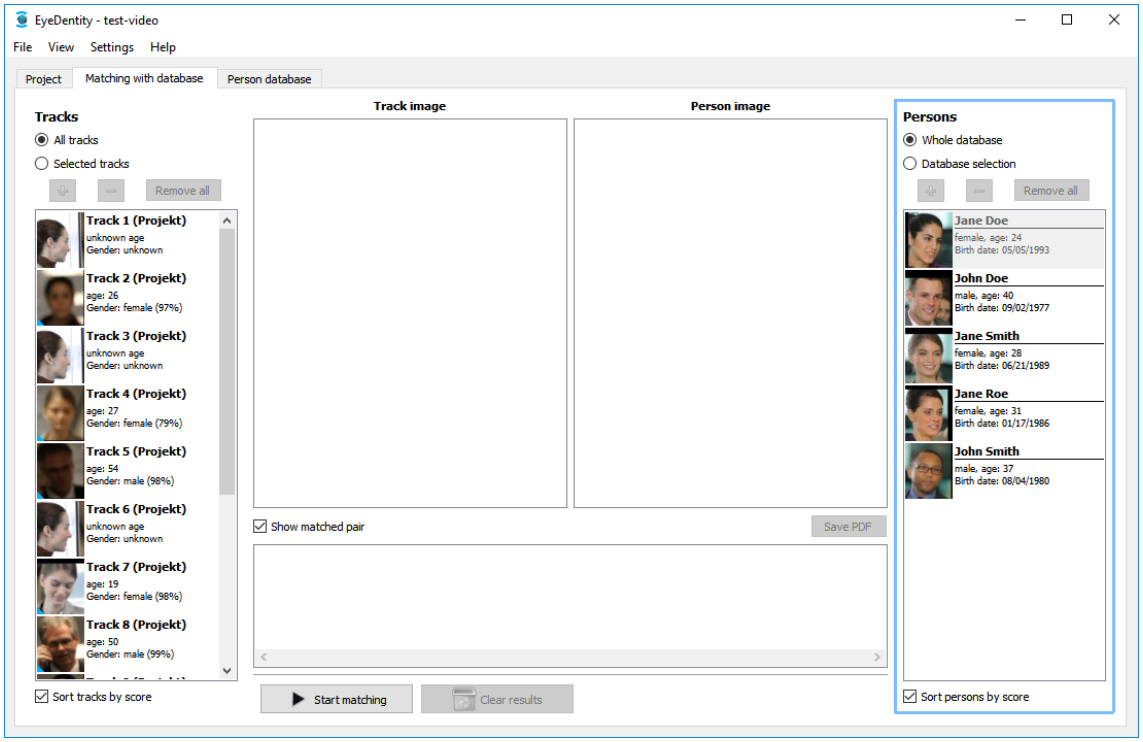



with the following options:

| | |
|---|---|
| Add to existing person | The track is added to the person selected from the database. |
| Add to new person | The track is added to the newly created person. |
| Find similar in this project | Sorts the project tracks with respect to similarity to the selected track. |
| Export images | Saves the track images (face cut-outs). |
| Match with database | Compares the track with the persons in database. |

### *Step 6: Matching the detected tracks with the person database*

We perform the matching of the detected tracks with the person database using the tab Matching with database.

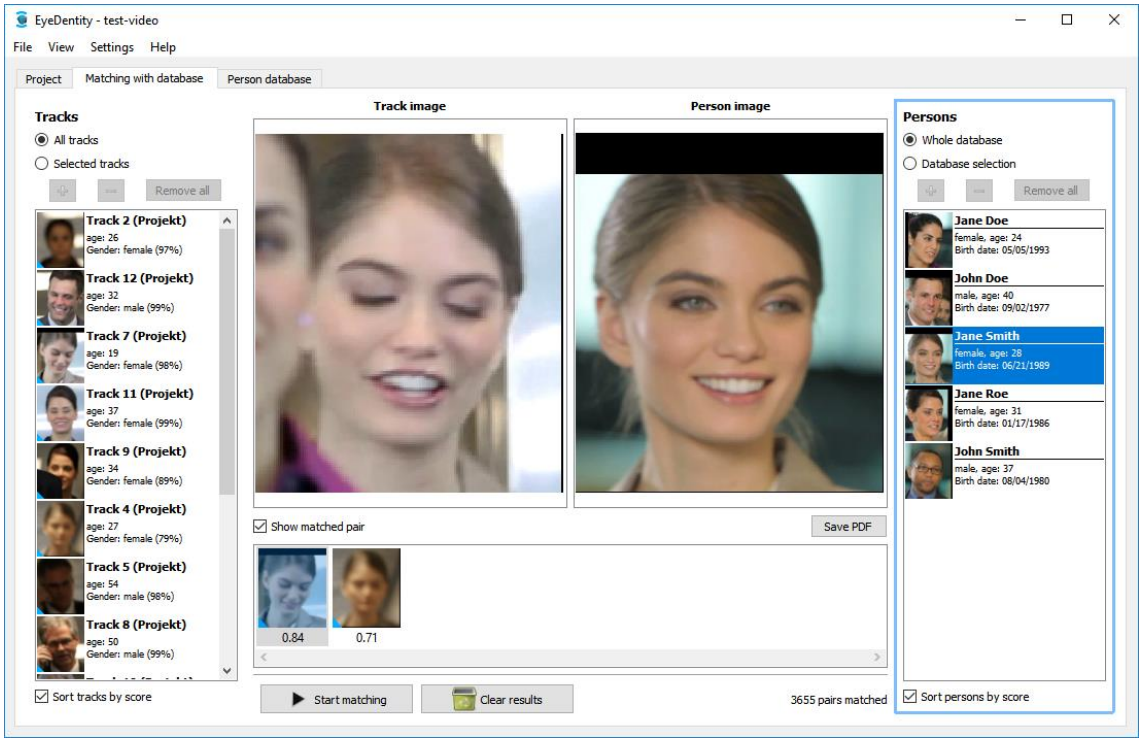



In the left part of the tab Matching with database is the List of tracks of the current project along with the Track filter, which is used for the selection of the facial sequences from the project, which we want to compare with the database.

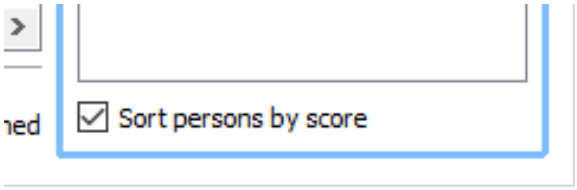
In the right part of the tab Matching with database is the List of persons from the database along with the Person filter, which is used to the selection of the persons of interest, which we want to search in the given sequence, i.e. with which we want to compare the found tracks.

We start the matching using the Start matching button after selecting the desired tracks from the project and persons of interest from the database.

The results of the matching are displayed in the middle part of the tab Matching with database. The selected pair of faces is displayed, on the left is the track image, on the right is the image from the person database.




At the bottom of the List of persons we can select, whether we want to sort the persons by computed similarity score, or alphabetically. Selecting the sorting by the score, the persons with the highest score will be on the first positions in the List of persons.



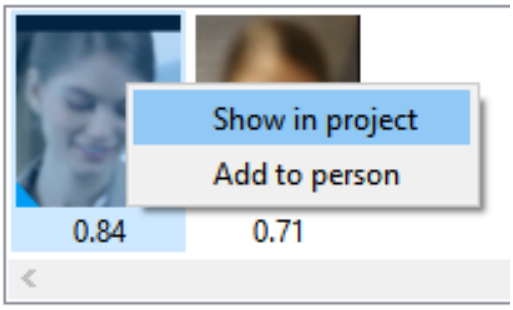

Down in the middle is the List of results of the currently selected person from the List of persons. Each result is displayed as a thumbnail of the cut-out from the matched track along with the achieved similarity score that is below the icon. The results are displayed from the highest score achieved.

We move through the List of persons by pressing a key up or down or by using the left mouse button, the corresponding results of matching are displayed with each selection of the person in the List of results.

We move through the List of results by pressing a key left arrow and right arrow or by using the left mouse button, the matched pair of the faces is displayed with each selection of the result.

We can switch between the columns List of tracks and List of persons using the key combination Ctrl + left arrow, which switches to the List of tracks, and Ctrl + right arrow, which switches to the List of persons.

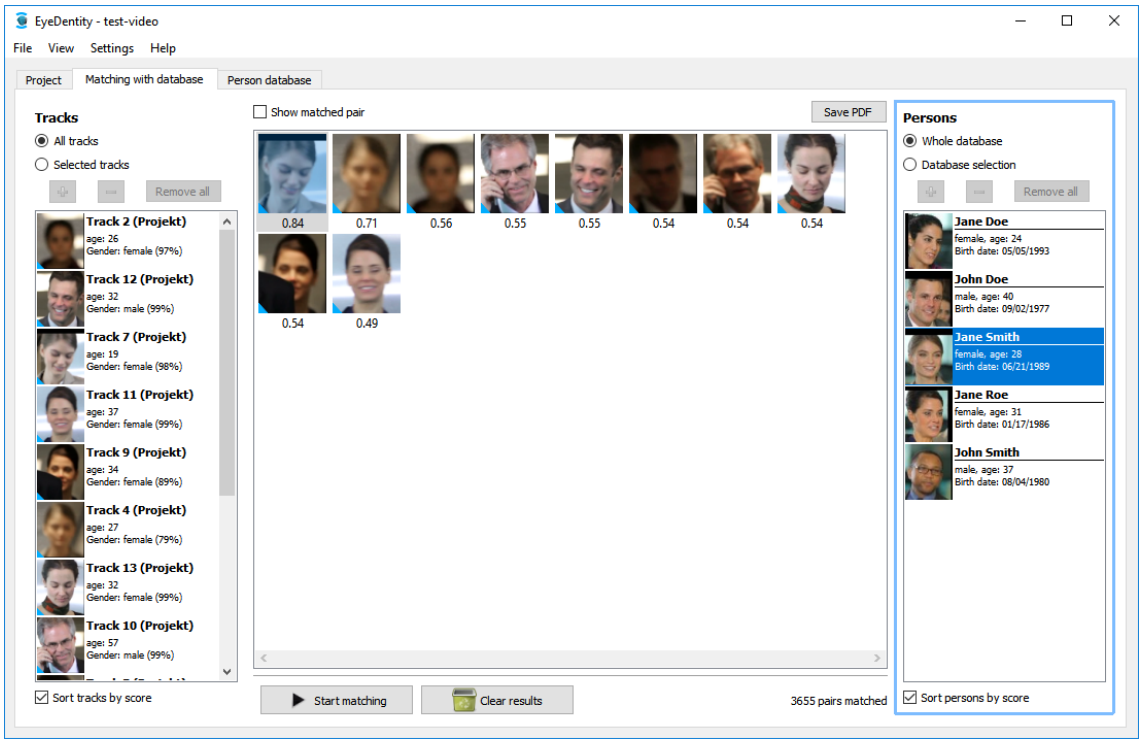
Right-click the selected result unfolds the drop-down menu




with the following options:

| | |
|---|---|
| Show in project | The selected track from the List of results is displayed and played in the tab Project. |
| Add to person | The selected track from the List of results is added to the person selected in the List of persons. |

Images of the currently selected matched pair can be hidden by deselecting Show matched pair. This layout is useful in the case the large number of the results is found. (For the following image, we temporarily decreased Min. matching score level for which the results are shown. This settings is described in chapter 9.4 .)



## 5.2 Example 2. Search the internal person database

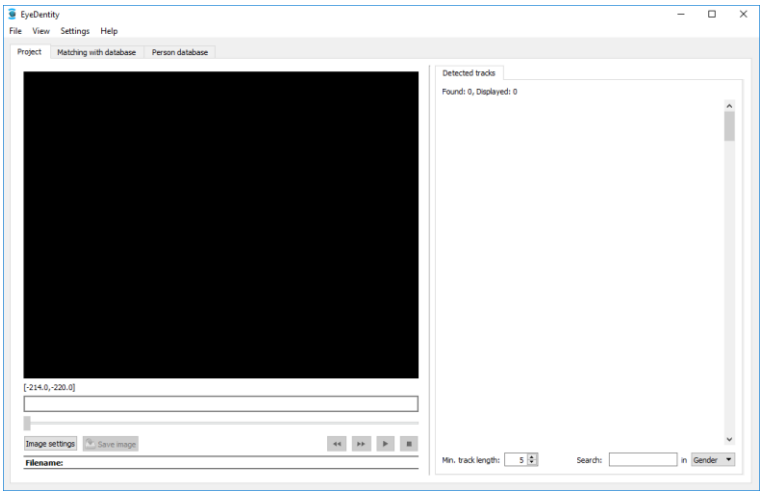
### 5.2.1 Task description

The operator has the photograph or the video sequence with an unknown person and needs to find the similar person in the internal person database. Specifically, he needs to sort the persons in the database based on the similarity with the person on the input photograph or in the video sequence.

### 5.2.2 Task solution

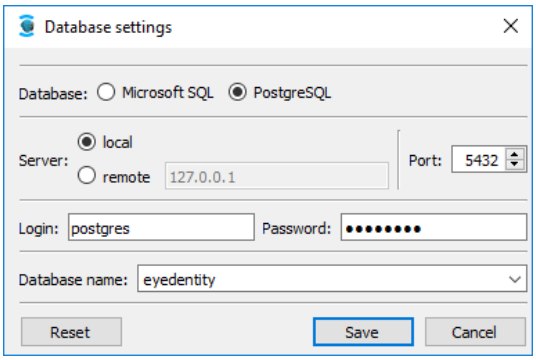
#### *Step 1: Application start*

The application starts using the icon EyeDentity, which is on the desktop or in the Windows Start Menu → Eyedea Recognition → EyeDentity. The main application window is displayed.




#### *Step 2: Check database connection*

In this demonstration we work with the testing database of the persons eyedentity, which was created at the first start of the application (see chapter 4.3 ). Verify, that the application is connected to the testing database eyedentity using the menu Settings → Database settings. The window is displayed:

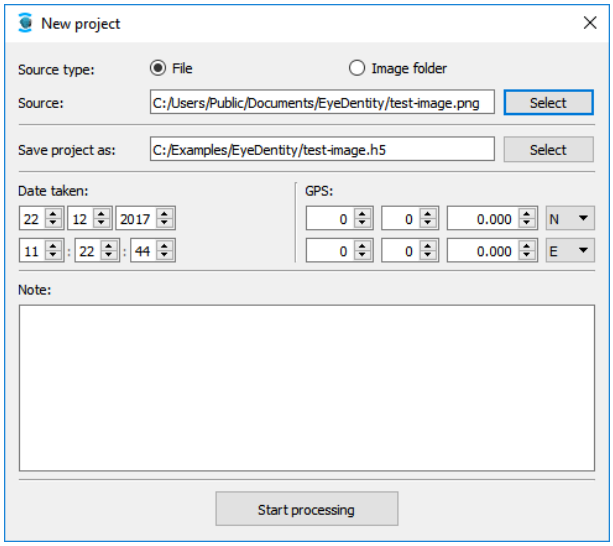



If the Database name is correct, click the Cancel button and continue with the step 3: Create a new project and select input data. Otherwise create the new database (see chapter 9.3 ) and fill it up with the testing data.

### *Step 3: Create a new project and select input data*

First of all, it is necessary to create a new project. We perform setting up of the new project using a command in the main menu File → New project. The window New project is opened.

Then select the input image in the line Source using the Select button. We use the testing image file C:\Users\Public\Documents\EyeDentity\test-image.png in this example.



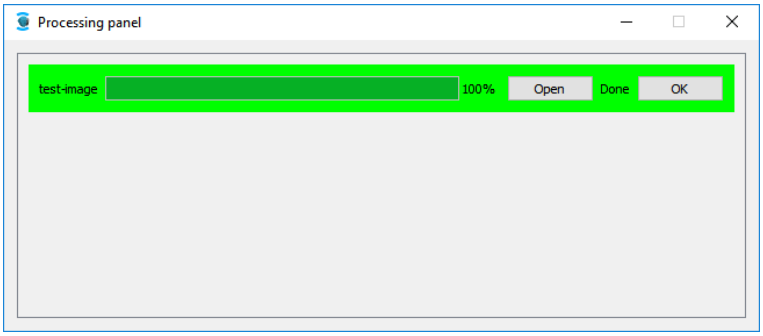

Press Select button in the Save project as section to change the name and path of new project file. For the remaining fields, we use default values and press Start processing button.

### *Step 4: Processing of input data*

By the processing of the input data is meant the automatic localization of the faces in the input image and the computation of the face descriptor. The result is called track. The track contains

the cut-out of the person with the appropriate descriptor. (In the case of processing the video sequences, one track can contain the time sequence of cut-outs of the face, i.e. more time consequent cut-outs of the relevant face, with the descriptors.)

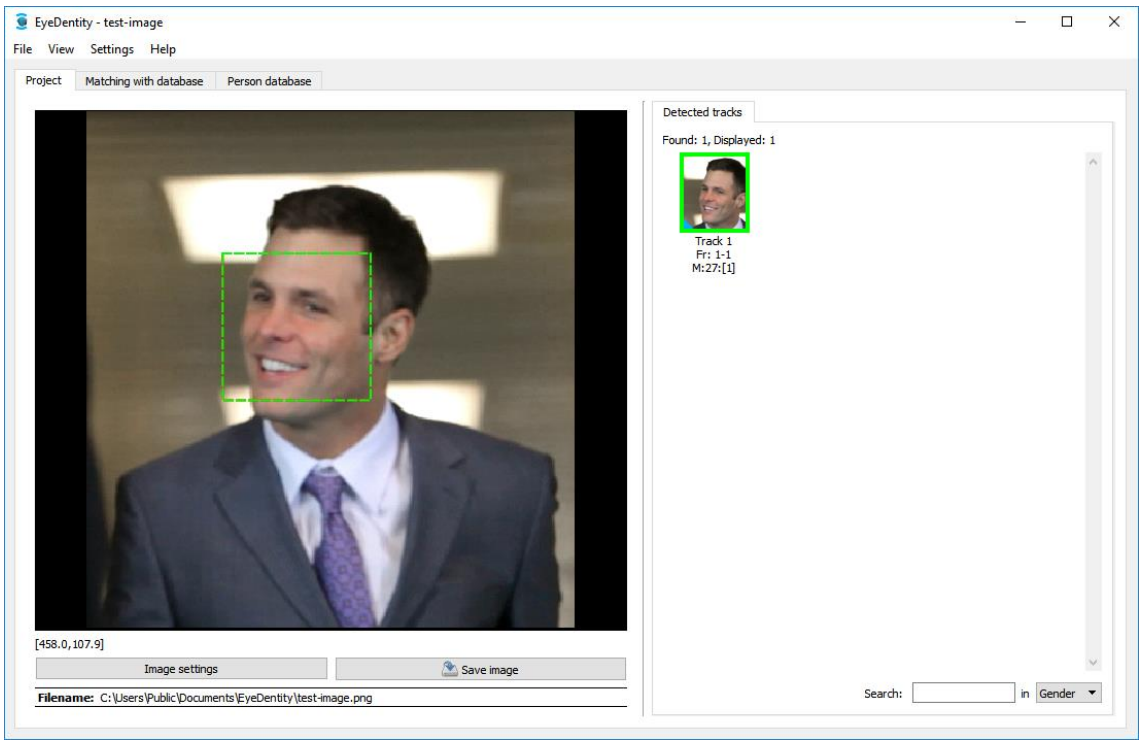
We start the processing of the input data using the Start processing button in the window New project. The Processing panel, which displays the progress of the project analysis, is opened.




The application allows to process more projects simultaneously. The user simply sets up another new project and starts processing. The partial results of the processing can be displayed already during the analysis using the Open button.

### *Step 5: Display a detected track*

In the left part of the main window, there is the analysed image with a frame around the detected face. The track is drawn in the right part of the main window in the Detected tracks tab. In this case, there is only one detected face, but in general more of them can be detected. Each track is described with the face cut-out, an integer identifier of the track, index of the image in sequence (useful when an image folder is analyzed) and estimation of gender and age of the detected face. The last entry in the square brackets is an identifier of the face.



Right-click the selected track unfolds the drop-down menu with the following options:

| | |
|---|---|
| Add to existing person | The track is added to the person selected from the database. |
| Add to new person | The track is added to the newly created person. |
| Find similar in this project | Sorts the project tracks with respect to similarity to the selected track. |
| Export images | Saves the track images (face cut-outs). |
| Match with database | Compares the track with the persons in database. |

### *Step 6: Matching the detected track with the person database*

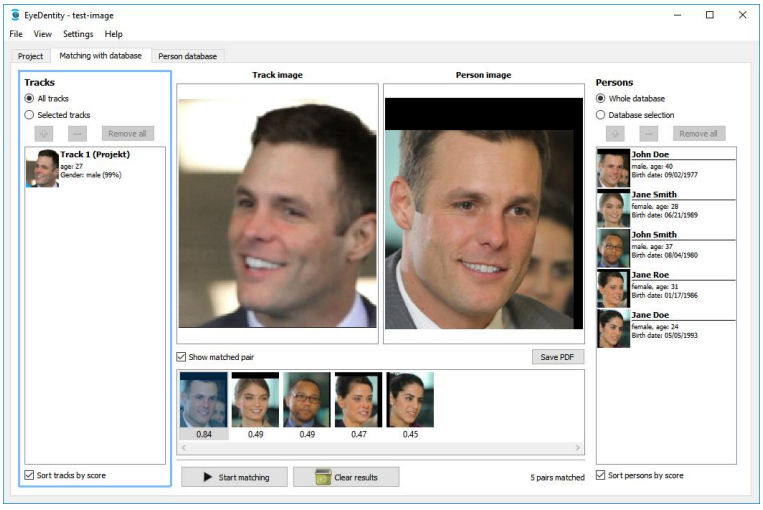
We perform the matching of the detected track with the person database using the tab Matching with database.

In the left part of the tab Matching with database is the List of tracks of the current project along with the Track filter, which is used for the selection of the face sequences from the project, which we want to compare with the database.

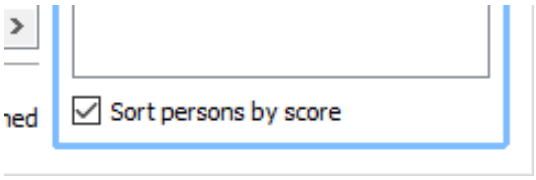
In the right part of the tab Matching with database is the List of persons from the database along with the Person filter, which is used for the selection of the persons of interest, which we want to search in the given sequence, i.e. with which we want to compare with the found tracks.

We perform the matching using the Start matching button.

The results of the matching are displayed in the middle part of the tab Matching with database. The selected pair of faces is displayed, on the left is the track image, on the right is the image from the person database.



At the bottom of the List of tracks we can select, whether we want to sort the tracks by computed similarity score, or by the order in the project. Selecting sorting by the score, the tracks with the highest score will be on the first positions in the List of tracks.



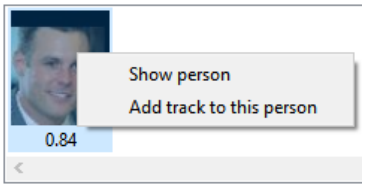

Down in the middle is the List of results for the currently selected track from the List of tracks. Each result is displayed as a thumbnail of the photograph of the matched person along with the achieved similarity score that is below the icon. The results are displayed from the highest score achieved. (Min. matching score level is set to default value 0.70 so only one result is shown. This settings is described in chapter 9.4 .)

We move through the List of tracks by pressing the key up and down or using the left mouse button, the corresponding results of matching are displayed with each selection of the track in the List of results.

We move through the List of results by pressing the key left arrow and right arrow or using the left mouse button, the matched pair of the faces is displayed with each selection of the result.

We can switch between columns List of tracks and List of persons using the key combination Ctrl + left arrow, which switches to the List of tracks, and Ctrl + right arrow, which switches to the List of persons.

Right-click the selected result unfolds the drop-down menu



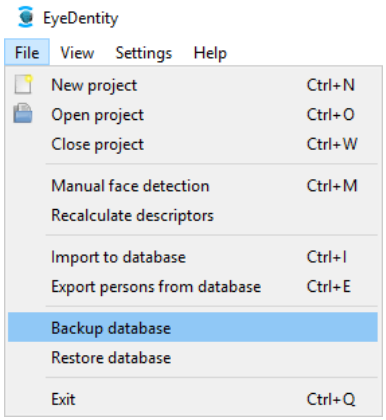

with the following options:

| | |
|---|---|
| Show person | It displays the window with the card of the persons from the database. |
| Add track to this person | The selected track from the List of tracks is added to the matched person from the List of results. |

# 6 Backup and restore the person database

The application uses the SQL database for storing the person database. Since EyeDentity version 1.1.3 it is possible to back up the data of PostgreSQL database directly from the application. If you need to restore the backup done in previous versions of the application, please refer the guide relevant to the used version.

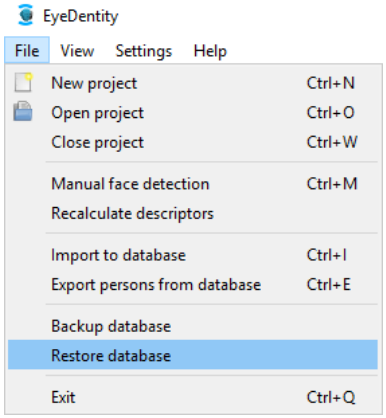
The application creates backups in one file, where the whole person database, face descriptors and all image data are stored. Using this file, it is possible to transfer the EyeDentity between different users and computers.




## 6.1 Database backup

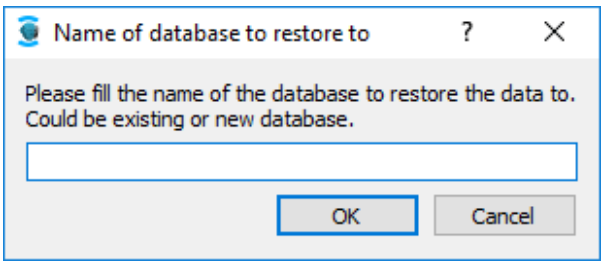
Backup of the application EyeDentity database is done using the menu File → Backup database. Then the window is opened where the user can select the destination to store the backup. After confirmation the backup itself is started. This process can take several minutes according to the size of the database. When the backup is finished, dialog with the information about the backup process is displayed.

## 6.2 Database Restore




Restore of the application EyeDentity database is done using the menu File → Restore database. Then the window is opened where the user can select the source file to restore. The user is asked whether he wants to restore the data to the current database, create new one or select another database. **WARNING** – when restoring to the current database, all contained data will be deleted. When restore to the new database is selected, the user must input the name of the database to create. After confirmation the restore itself is started. This process can take several minutes according to the size of the database. When the restore is finished, dialog with the information about the restore process is displayed.

Database restore will fail, if there is more users connected to the database, therefore it is necessary to make sure, that all users are disconnected before the restore.



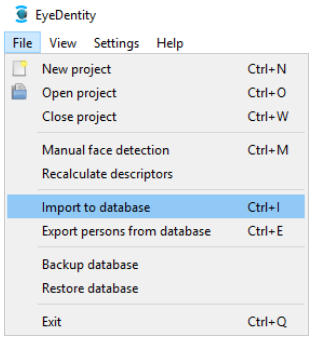
# 7 Import and export of persons

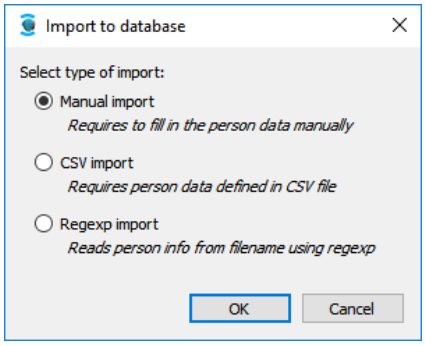
The application EyeDentity allows from version 1.1.0 to perform the import of the persons along with the image data that belongs to them. Simultaneously, it is also possible to export the list of the persons, who are in the database.

This functionality does not replace backup and restore the database and created data. This serves only for more comfortable filling of the person database or alternatively for creating the list of persons, which can be processed in another application.

## 7.1 Import to database

The function Import to database is designed for the bulk processing of the image data, which belongs to the individual persons. Import can be done in three ways which are described in detail in the following chapters: Manual import, CSV import and Regexp import.




### 7.1.1 Manual import

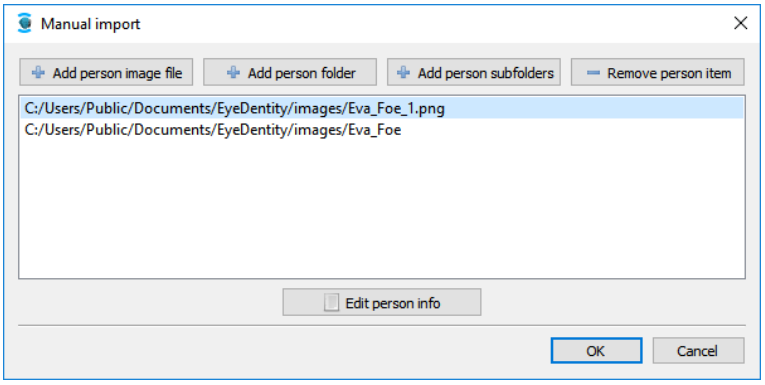
The function Manual import enables a creation of a list of persons and relevant data for import to a database directly in the application. Each record of the list represents one person. All fields contained in the person database can be set for each person.

In the first step either an image or an image folder of each imported person must be selected. For that purpose there are Add person image file, Add person folder and Add person subfolders buttons that open the corresponding Open dialog window. The selected image or folder is added to the list of imported persons.

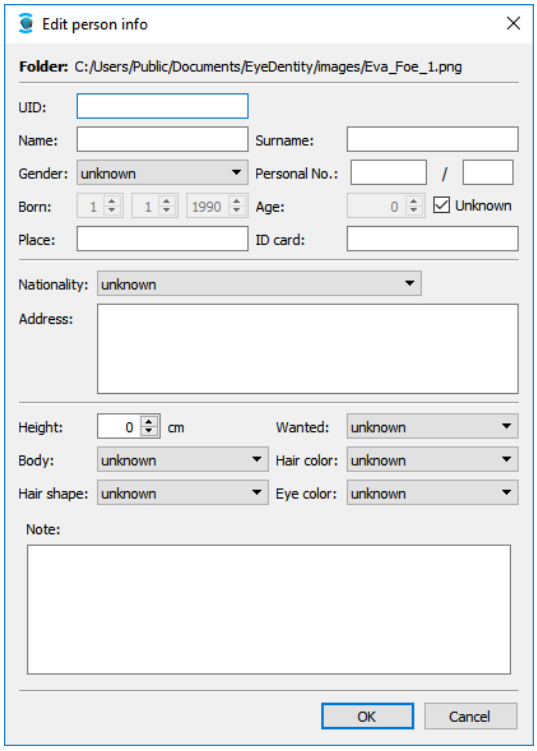
**Add person image file**
A person is added with one image attached. A face found in this image will be added to the database along with the person.

**Add person folder**
A person is added along with all images found in the selected folder (and all its subfolders). A person and all detected faces will be added to the database.

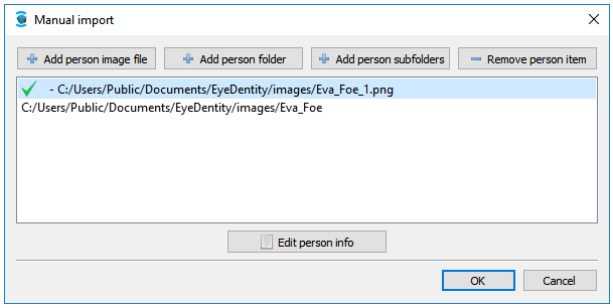
**Add person subfolders**
After selecting the folder all its subfolders are added to the list, where each represents one person.



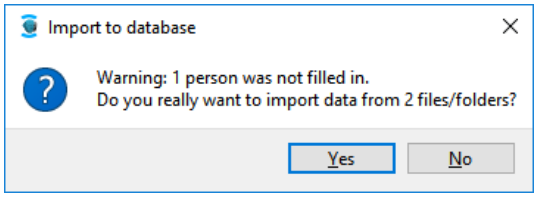

The person can be removed from the list using the Remove person item button. Personal information can be filled by pressing Edit person info button.




Edited persons are marked with a green tick in the list. Confirm the selection by pressing OK button in Manual import dialog window to start the image data processing.




If any of the imported person's data has not been edited, a warning appears; otherwise you are requested to confirm the import.




Click Yes to process image data and add persons and found tracks to the database. If a face has not been detected on a picture, the Manual detection window appears. Such a situation is described in chapter 8.6.2 .

### 7.1.2 CSV import

The import processes a CSV (comma-separated values) input file containing information about one or more persons. The file must meet the general requirements described below:

1. All fields belonging to each single person are placed on a single line.
2. Each line must contain requested number of fields.
3. If a text field contains a comma or a new line character (allowed e.g. in address field), its content must be put in quotation marks "" (from the import point of view, such a field is still considered as single-line). In other cases, a field may or may not be enclosed with quotation marks "". **Warning**: always use "" to quote a CSV field, not **“”** or **„”**!
4. If there is a need to enter a quotation mark " or a backslash \ in a text field, it has to be escaped with the \ character. In that case for example the string *"text"* will be written as *\"text\"* and *C:\Examples\EyeDentity* will be written as *C:\\Examples\\EyeDentity*.
5. Initial and trailing spaces in fields are ignored.
6. If the text field is to be blank, you can either enter an empty quotation mark or omit the value (in this case, two commas follow in sequence; in the case of the last field, the line ends with the last comma separator).

The order of CSV fields: *Folder, Name, Surname, UID, Age, Gender, Birth date, Birth place, Personal No., ID card number, Nationality, Address, Wanted, Height, Body, Hair color, Hair shape, Eye color, Note*

In addition to the general requirements, there are specific filed formats:

| Field | Representation, comment |
|---|---|
| ***Folder*** | Text string indicating the path to image data. If we do not want to import image data, leave this field blank |
| ***Name*** | Text string |
| ***Surname*** | Text string |
| ***UID*** | Text string |
| ***Age*** | Integer 0 – 200 |
| ***Gender*** | Character: *'m'* - male, *'f'* - female, *'u'* or blank - unknown |
| ***Birth date*** | Text string in the format *dd.MM.yyyy*<br>(dd: 01-31, MM: 01-12, yyyy: year) e.g.: 01.12.1980 |
| ***Birth place*** | Text string |
| ***Personal No.*** | Text string in the format *xxxxxx/xxxx* where *x* stands for a digit (0-6 digits |

| | |
|---|---|
| | followed by '/' character followed by 0-4 digits). Also may be blank |
| ***ID card number*** | Text string |
| ***Nationality*** | One of the values, which is found in the EyeDentity in the field *Nationality*. |
| ***Address*** | Text string, possibly multiline |
| ***Wanted*** | Integer 0 – 3: *1* - wanted, *2* - missing, other - unassigned |
| ***Height*** | Integer 0 – 250 |
| ***Body*** | One of the following values: *unknown, anorexic, skinny, thin, slim, medium, fat, obese* |
| ***Hair color*** | One of the following values: *unknown, white, black, brown, dark brown, highlights, dyed, bleached, blonde, red, gray* |
| ***Hair shape*** | One of the following values: *unknown, straight, curly, wavy, bald* |
| ***Eye color*** | One of the following values: *unknown, black, brown, blue, green* |
| ***Note*** | Text string, possibly multiline |

**Example:**

We want to import the following data:

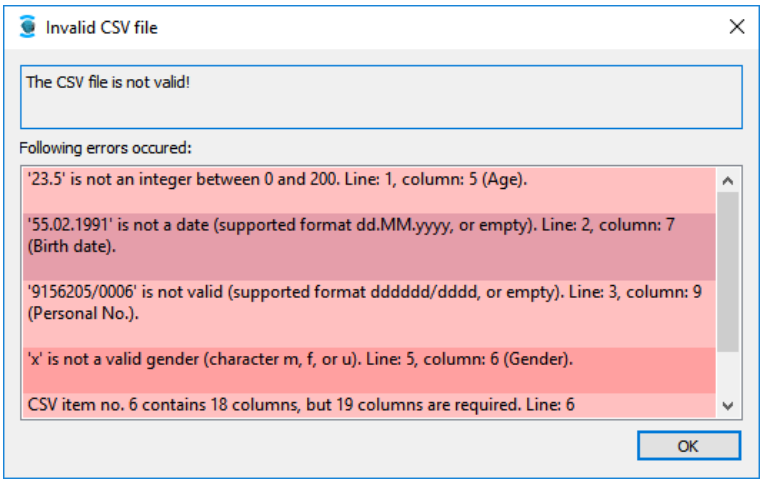
| **Person 1** | | | |
|---|---|---|---|
| Folder with image data: C:\data\images\ivakopecka\ | | | |
| Name:<br>Surname:<br>UID:<br>Birth place:<br>ID card number:<br>Address:<br><br><br>Note:<br>Gender:<br>Birth date: | Iva<br>Kopecká<br>e46as1d<br>Helsinki<br>F2PO245IX2<br>Nádražní 62<br>Bruntál<br>792 01<br><br>female<br>5th February 1991 | Personal no.:<br>Nationality:<br>Wanted:<br>Age:<br>Height:<br>Body:<br>Hair color:<br>Hair shape:<br>Eye color: | <br>Finland<br>unassigned<br>23<br>168 cm<br>thin<br>brownblack<br>curly<br>green |

| **Person 2** | | | |
|---|---|---|---|
| Folder with image data: E:\Users\Jan Novák\Images\udatny | | | |
| Name:<br>Surname:<br>UID:<br>Birth place:<br>ID card number:<br>Address:<br><br><br>Note: | Michal<br>Udatný<br>u64r<br>Rokycany<br>129442893797<br>Masarykova 29<br>Kladno<br>272 01<br>The missing man left his place of residence in Kladno and he has not made any contact until now. The description of the clothes that he wore last is not known. | Gender:<br>Birth date:<br>Personal no.:<br>Nationality:<br>Wanted:<br>Age:<br>Height:<br>Body:<br>Hair color:<br>Hair shape:<br>Eye color: | male<br>21.6.1972<br>722106/0377<br>Czech Republic<br>unassigned<br>42<br>178 cm<br>slim<br>brown<br>straight<br>unknown |

The content of the CSV file for import is the following:

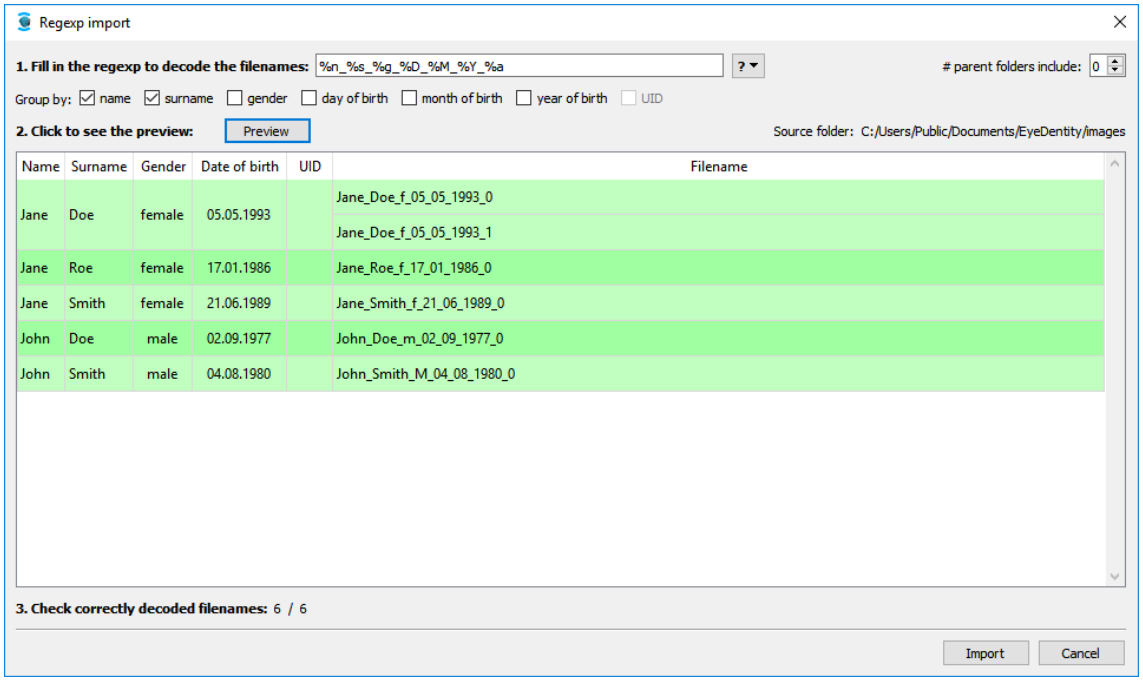
```
"C:\\data\\images\\ivakopecka\\","Iva","Kopecká","e46as1d",23,f,05.02.1991,"Helsinki",,
"F2PO245IX2","Finland","Nádražní 62
Bruntál
792 01",0,168,"thin","brownblack","curly","green",""
"E:\\Users\\Jan Novák\\Obrázky\\udatny", "Michal", "Udatný", "u64r", 42, "m", "21.06.1972",
"Rokycany", "722106/0377", "129442893797", "Czech Republic", "Masarykova 29
Kladno
272 01", 0, 178, "slim", "brown", "straight", "unknown", "The missing man left his place of residence in
Kladno and he has not made any contact until now. The description of the clothes that he wore last is not
known. "
```

If provided CSV file is not correct, the application informs user with a dialog window containing a detailed list of errors. All necessary information is included - a brief description of the error and the line number in the CSV file where the error occured. Also if it's possible, the entry contains the value which caused the error.




### 7.1.3 Regexp import

The prerequisite for using this function is the fact that all person data which we need to decode is contained in the image filenames or in the paths to these files. It is also important that all data which we want to decode is contained in the filenames and file paths with respect to one specific rule. Regular expression is used for describing this rule during the import. If one or more filenames or paths do not satisfy the rule the decoding of these entries is skipped.




The regular expression is a text string built from predefined elements which are representing specific person data fields. The elements which can be used in regular expressions are following:

| Regular expression | Meaning | Description |
|---|---|---|
| **%a** | Anything | Substitutes any character or the sequence of characters. |
| **%n** | Name | Name of the person containing letters or numbers. |
| **%s** | Surname | Surname of the person containing letters or numbers. |
| **%g** | Gender | Gender of the person defined by character **f** / **F** for female and **m** / **M** for male. |
| **%d** | Day of birth | Day of birth of the person defined by number without leading zero (1 - 31). |
| **%D** | Day of birth | Day of birth of the person defined by number with leading zero (01 - 31). |
| **%m** | Month of birth | Month of birth of the person defined by number without leading zero (1 - 12). |
| **%M** | Month of birth | Month of birth of the person defined by number with leading zero (01 - 12). |
| **%y** | Year of birth | Year of birth of the person defined by two-digit number (00 - 99). |
| **%Y** | Year of birth | Year of birth of the person defined by four-digit number (0000 - 9999). |
| **%u** | UID | Substitutes any character or the sequence of characters. |

## Example:

We have following filename list:

persons/wanted/Jan_Novák-25_01_89_M.jpg
persons/wanted/Petra_Bosá-05_11_81_f.png
persons/wanted /Zdeněk_Čermák-12_06_64_m.bmp
persons/missing/Jiří_Zelený-10_11_42_M.png
persons/missing/Žaneta_Udatná-18_02_01_F.jpg
persons/other/Lenka-Rychlá-12_1_1969_ž.jpg
persons/other/Šárka_Dobrá-07_09_75_f.jpg

Result for expression **%a/%n_%s-%D_%M_%y_%g**:

| Name | Surname | Gender | Date of birth |
|---|---|---|---|
| Jan | Novák | male | 1/25/1989 |
| Petra | Bosá | female | 11/5/1981 |
| Zdeněk | Čermák | male | 6/12/1964 |
| Jiří | Zelený | male | 11/10/1942 |
| Žaneta | Udatná | female | 2/18/2001 |
| | | | |
| Šárka | Dobrá | female | 9/7/1975 |

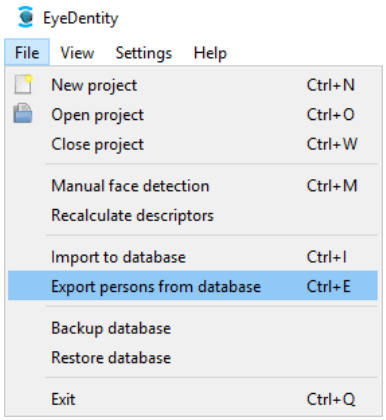
Decoding data for Lenka Rychlá's photo failed because its name does not correspond to the regular expression format even in several places: separating the name and surname with a hyphen instead of the underscore, January is written as "1" instead of the desired "01" form, the year is a four-digit, and the gender is written with unsupported "ž".

If there are multiple pictures for a single person, the user can easily group them. There are seven checkboxes that can be used to group photos together. The grouping is done in the cases when all the values from selected groups are identical. Example: In the previous picture two photos were assigned to Jane Doe, because parsed name and surname values were identical.

In the case when the user wants to edit the value, which was automatically parsed from the file name, it is possible by double-clicking the cell.

## 7.2 Export persons from database

The function Export persons from database is intended for creating the list of persons and their data from the database of the application EyeDentity, which is intended for further processing in other applications, alternatively for further re-import into the application EyeDentity. However, the function does not allow to export the image data from the database, it cannot be interchanged with backup of the database and data (see chapter 6 ).




The data of all persons in the database is saved to the CSV file after export, which is similar to the file for import from the chapter 7.1.2 . The only difference is that the exported file contains the value *UID* instead of the value *Folder*.

The exported values will be on the line in this order: *UID, Name, Surname, UID, Age, Gender, Birth date, Birth place, Personal No., ID card number, Nationality, Address, Wanted, Height, Body, Hair color, Hair shape, Eye color, Note*

**Example:**

If we export the following data:

| **Person 1** | | | |
|---|---|---|---|
| Name: | Iva | Personal no.: | |
| Surname: | Kopecká | Nationality: | Finland |
| UID: | e46as1d | Wanted: | unassigned |
| Birth place: | Helsinki | Age: | 23 |
| ID card number: | F2PO245IX2 | Height: | 168 cm |
| Address: | Nádražní 62<br>Bruntál<br>792 01 | Body:<br>Hair color:<br>Hair shape: | thin<br>brownblack<br>curly |
| Note: | | Eye color: | green |
| Gender: | female | | |
| Birth date: | 5th februar 1991 | | |

The content of the exported CSV file is the following:

```
"e46as1d","Iva","Kopecká","e46as1d",23,f,05.02.1991,"Helsinki",/,"F2PO245IX2","Finland","Nádražní 62
Bruntál
792 01",0,168,"thin","brownblack","curly","green",""
```

# 8 Description of main features

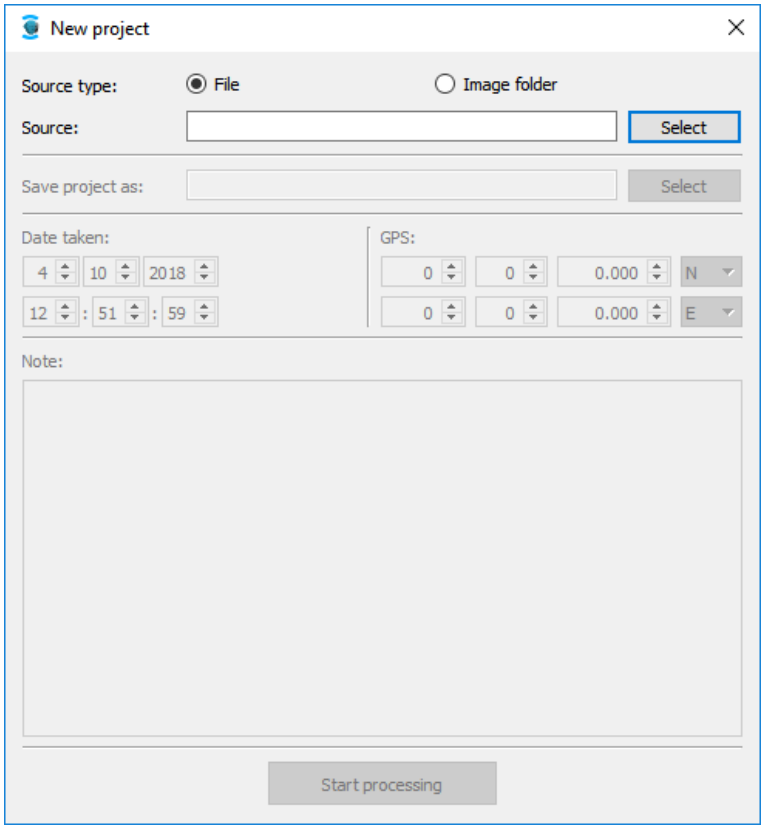
## 8.1 Project

Analysis of input files in the EyeDentity application takes place through projects. The project file stores information about the location of the source file (video or photos) and faces detected by the application (referred to as tracks). The most time-consuming operation takes place only when the project is created, so opening an existing project is relatively fast.

Since EyeDentity version 1.3.2, the application allows manual detection of tracks – faces in the input file that have not been detected. This functionality is described in chapter 8.6.1 .

### 8.1.1 Creating the new project

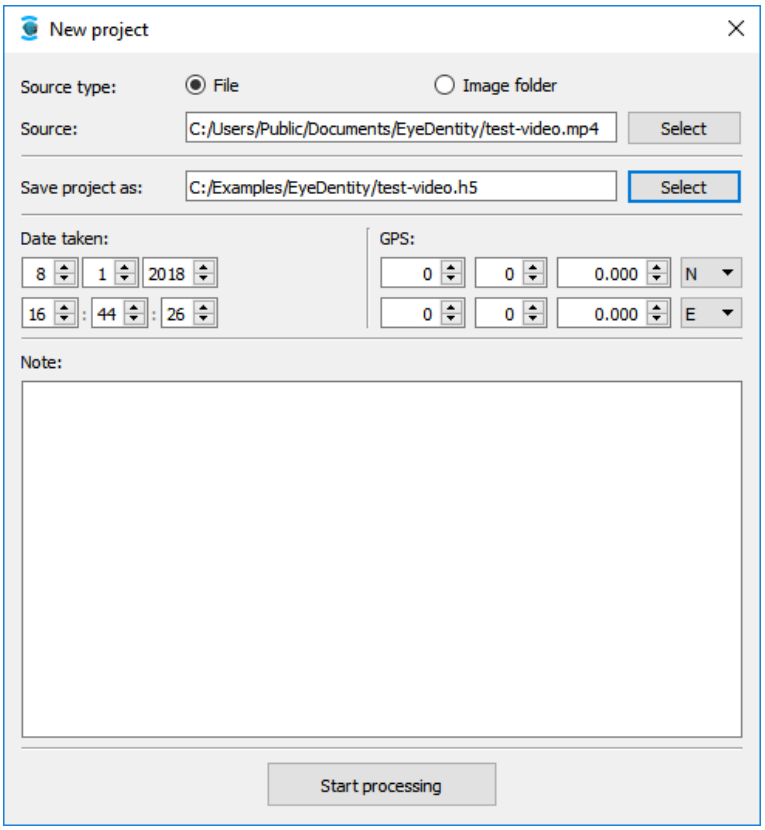
To process the digital image data with the application use the command File → New project in the main menu. It is possible to process bitmap images of the type JPG, PNG, BMP, TIFF and GIF and the video files AVI, MPG, MP4 and MOV. The program supports all video codecs of the standard ffmpeg, i.e. the most of the known codecs[1].



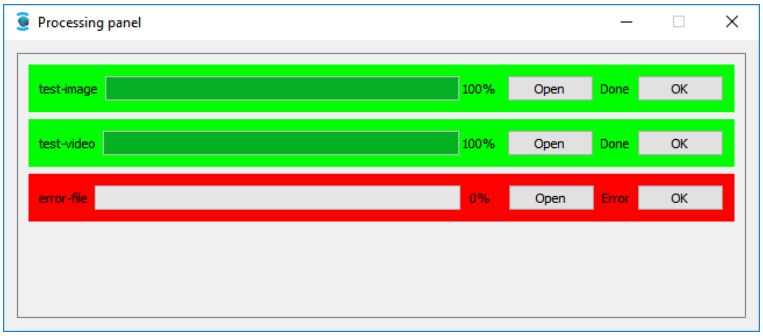

[1] In the case that it is necessary to process the video, which codec the program does not support, it is necessary to re-encode the video before processing.

In this dialog box, it is possible to choose whether to process a single file (image or video) or an image folder (which folder may contain additional subfolders) using the Source type switch. Click Select button to select a specific file/folder.

Once the source is selected, the Save project as field is automatically filled in. You can change the name of the project in h5 format as well as its path by clicking on the corresponding Select button. The project file name should not contain non-ASCII characters. It is also possible to enter the Date of acquisition, the GPS coordinates where the record was made, and possibly a text Note.




Press the Start processing button to start the processing of data. The window Processing panel is opened, there you can see the progress of the task processing and there it is possible to end processing using the Cancel button.




It is possible to load the results of processing into the application using the Open button, even if the project is not completely processed. In this case, it will show all findings up to now. After the processing completion is the project in the Processing panel highlighted in green.

In the case of the error the project is marked red. The project is removed from the list in the Processing panel using the OK button.

The project processing runs in the background. During processing it is possible to work normally with the application and also to create the new projects. The application can process up to 4 projects at once. Other projects are queued and are processed after the completion of the previous ones.

For displaying the video or image in the left part of the main window it is necessary that the input video or image is always available in the original location, for this reason it is suited to copy the data before processing in the folder, where the project will be saved.

The processing time depends on the length and the resolution of the input video or the number and the size of the input photographs, the total number of the faces included and the performance of the computer. The most time-consuming operation, which runs during processing, is the computation of the face descriptor. It takes on an ordinary PC several hundreds of milliseconds per face on CPU and units or tens of milliseconds per face on GPU (processing time depends on available computation power).

### 8.1.2 Open project

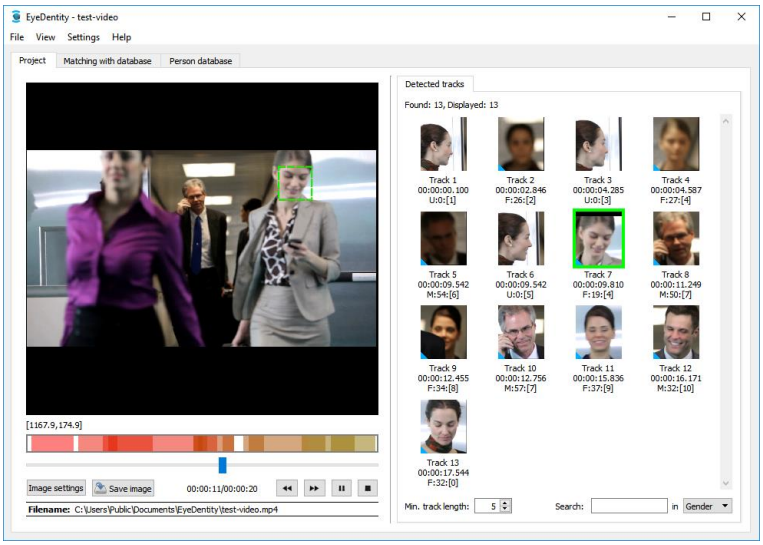
Processed projects can be opened either after completion of the processing from the Processing panel or using the item File → Open project in the main menu of the program. New projects (from version 1.3.1) have the extension h5, but it is possible to open older XML project files as well – in that case the old project will be automatically transformed and saved in the new h5 format.

### 8.1.3 Recalculation of descriptors

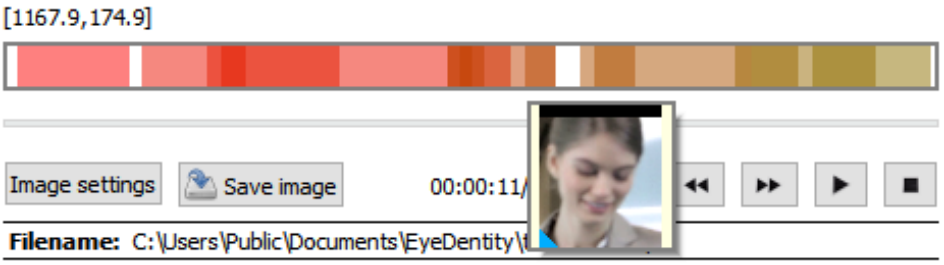
By choosing File → Recalculate descriptors, the input file will be processed from scratch, including track detection and descriptor computation (in fact, it corresponds to the creation of a new project with the same name and based on the same source). This option is particularly useful if the user cancels the processing of a new project but wants to complete it in the future. Recalculating descriptors also removes all manually detected tracks.

## 8.2 Work with found tracks

After opening the processed project from Processing panel or via File → Open project is in the left part of the main window of the application displayed the view of the video/image with the marked detections of the faces and in the right part is the list of all detected tracks with the faces.




When clicking the detected track is this track displayed in the left part of the window in the context of the entire image, or in the context of the video, from which the track comes from. The individual tracks detected in the video can be also be viewed by clicking the colored bar in the control under the video view, that shows, where are the tracks detected in the input video. When you place the cursor on the location with the detected track, the image of the detected track is displayed.




The video can also be seeked using the slider under the video and using the buttons serving to move to the previous and the next picture of the video.

In the case that one image is processed, these controls are not displayed. If the image folder is processed, only the slider is displayed to move between the images and the buttons to move to the next or previous image.

Bounding box around the detected faces can be turned on or off using the item View → Show all detections in the main menu in the preview of the video/image. Similarly, you can set highlighting of the active detection, (the detection that is selected in the right part of the window in the panel Detected tracks) in the main menu under the item View → Show active detection.

For each detected track is displayed information to the track below the image of the track. The first line indicates the number of tracks, the second line shows the time when the track in the video begins. On the third line is written the gender of the person recognized by the detector (M for male, F for female and U if the detector is not able to estimate the gender) age of the person estimated by the detector and the number of the identity in square brackets. It can be the same on more tracks, if the detector determines that it is probably the same person.

Tracks that **can be matched with the database** and for which advanced recognition functions can be applied are **marked with a blue triangle** in the lower left corner (these tracks usually contain one or **more frontal faces** of the given person or were detected manually).

### 8.2.1 Filtering of found tracks according to the length

In the case of the video processing the program automatically combines the detections of one face in the consecutive video frames into the tracks, which can then be filtered by the minimal number of the frames in the track using the field Min. track length on the card Detected tracks at the bottom left.

### 8.2.2 Sorting of found tracks by gender, age and identity

The detected tracks can be sorted using the field Search at the bottom right. It can be sorted by the recognized gender of the person, the recognized age and the identity. The search function sorts the detected tracks so that at the beginning are the tracks corresponding to the entered search, and then follow all other tracks. Sorting is started by pressing the key Enter in the search field.

#### *Sorting of found tracks by gender*

When searching the detected tracks by the gender enter the letter M in the field Search, if you want to find the tracks, where the detector determines the gender male. Enter the letter F, if you want to display females. Enter the letter U, if you want to display the tracks, where is a small confidence of the gender classification.

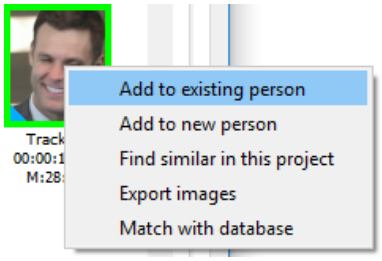
#### *Search in the detected tracks by age*

When searching by the age enter the desired age (e.g. 25) in the field Search. The detected tracks are then sorted according to the difference of searched age from the age recognized by the detector. For example, if you enter to search the age 25, at first will be the tracks with the estimated age 25, then the tracks with the age 24 and 26, then the tracks with the age 23 and 27 and so on.

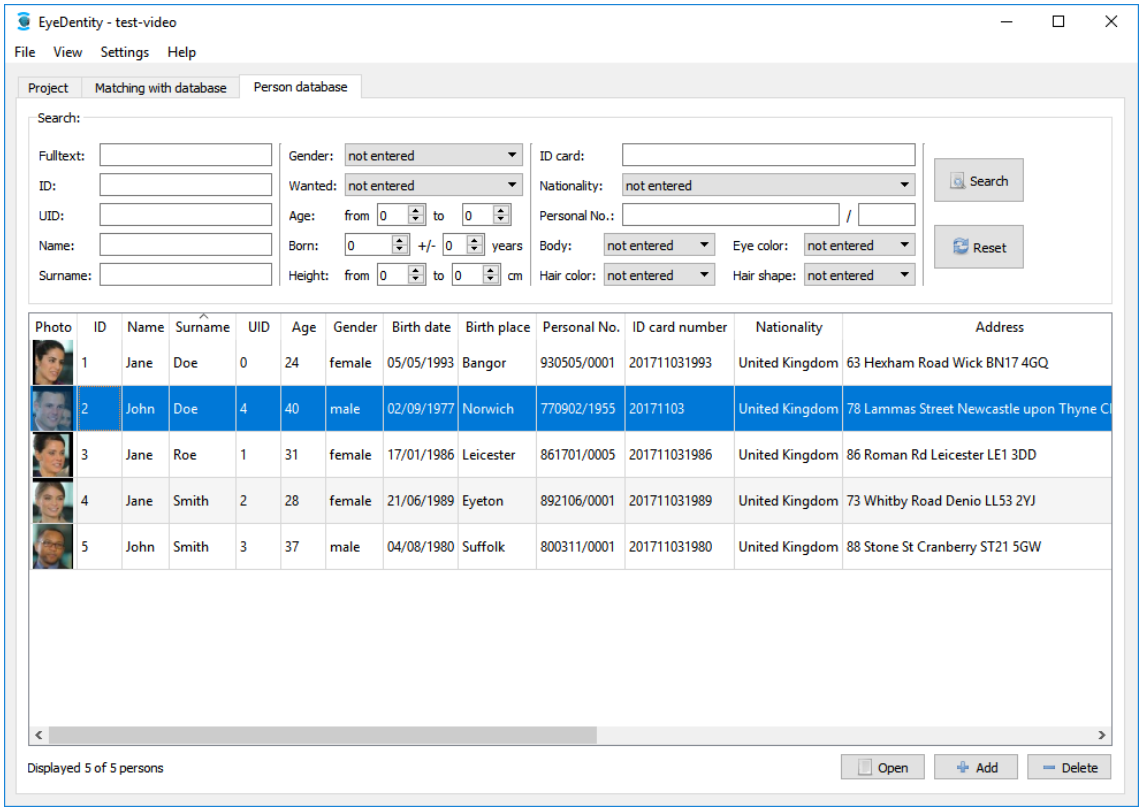
#### *Search in detected tracks by identity number*

During the detection of the tracks in the data are the found tracks mutually compared. If the detector determines that the identical person is on more tracks, all tracks have the same identity number. It is possible to search in the detected tracks by this number to determine whether more tracks belong to one person. When searching by the identity number the tracks of the given identity are displayed first and then the other tracks.

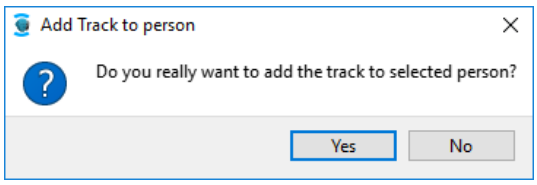
### 8.2.3 Adding a track to an existing person




Using the command Add to existing person, it is possible to add the selected track to the person, which already exists in the database. Using the keys Ctrl and Shift it is possible to add more tracks to one person at a time. The dialog box of the person selection opens after selecting the menu entry, where it is possible to select the desired person, to which the tracks are added.




In this dialog you can filter and sort the list of the persons in the same way as in the Person database (see chapter 8.5 ). Double-click to open the window with the details of the selected person. Click the OK button to add the selected track to the selected identity and confirm that the track is added to the selected person.

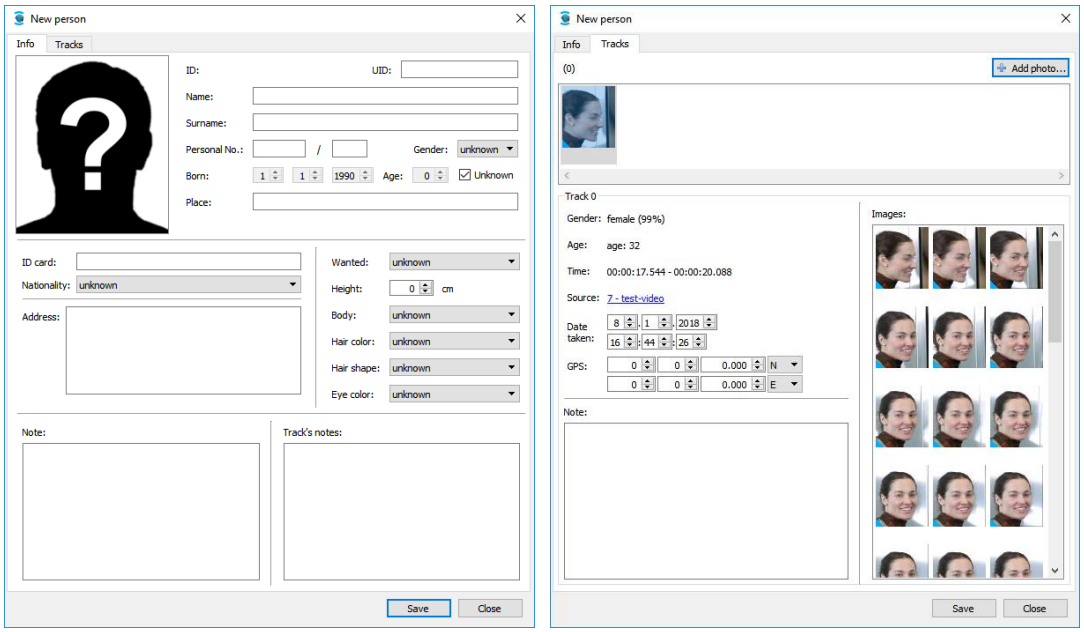



It is possible to cancel the addition using the No button.

Track previews that have been added to any person from the connected database are marked with a green tick in the lower right corner.

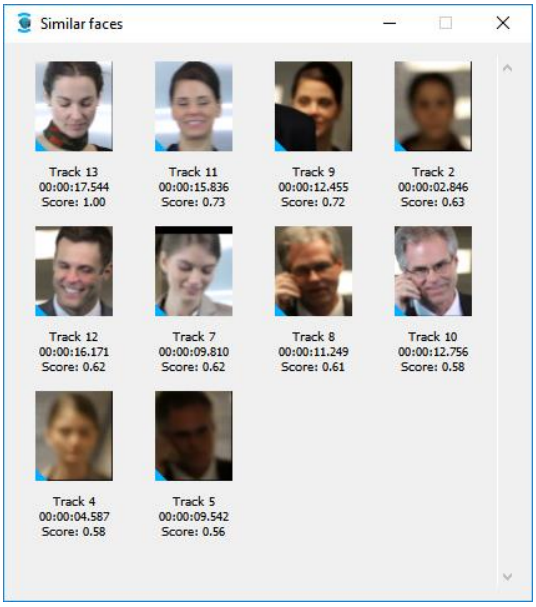
### 8.2.4 Adding a track to a new person

The found track can also be added to the newly created person. In this case the dialog for filling in the data for the new person is opened.




### 8.2.5 Finding similar tracks in project tracks

It is possible to search the similar tracks in the detected tracks in the given project based on the visual similarity of the faces. For this purpose serves the item Find similar in this project in the context menu (see the image on page 8-48). It is possible to search for the similar tracks only in the tracks that contain the frontal views, these tracks are marked with a blue triangle on the bottom left. Only the frontal faces are displayed in the search results.




### 8.2.6 Export images

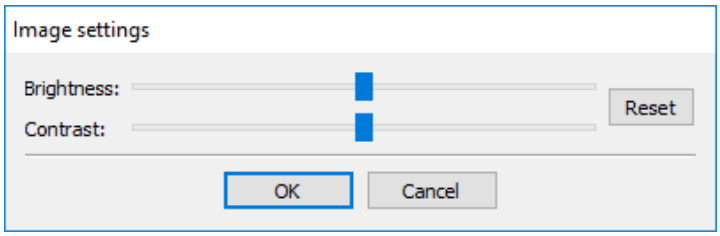
This option allows to save the cut-outs of all images of the selected track (the cut-outs with the faces, not original images) on the disk to the specified folder. The images are saved in a PNG format.

## 8.3 Working with the image

The following chapters describe how to work with the image displayed on the player.

### 8.3.1 Brightness and contrast adjustment of an image

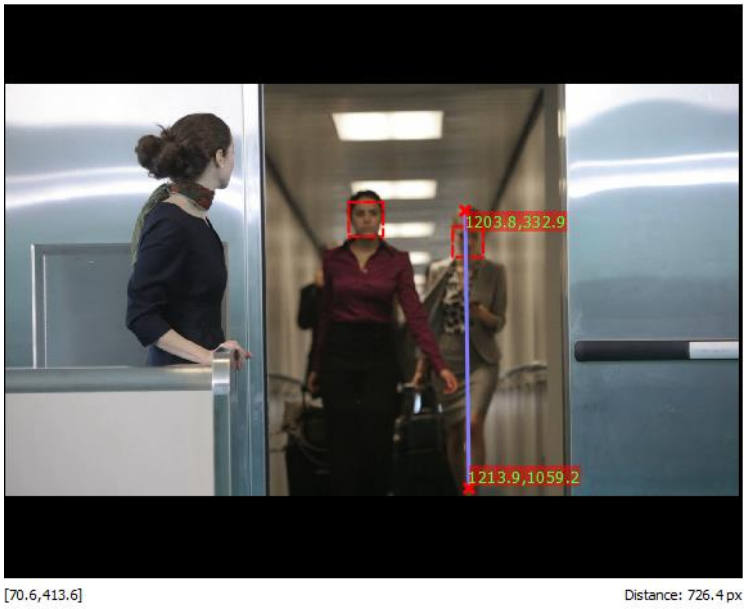
Brightness and contrast of the displayed view can be adjusted in case of need by pressing the Image settings button at the bottom left.




The program remembers this setting also for the projects opened afterwards and also after closing the program. The Reset button serves for setting the default values.

### 8.3.2 Measurement in an image

When moving the cursor over the preview of the video/photograph on the left under the picture are the current coordinates of the cursor in the image. When clicking on the image a mark is added in this place and clicking the second point in the image the distance between these points in pixels is displayed below the image on the right. The third click deletes the measurement.




### 8.3.3 Saving an image with detections

The current frame of the video or the image displayed in the left part of the window can be saved using the Save image button. The image will be saved as it is currently displayed, including the image settings and the displayed detections. The image can be saved in one of the formats PNG, JPG, BMP. The saving is recommended in the format PNG.

### 8.3.4 Keeping the aspect ratio / window customization

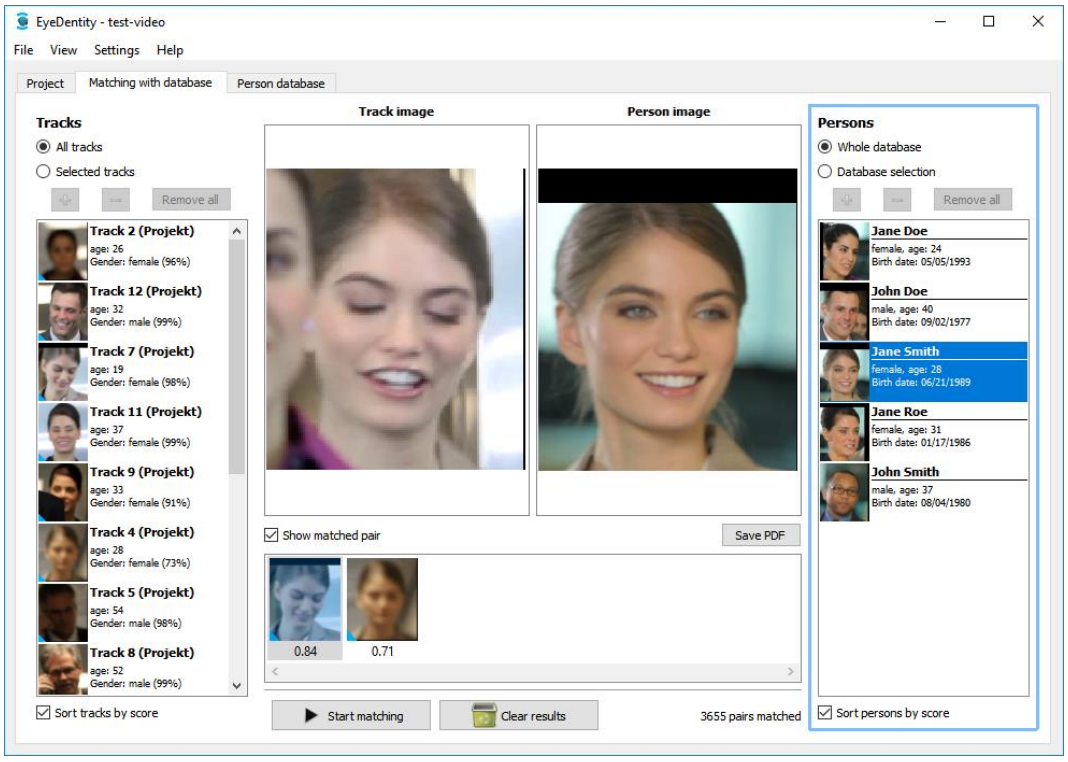
The size of the displayed photo or video is automatically adjusted to the size of the application window. By default, the aspect ratio is kept. Right-clicking on the player area and selecting the Fit to window option from the context menu fills the entire area of the player. Switch back to the original state by selecting the Keep aspect ratio option.

### 8.3.5 Zoom

You can zoom in or out the photo or paused video on the player by turning the mouse wheel while holding down the Ctrl key.

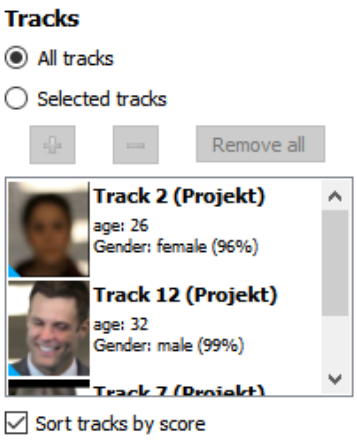
## 8.4 Matching of faces

The panel Matching with database is used for setting, to start the matching and to view the results afterwards. The panel is divided into four areas. On the left is the column with the List of tracks, on the right is the List of persons, at the bottom in the middle is the List of results and on top in the middle is the Pair of faces, that is currently selected. Matching is started using the Start matching button, the results are displayed afterwards. Deleting of the found results can be done using the Clear results button.




### 8.4.1 List of tracks

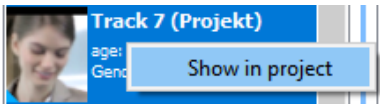
The left part of the panel Matching with database contains the List of tracks, that were found in the current project. The list is used both for the display of the found tracks and setting of the matching parameter, and viewing the results that belong to the individual tracks.




The switch All tracks determines that all found tracks in the project will be included in the matching. On the contrary, the selection Selected tracks allows to include in matching only the subset of the found tracks in the matching. This speeds up the matching itself and also increases the clarity in viewing of the results.

The individual tracks in the list can be sorted in descending order according to the achieved score in the matching by enabling the switch Sort tracks by score. In the opposite case are the tracks sorted by the order in the project.

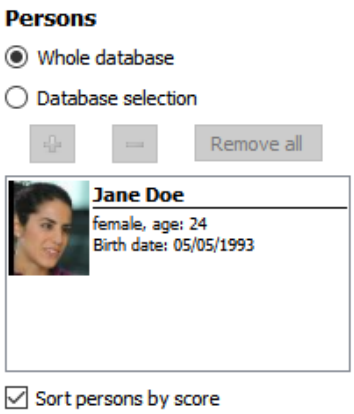
Right-click the selected track unfolds the drop-down menu




with the following options:

| | |
|---|---|
| Show in project | The selected track is marked and played in the list of faces in the tab Project. |

## 8.4.2 List of persons

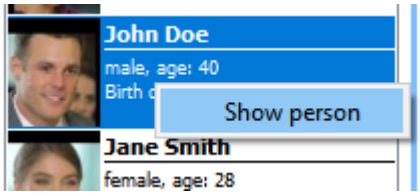



The right part of the panel Matching with database contains the List of persons, which are in the database. The list is used both for displaying the persons and setting the matching parameters, and viewing the results that belong to the individual persons.

The switch Whole database determines that all persons from the database will be included to the matching. On the contrary, the selection Database selection allows to include only the subset of the persons for the matching. This speeds up the matching itself and simultaneously increases the clarity in viewing the results.

The individual persons in the list can be sorted in descending order according to the achieved score in the matching by enabling the switch Sort persons by score. In the opposite case are the persons sorted alphabetically.

Right-click the selected person in the List of persons unfolds the drop-down menu




with the following option:

| | |
|---|---|
| Show person | It displays the window with the card of the person from the database. |

### 8.4.3 List of results

The panel Matching with database contains at the bottom in the middle the List of results. Here are shown the found results for the currently selected track/person sorted in descending order by the achieved score. The displayed results change based on the currently selected track/person.

In the case of the selection of the track from the List of tracks are the persons in descending order sorted by the achieved score with the selected track displayed in the List of results. Selecting the person from the List of persons the tracks are displayed in descending order sorted by the score with the selected person in the List of results.

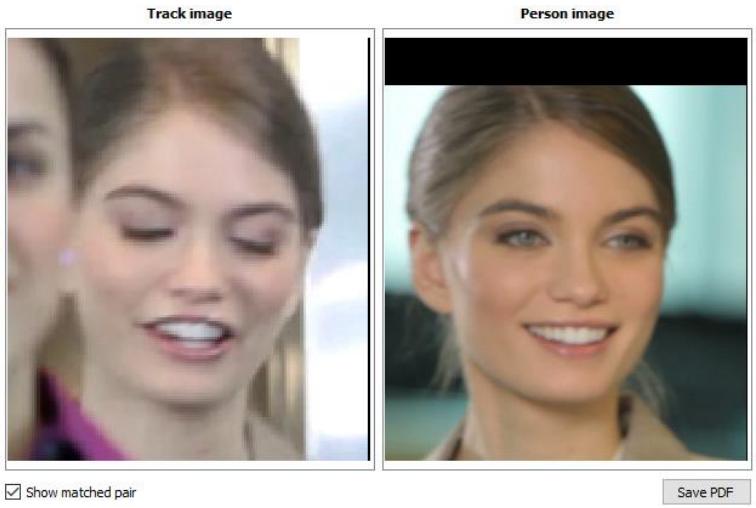
### 8.4.4 Browsing the results

The results of the matching can be browsed both using a mouse and using a keyboard. When using the mouse is the selection from the List of tracks, the List of persons and the List of results done by left-clicking. The right-click allows to display the context menus.

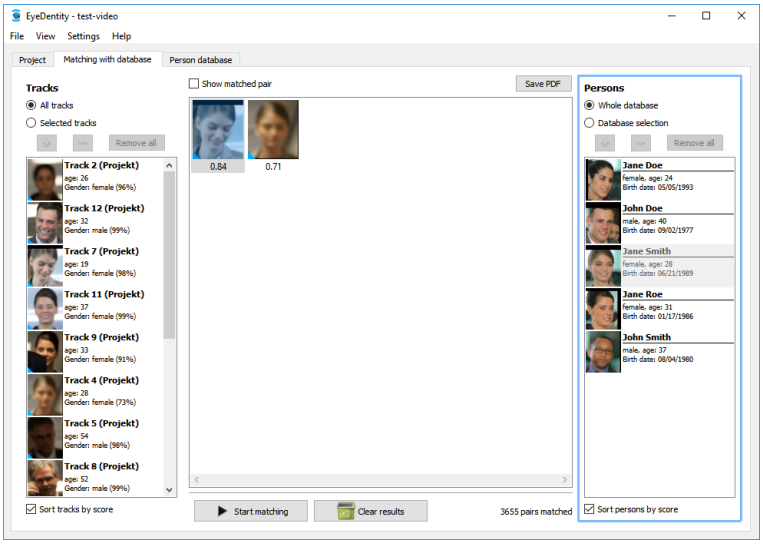
In comparison with the mouse, using the keyboard enables faster browsing of the results, but it does not have the context menus for the individual elements. Browsing the List of tracks and the List of persons is possible using the keys up and down. Switching between the List of tracks and the List of persons is possible using the keyboard shortcuts Ctrl+left that activates the List of tracks, and Ctrl+right that activates the List of persons. The active list is marked with a blue frame. Browsing the results in the List of results is possible using the keys left arrow and right arrow.

### 8.4.5 A pair of faces

The panel Matching with database contains on top in the middle the pair of the currently selected faces. Here are shown the cut-outs of the found and matched faces. The displayed pair of faces changes when selecting the result in the List of results. On the left is the image from the matched track, on the right is the image of the matched person from the database.



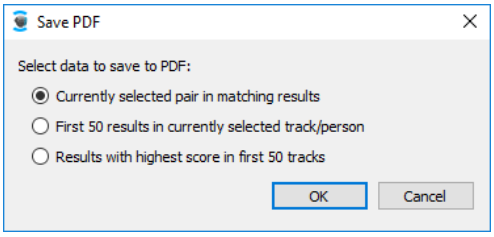
The pair of faces can be displayed/hidden using the selection Show matched pair. The List of results extends, and more space for the result thumbnails is created.




## 8.4.6 Saving results to PDF

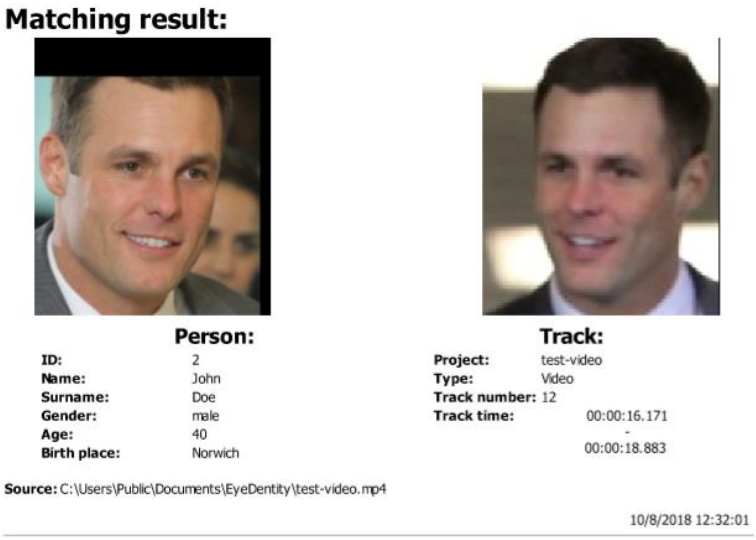
Uložit PDF

The results obtained from the matching can be saved to a file in PDF format. There are three saving options as a choice, which vary according to the results, which are included in the file. It is possible to save Currently selected pair in matching results, First 50 results in currently selected track/person and Results with highest score in first 50 tracks.




### *Currently selected pair in matching results*

When selecting this option, the currently selected pair of matching is saved in the file. This can be determined by selecting the appropriate track/person from the List of tracks/List of persons and subsequent selection of the result from the List of results.



### *First 50 results in currently selected track/person*

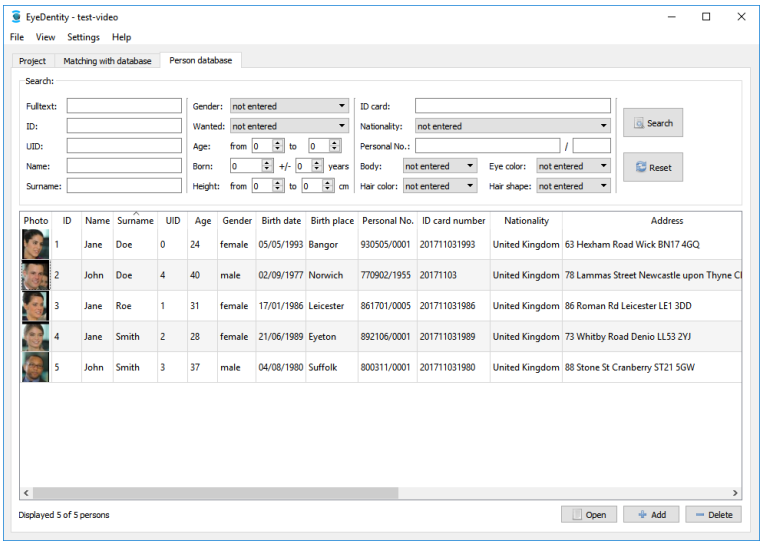
The mentioned selection allows to save the first 50 results sorted by the score. The group of the results, from which it is selected, is determined by the active track/person from the List of tracks / List of persons.

### *Results with highest score in first 50 tracks*

With this option are always saved the first best results from the first 50 tracks sorted in descending order by the highest achieved score in the PDF file.

## 8.5 Person database

It is possible to create and manage the person database in the program, that can contain up to several thousands of records. It is possible to search easily in this database, or to filter it by the individual fields.




It is possible to sort the database records by clicking the header of the appropriate column. At the first click the records are sorted in ascending order, at the second click in descending order and then is the direction of sorting switched over and over.

### 8.5.1 Search in the person database

The search field for all items in the database are permanently displayed at the top of the perons database table. Between search terms in the individual fields is a logical conjunction “and”, it means that all conditions must be valid together. For example, if we enter into the search the Name Jan and the Surname Novák, after the press of the Search button are found all persons, who are named Jan Novák, but not e.g. Jiří Novák or Jan Svoboda.

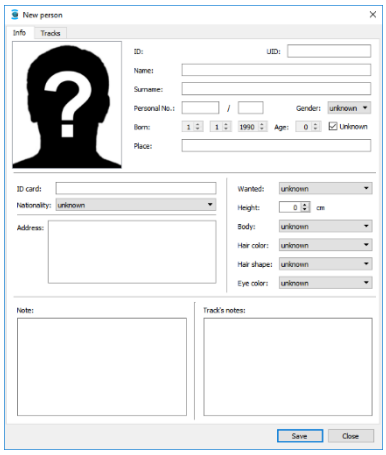
Zero in the fields Age, Born and Height indicates that the search by this field is turned off.

In the text fields it is possible to search by entering the initial letters, e.g. when entering the name “Vladi” the program finds the persons named Vladimír, Vladislav, Vladislava, …. But this works only for the initial letters, it is not possible e.g. to enter to the field name “mír” and to expect that the program finds the persons named Vladimír, Jaromír, and similar.

The field Fulltext is used to search in all text fields at once. These are the fields Name, Surname,

UID, ID card number, Address, Birth place, Personal No., Note and Notes in the tracks.

### 8.5.2 Adding a new person to the database

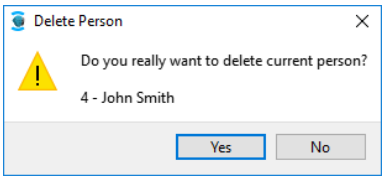


A new person can be added to the database using the Add button directly on the Person database tab. After pressing this button, a blank card of the person is displayed.

On this card, it is possible to fill in all the required information and to add it to the database using the Save button. The person's picture can be uploaded by pressing the Add photo... button on the Tracks tab (for details see chapter 8.5.4 ).

An alternative way to add a new person to a database is to create a new project with photos of the person concerned. Then select Add to new person from the detected track context menu (for more details see chapter 8.2.4 ).

### 8.5.3 Removing a person from the database

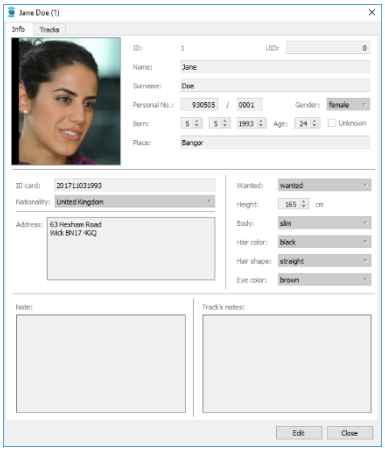



To remove a person from the database user can use the Delete button at the bottom right of the window that will remove the selected person. Using the keys Ctrl and Shift can be selected and deleted more persons at once. A confirmation dialog is displayed before removing. The person is removed from the database and cannot be restored in any way after the confirmation.

### 8.5.4 Editing a person

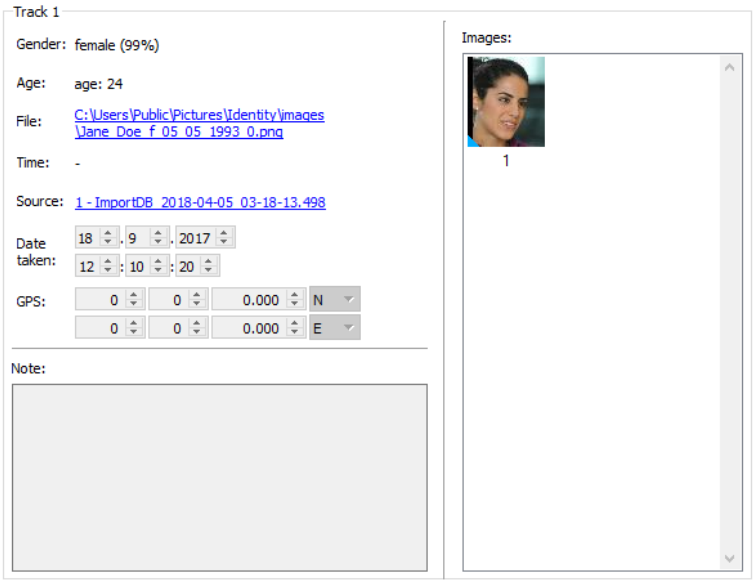
Editing a person saved in the database can be done by opening the window with details of the person and either double-click the given person or by using the Open button.

Click the Edit button to make available editing in all fields. Information about the person can be edited in the tab Info. The assigned tracks and images can be modified in the tab Tracks.



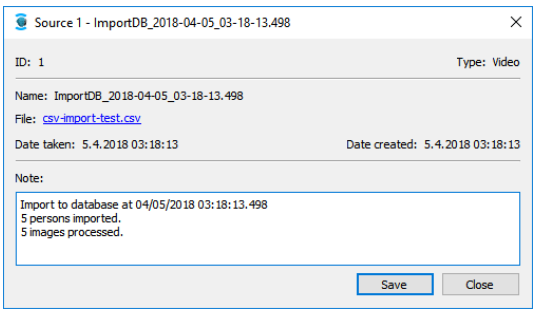
To find the face in one photograph and then add a track to the displayed person the button Add photo... can be used. If the face will be detected in the photograph, it will be immediately loaded among the tracks of the person. To save this track to the database, it is necessary to save the whole person using the button Save.

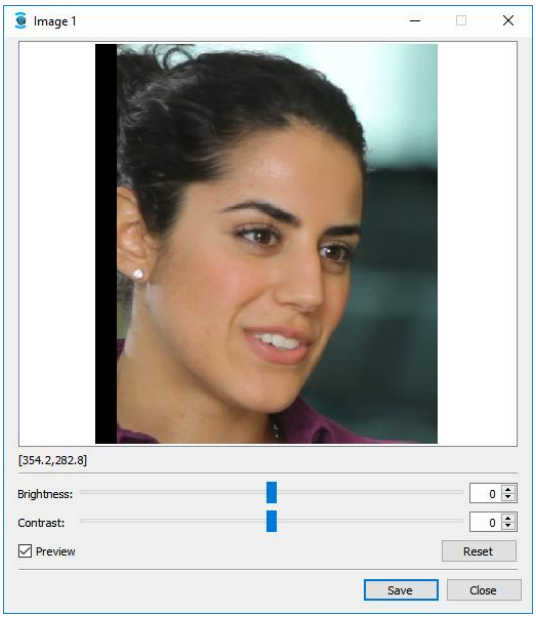
Selecting a track from the list displays all relevant images and also the information obtained from the face detector and the source project at the same time. It is possible to save a note and GPS coordinates to each track.

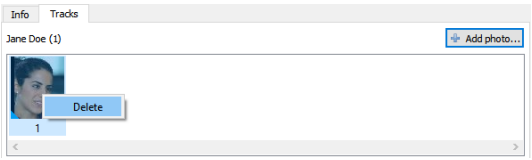



Clicking on the linked source opens a window with detailed information about the source itself (which can be either a project, or an import). It includes the type, name, source file name, date of taking, date of insertion and editable note.

The brightness and contrast of the image can be changed by double-clicking on individual track images. This setting is saved when the Save button is pressed, and the image will be displayed on the Tracks tab with adjusted brightness and contrast.

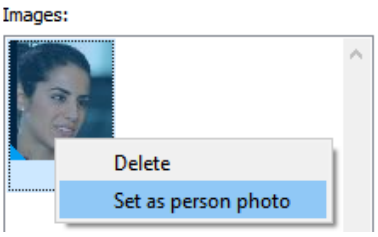





On the Tracks tab, you can also delete the selected track by pressing the Delete key or by selecting Delete from the context menu by right-clicking the track image.

Similarly, you can delete selected images from the track using the right-click contextual menu or by pressing the Delete key. Any image from the track can also be set as the preview of the person using Set as photo of person in the context menu.



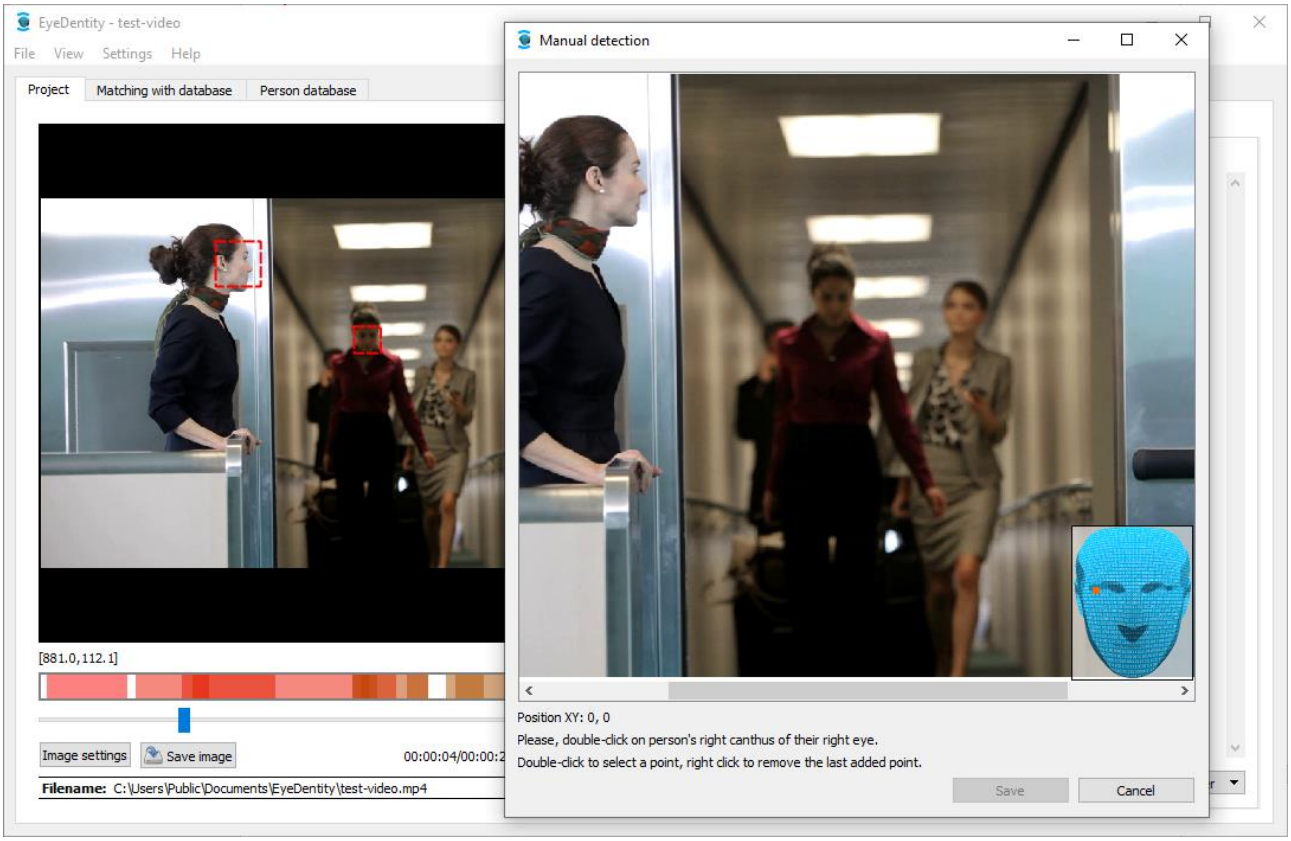

## 8.6 Manual detection

If our face detector could not find a face on the image, it is possible in some cases to add significant points on the face manually. Once entered, the person can be identified automatically as if added by the detector itself.

The Manual detection window can be displayed in order to add a project track, it will also be automatically displayed when detection fails when importing to a database or adding an image while creating / editing a person in the database. All three cases are discussed in more detail below.

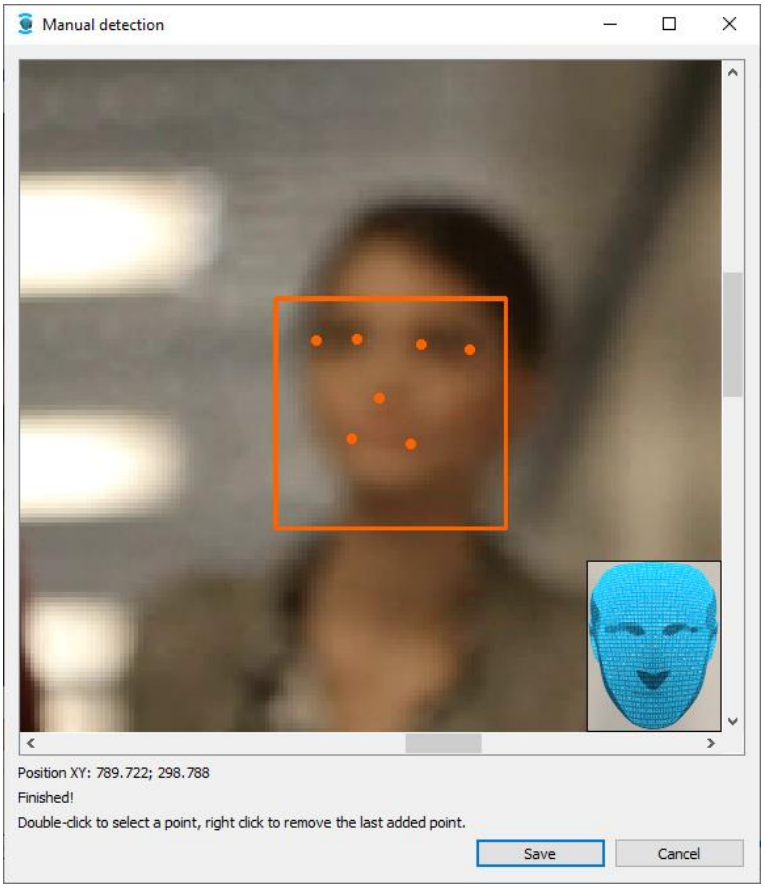
### 8.6.1 Track detection

If the application does not detect a face in the input file when creating a project, it can be marked manually using the File → Manual face detection option.

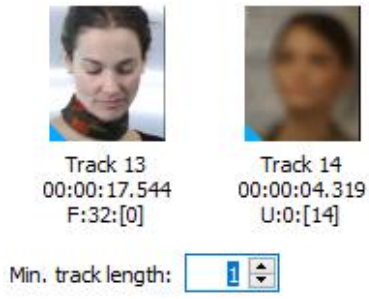


The user is asked to enter these seven points in the dialog window: Right canthus of person's right eye, left canthus of person's right eye, right canthus of person's left eye, left canthus of person's left eye, person's nose tip, right corner of person's mouth and left corner of person's mouth. The selected points are highlighted with a red dot. In the lower right corner of the picture there is a small blue face with a red mark indicating the point to be labeled.

For more precise selection, you can zoom in with the mouse wheel while holding the Ctrl key. It is recommended to mark the points very carefully as it affects the quality of the subsequently calculated face descriptor.

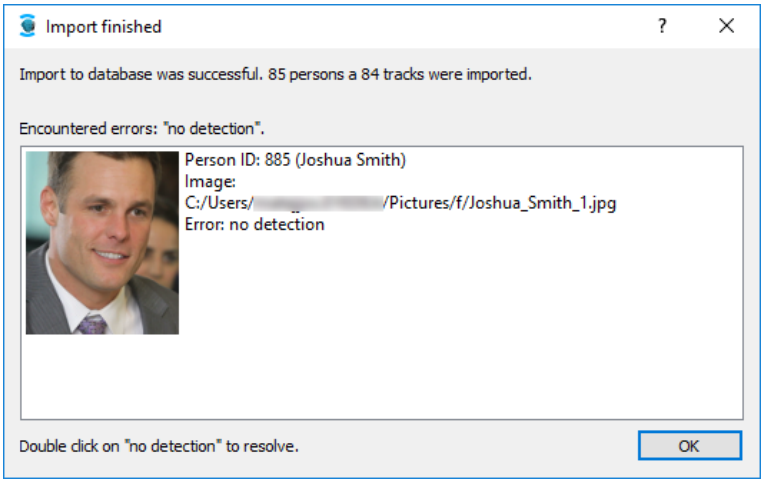



After selecting the last point, the face is marked with a red square and you can press the Save button to compute the descriptor and save the track. Note that in the case of a video, a manually detected track always has a length of one image, so it is necessary to change the Min. track length to 1 to show that track on the Detected tracks tab.

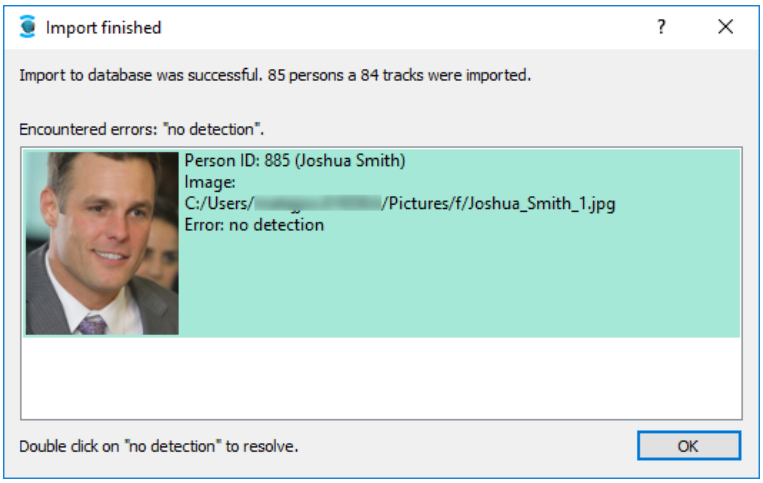


### 8.6.2 Importing to database

After the import is done, information message will appear on the screen, in the upper area there will be information summarizing how many tracks and persons were added to the database, in the lower area, there will be list of errors. User can double click on any of those, that say "no detection".




After that the Manual detection window with selected image appears. The user is asked to mark seven points in the same way as for the track detection. When the Save button is pressed, the previous window is displayed again with the green background for the resolved image.



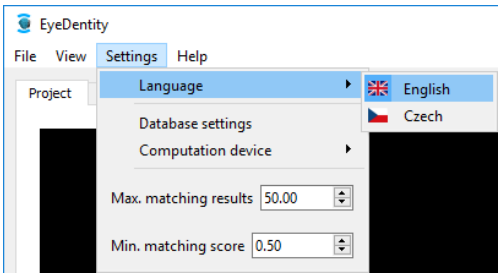

### 8.6.3 Adding a photo while creating/updating a user

In this case only window for manual detection will be displayed, the process of marking facial features is exactly same as described in 8.6.2 .

# 9 Program settings

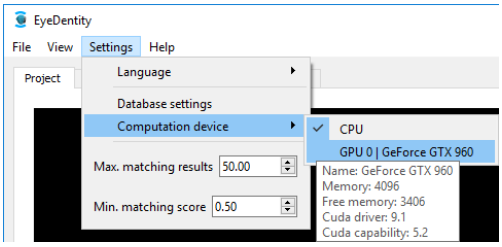
## 9.1 Language change

The application EyeDentity allows switching the display language from the version 1.1.1. This can be done in the main menu in the Settings → Language. Currently, the application supports Czech and English language. After selecting the relevant language, application will be restarted with the selected localization.



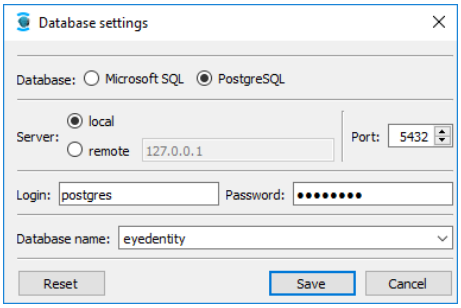

## 9.2 Computing device change

Since version 1.3.0 it is possible to change the computing device. The processor (CPU) or one of supported graphics cards (GPU) can be selected. The user can change the computing device through menu Settings → Computing device. Graphics cards supporting CUDA® 8.0 and higher can be used. For a successful change to GPU it is necessary to have a valid license for the GPU computation. If a valid license is not available or if there's any other issue, the application will roll back to the CPU computation.

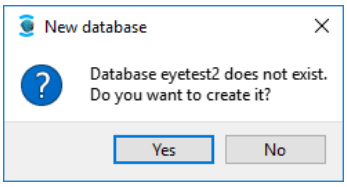



## 9.3 Database settings

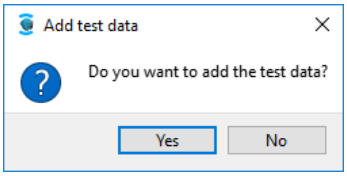
The dialog Database settings allows to set the database location and other options. The item Database determines which type of SQL server will user connect to – for the right settings please contact your Database Administrator.



The item Server determines where the database is located. In the default setting it is local (installed on the same computer as the application). The item Port determines using what port it is possible to access the database. In the default setting is PostgreSQL installed on the port 5432. The field Database name determines, to which database the program will connect. If the entered name of the database does not exist, its creating is offered subsequently. The database name can contain only small letters, digits and underscore character.




Insertion of test data for the first test of the application functions is offered after the database creation.




Using the database name, it is possible to have more different databases of the persons on one computer and to switch between them by changing the database name.

After editing it is necessary to save the changes using the Save button, or alternatively it is possible to close the dialog without saving of the performed changes using the Cancel button. Reset button allows resetting the default values. With that the application will work, if these values were not changed after installation.

## 9.4 Matching settings

The item Max. matching results determines, how many results at most will be shown in the tab Matching with database after pressing the button Start Matching. The item Min. matching score determines the lowest possible score for the result to show.

# 10 Technical details

## 10.1 Possible harddrive writes

Application Eyedentity during its run sometimes needs to write to the computer's harddrive, because in some cases it can be handy to know during which operation and where the program writes, we provide you with this short summary.

The program continually maintains information about its settings so it can be used again after it is restarted. Therefore there is a configuration file in C:\Users\$USER\AppData\Local\EyeDentity folder where $USER indicates the name of the logged-in user in Windows. Internal temporary files of EyeDentity can also be found in this folder.

The location where the project file will be saved in the h5 format is chosen by the user when the project is created. Optional is also the location of all exported data, whether images, export / backup of database or PDF file with comparison results.

EyeDentity does not write into any other location apart from those mentioned above and the person's database.

## 10.2 How to create person Microsoft SQL Server database

This guide is for Microsoft SQL Server Administrator,, because the specific privileges are needed to create the new database. After creation of database with desired name, it is neccesary to execute two SQL files from the folder DB in installation path C:\Program Files\Eyedea Recognition\Eyedentity, names of those files are create_tables_microsoft.sql and insert_values.sql, please execute them in this order.

The execution can be done using the Microsoft SQL Server Management Studio 17, after the connection to the database, open the file named create_tables_microsoft.sql, you can open the files with keyboard shortcut Ctrl+O, and then press F5 or Execute button, same steps should be used to execute the second file.

## 10.3 How to update person Microsoft SQL Server database

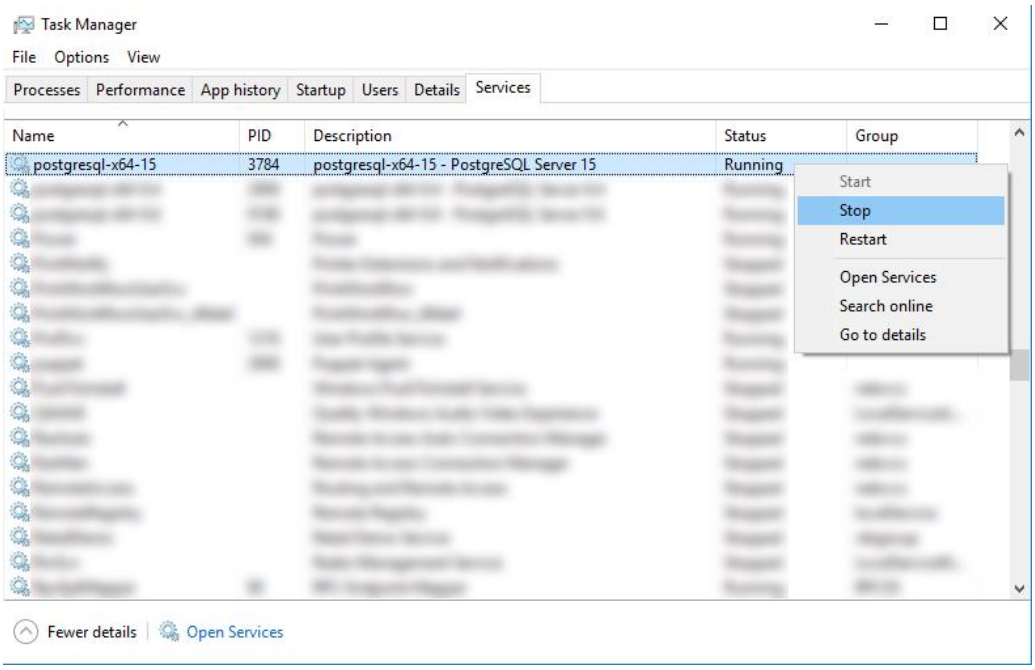
This guide is for Microsoft SQL Server Administrator. If the person database has been created for EyeDentity version 1.2.1, it is necessary to update it to support the version 1.3.0. In the installation folder (e.g. C:\Program Files\Eyedea Recognition\Eyedentity) in the subfolder db/, a file update_1.2.1_to_1.3.0_microsoft.sql can be found. This file must be loaded into the database, in the way it is described in the Chapter 10.2 .

## 10.4 How to move PostgreSQL database data

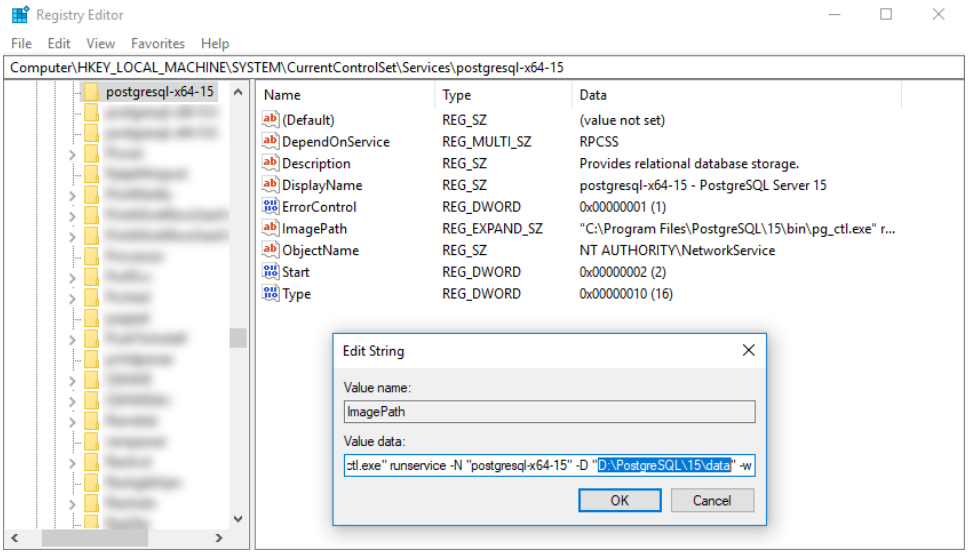
This guide describes, how to move PostgreSQL data, that are used by EyeDenity, into a new location in the file system.

**Before you continue, we strongly suggest to backup your database (see chapter 6.1 )**

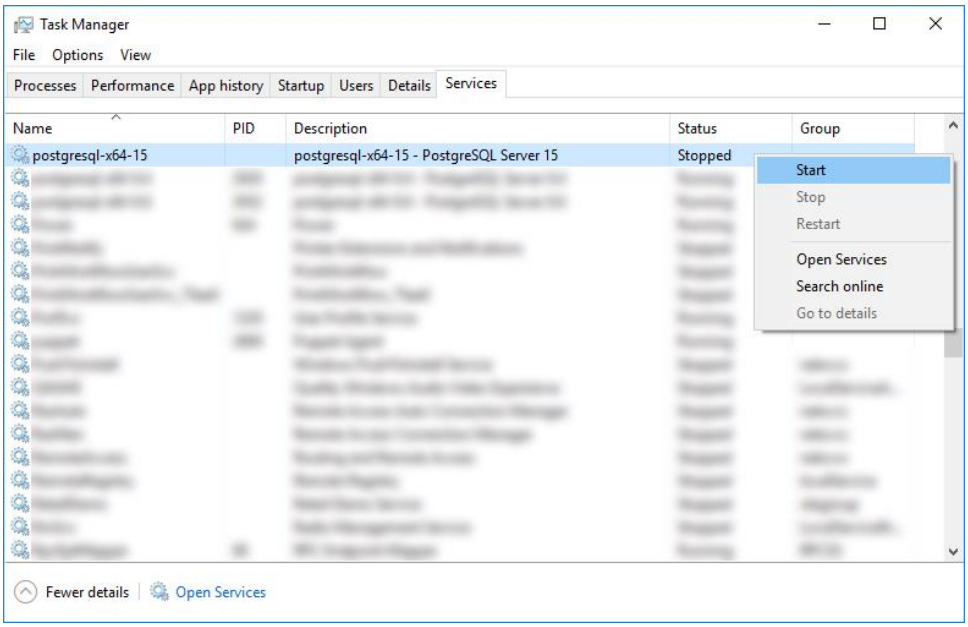
1) First of all start the Task Manager and open the Services tab. In the list of services find PostgreSQL database service, it's usually named *postgresql-x64-<VER>*, where *<VER>* denotes a version number of the database server. There can be several database servers installed, which can be distinguished by their version. Each version has its own data directory, so the user has to find and select the correct data folder to move.
2) Before we can continue we have to stop the selected service *postgresql-x64-<VER>*: right click the service and select the action Stop.




3) After the service was successfully stopped, start the program regedit (Start → search regedit → press Enter). The Register Editor window appears. In the upper part of the window is the address input line, insert the following address (you can also use the tree structure in left part of the window): *Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\postgresql-x64-<VER>*. Replace the string *<VER>* with the correct version number of PostgreSQL database.
4) In the right part of the window choose the value ImagePath and double-click it with left mouse button. A dialog appears where the chosen value can be editted. The path to database data is located in the string after parameter -D surrounded by quotation marks. Change the original address (usually *C:\Program Files\PostgreSQL\<VER>\data*, *<VER>* is the version number) to a new location (for example: *D:\PostgreSQL\15\Data*).




5) Confirm the new location by clicking the OK button and close the Register Editor. Open the File Explorer and find the original location, where the data is still located (as mentioned before, it is usually *C:\Program Files\PostgreSQL\<VER>\data*, *<VER>* is the version number).
6) There select all directories and files and move them into the new location (the one chosen in the steps above, for example: *D:\PostgreSQL\15\Data*).
7) When the copying is done, run the Task Manager again and open the Services tab. Find the service *postgresql-x64-<VER>* again, the one which was previously stopped, right-click it and select action Start. After the service successfully starts, the database server is ready to use.



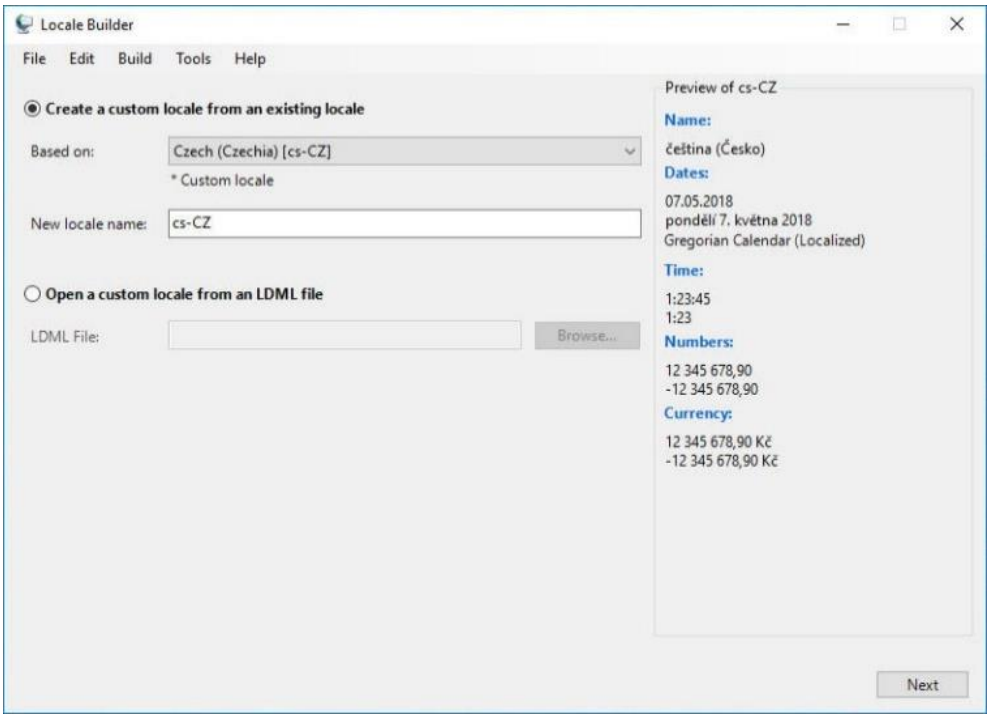
# 11 Known issues

## 11.1 PostgreSQL failes to run

After Windows 10 Fall Creators Update (KB4041994) installation, the czech localization in Windows 10 was renamed from Česká Republika / Czech Republic to Česko / Czechia. Because the PostgreSQL refers to the old localization name, the database server fails to run after this update. For this case, here is a workaround.

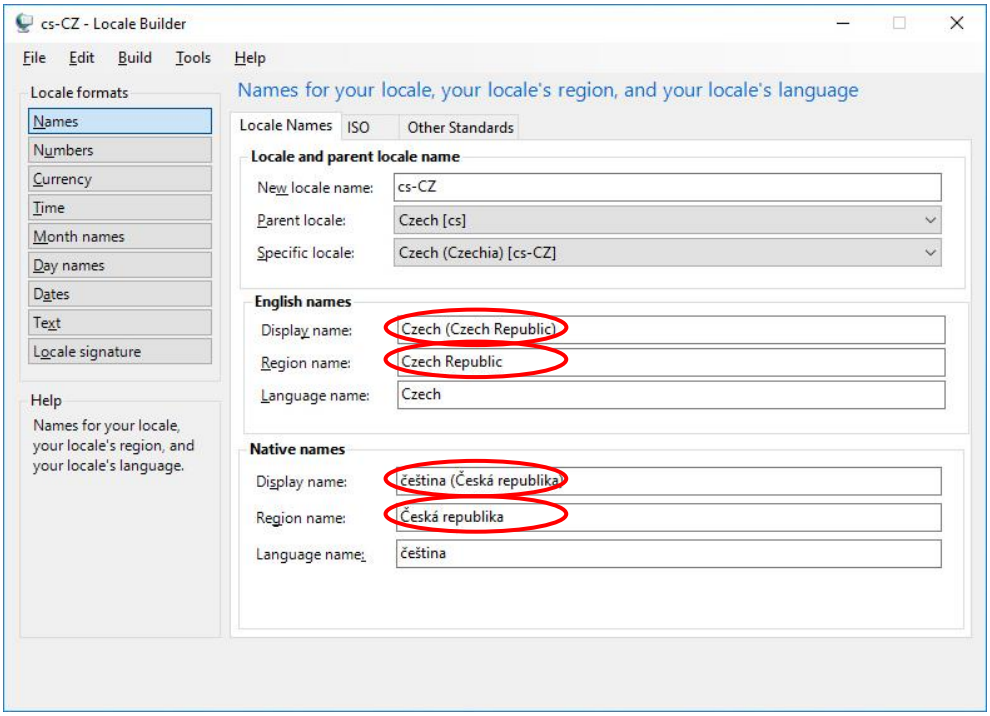
1) Download and install the Locale Builder 2.0 application from Microsoft web page (https://www.microsoft.com/en-us/download/details.aspx?id=41158).
2) Run Locale Builder (Start menu → find Locale Builder → press Enter).
3) Initial screen is displayed. Select Create a custom locale from an existing locale option and from the Based on field select Czech (Czechia) [cs-CZ].

   Click Next.

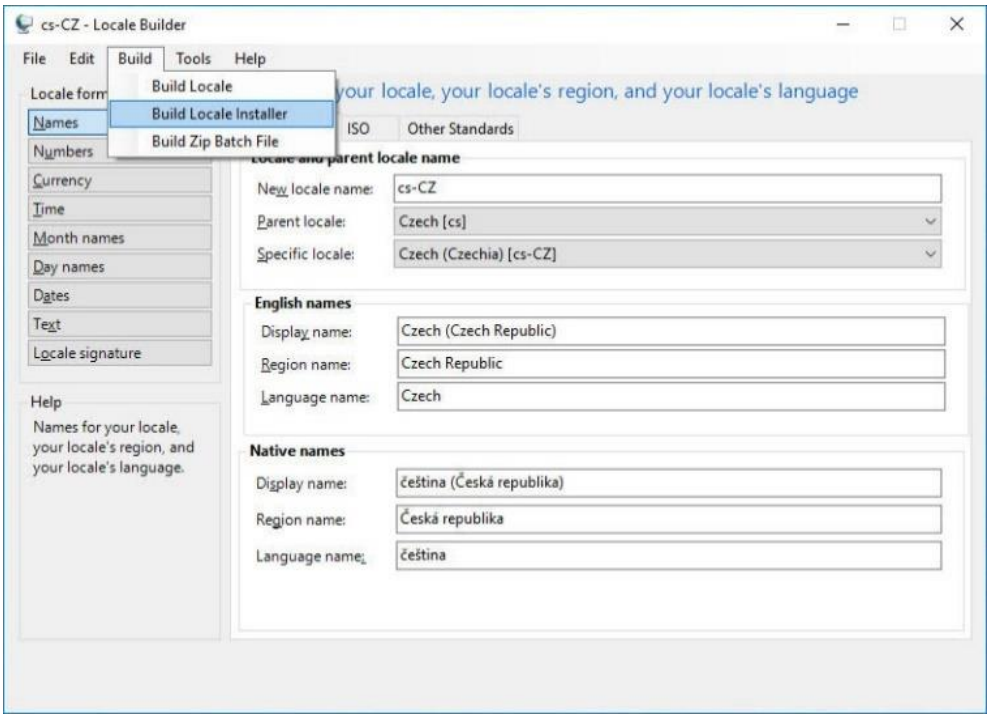



4) In the English names region set Display name field to *Czech (Czech Republic)* and Region name field to *Czech Republic*. In Native names region set Display name field to *čeština (Česká republika)* and Region name field to *Česká republika*.

   The resulting setting should look the same as the picture below.

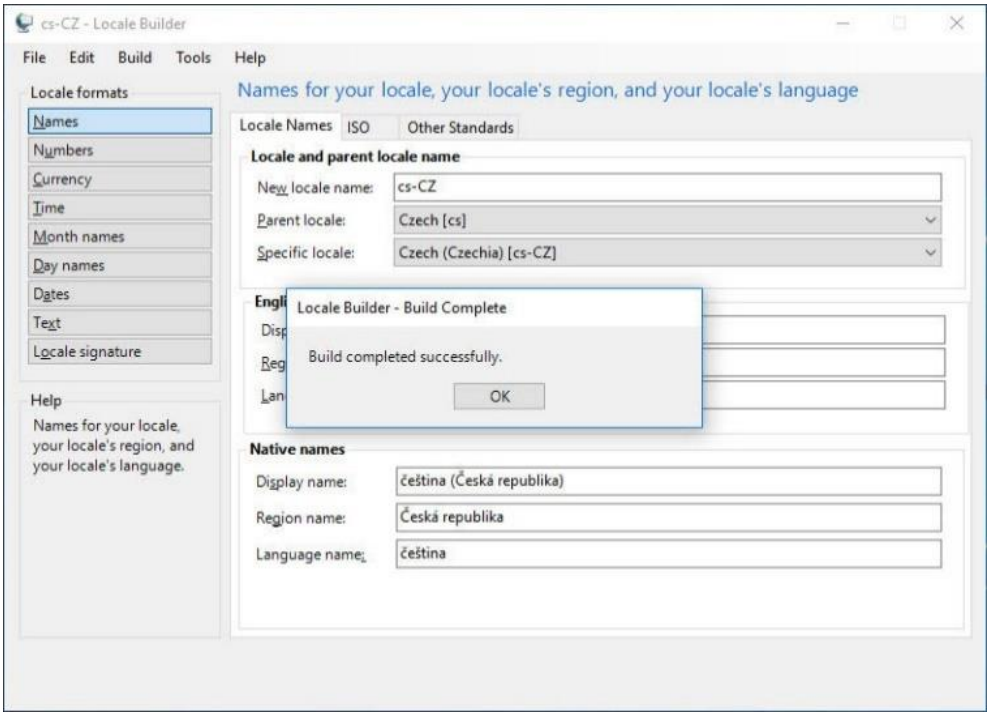



5) From the main application menu select Build → Build Locale Installer. Installer dialog box appears. Save the installer to the selected location.




6) The installer is created and saved to the selected location.

   Now you can close the Locale Builder application.

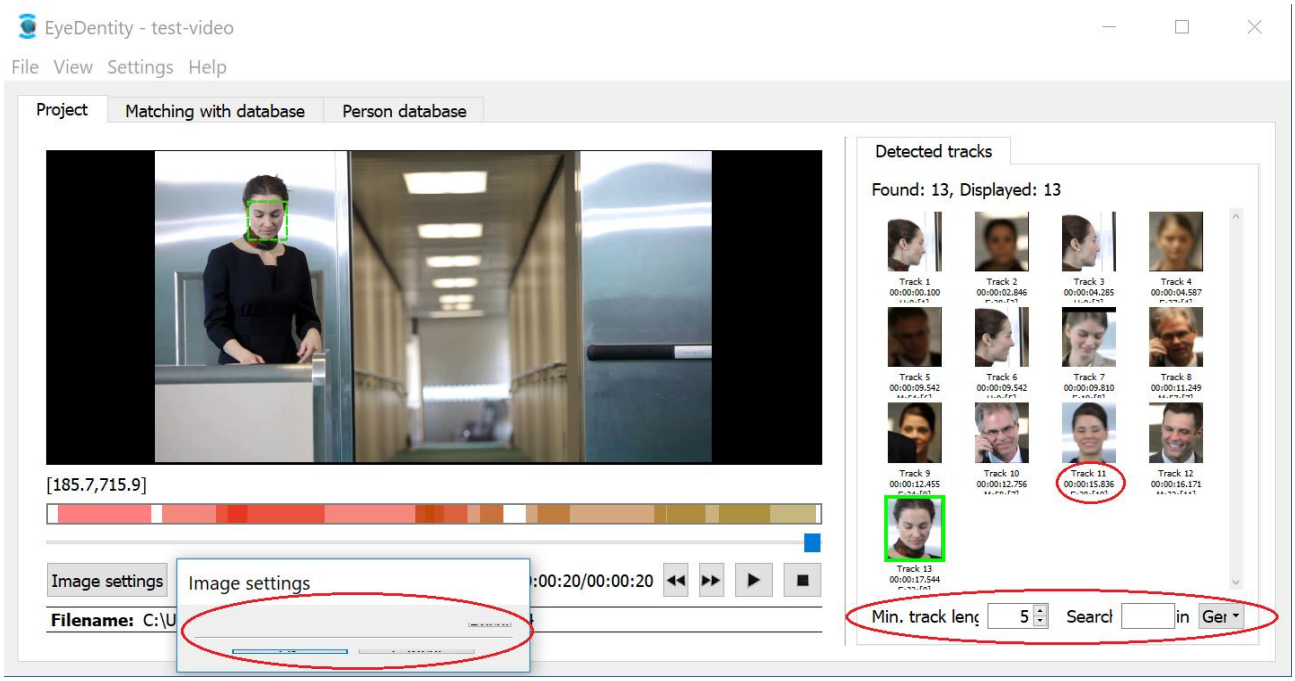



7) Run and install the installer created in the previous steps. After the installation is finished, run Task Manager and open the Services tab. From the list find the PostgreSQL database service (its name is *postgresql-x64-<VER>* where *<VER>* stands for version number of the database server).

8) Right-click the PostgreSQL database service and from context menu select Start. Once the service is restarted, the database server is ready for use.

## 11.2 Corrupted layout on high DPI displays

If you use EyeDentity version 1.3.0 (or older), and in Windows Display settings other value than 100% is set for Change the size of text, apps and other items (which is common especially for high resolution / DPI displays), the application layout may be corrupted:

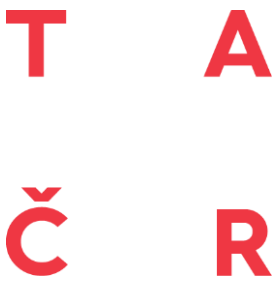



In that case we recommend the following workaround. Open the Start menu and find and run Edit environment variables for your account. In the User variables section, click New..., fill in both fields as follows and confirm OK.

| | |
|---|---|
| Variable name: | QT_AUTO_SCREEN_SCALE_FACTOR |
| Variable value: | 1 |

In order for the settings to take effect, you must log out and in again to Windows.

Beginning with EyeDentity version 1.3.1, this environment variable is automatically set during installation, so serious problems with the application display should no longer occur.

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