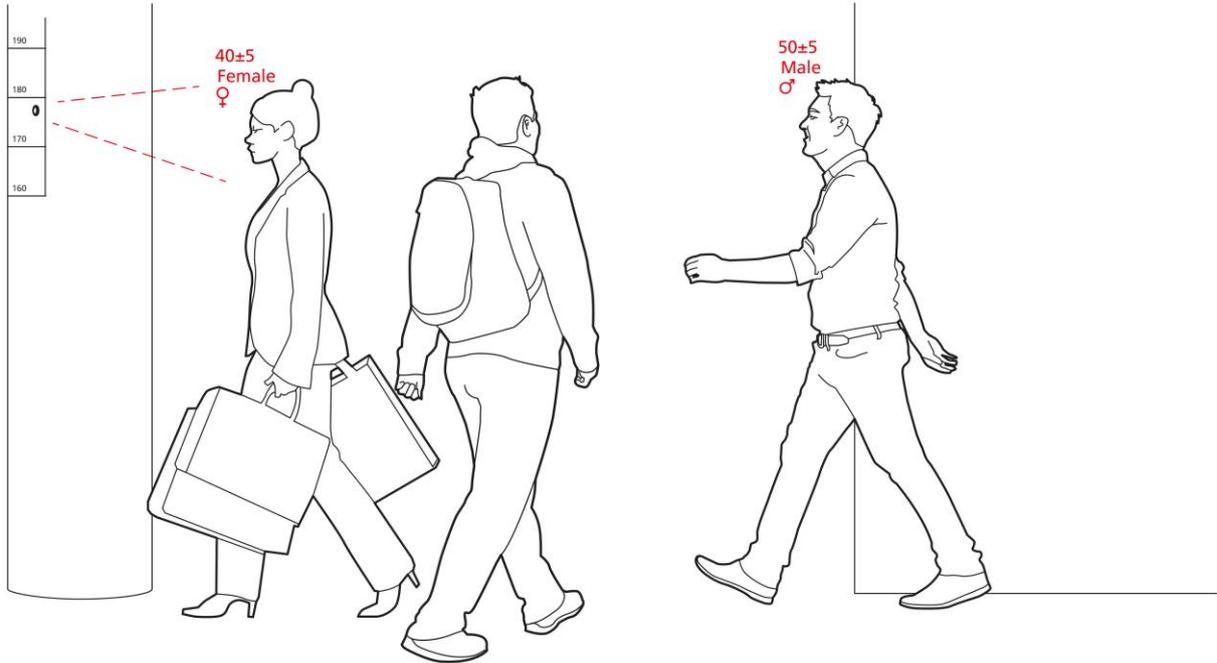


TrueView Demographics® - Manual



Embedded for Axis IP Cameras

Version 1.2

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Overview

TrueView Demographics® is a fully embedded software module developed by Cognimatics for Axis IP cameras, intended for retail and other environments where one wants to detect the gender and age of people.

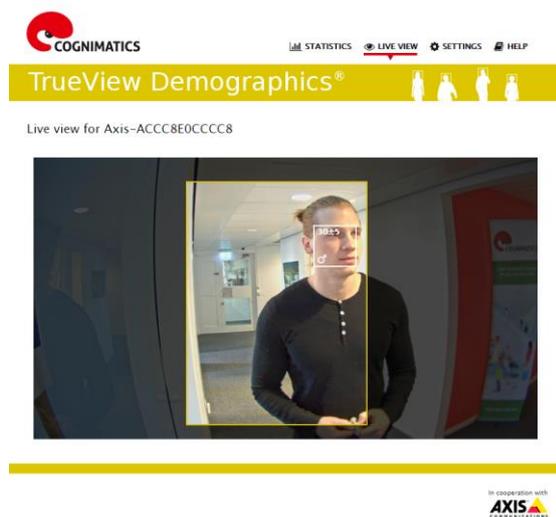
The application is perfect for digital signage implementations, as well as when you want extended knowledge about visitors.

When combined with TrueView People Counter® statistics, the output gives you a good understanding about the number of men and women that have visited, and in what age category the visitors were in.

Mounting the camera

The camera should be installed so that it can see the person's face from a reasonably good angle. Approximately +/- 15 degree, yaw, roll or pitch angle from a frontal face is OK.

It could also be installed from the side of an exit looking at the passing person. See example 1 below. The installation can for example be from above, mounted at the exit looking at the path of people walking out. See example 2 below.



Installation from the side.

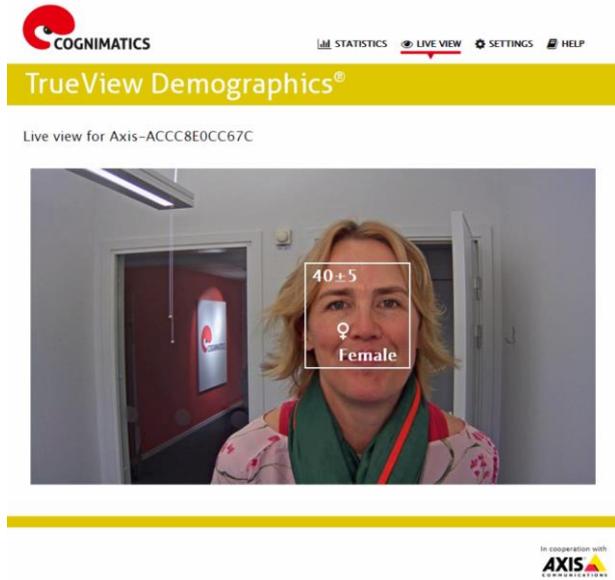


Installation from above.

Aim for a setup where the faces passing by are as sharply focused, rich in contrast, and clear as possible. Furthermore, aim for a setup with illumination that results in evenly illuminated faces where reflections and shadows are avoided as much as possible.

In scenes with strong backlight, resulting in dark faces with low contrast, consider complementing the setup with illumination sources to achieve better face images.

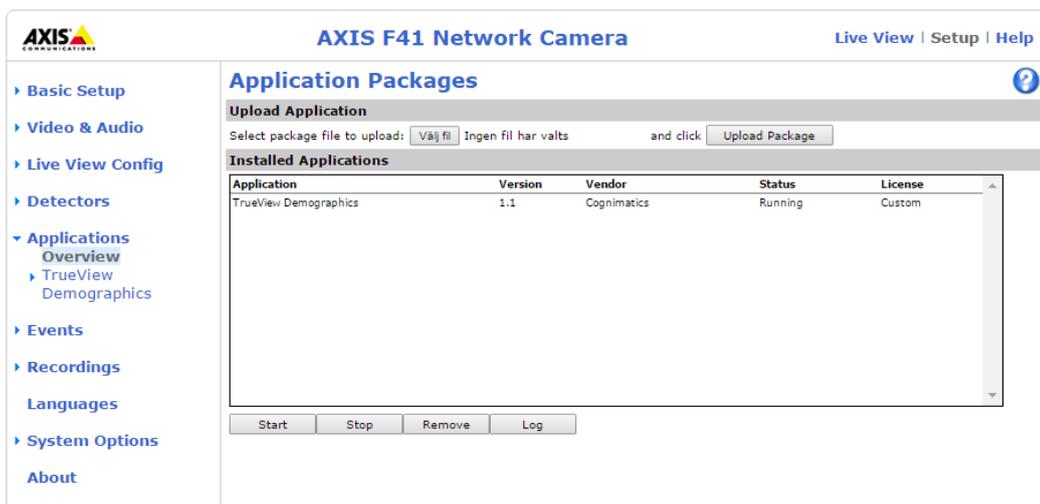
In a digital signage scenario, the camera could be installed so that the camera looks straight on the persons face. See example below:



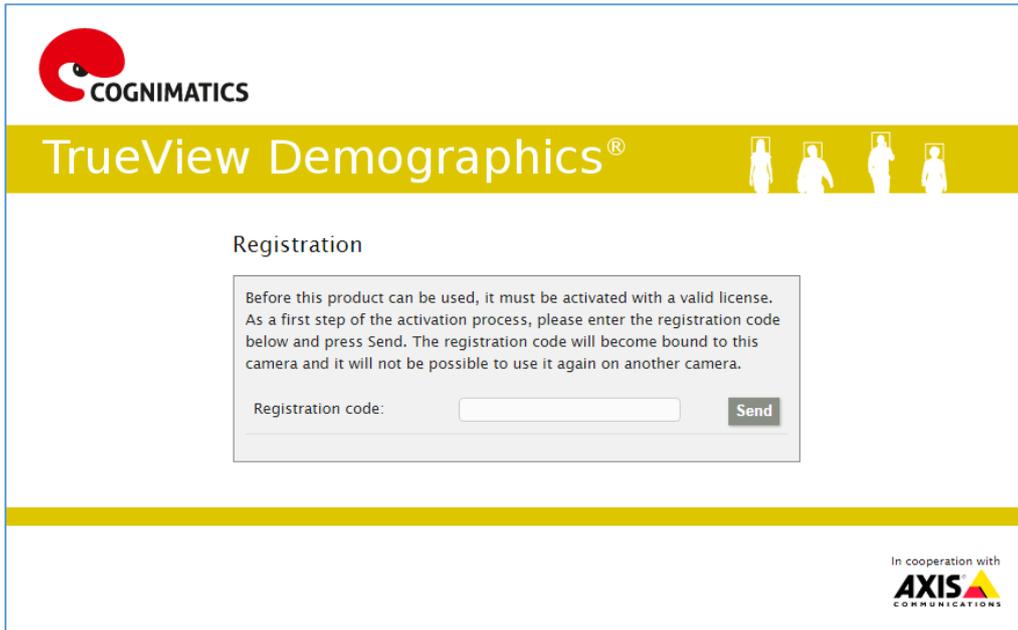
Installing the software

If TrueView Demographics® software is not already installed on the camera by your vendor, it must be installed onto your Axis camera.

1. Install the camera on your network, start it up and point your web browser to it (you can use the Axis IP Utility to easily find the camera on the network). The camera supported web browsers are Mozilla Firefox 3+, Internet Explorer 8+, Safari 4+ and Google Chrome 4+.
2. Upload the TrueView Demographics® installation file by clicking Setup -> Applications in the Axis camera menu. Under the section "Select package file to upload", specify the path to the TrueView Demographics® installation file or use the browse button. Click on the Upload Package button. See below picture.



3. The installation of the application will take 30 to 60 seconds. When it is done you will see the TrueView Demographics® application in the Axis installed applications menu. Now click the Live View in the upper right corner to get to the application and start the registration process. See picture below:



4. Enter the registration code you have received in the licence delivery PDF, and follow the instructions. The software will attempt to activate the license automatically by connecting to a registration server.
If the registration server cannot be reached, you will be asked to activate the license on a computer with Internet access via the web page: <http://face.cognimatics.com/activation>

When the license activation is complete, the camera will be ready for the Demographics configuration.

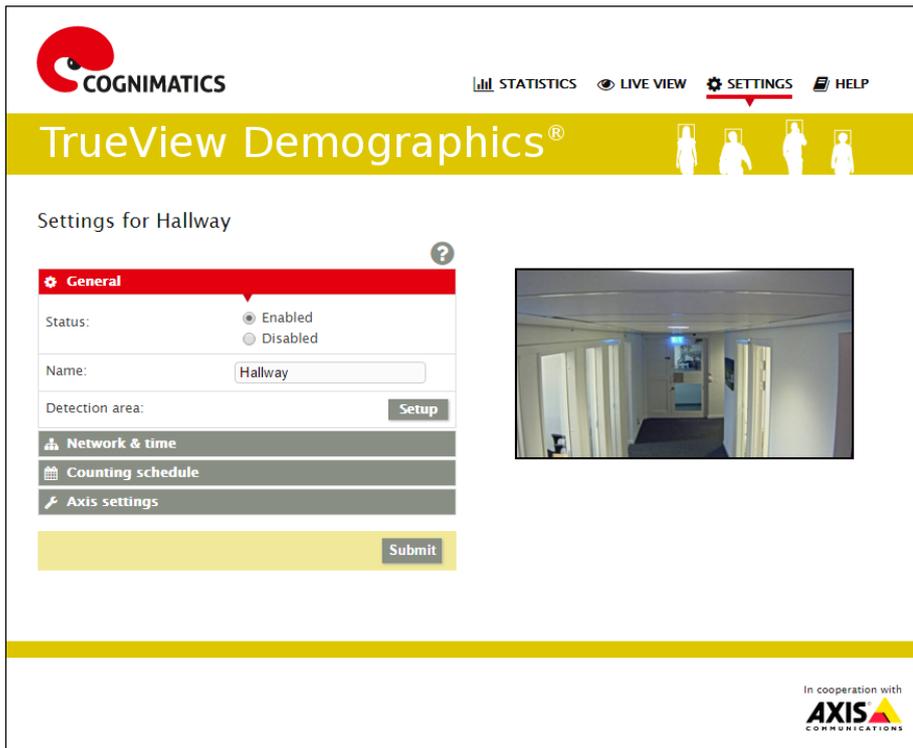
Note that your software license is valid for one camera only. You cannot activate another camera without a new software registration key.

Configuring TrueView Demographics®

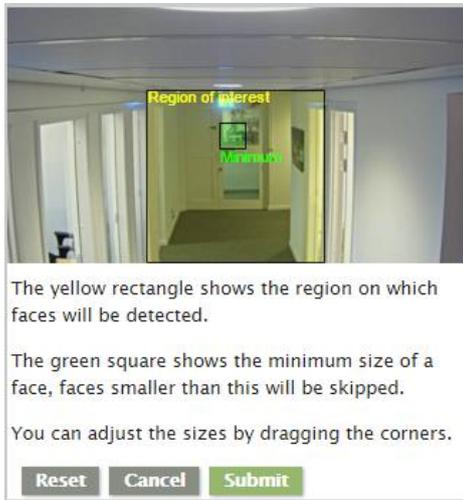
Settings page

General

- The first page after the registration is the Settings page.
- Set a suitable name, such as the name of the place where the camera is located. See below picture.



- Configure the detection area for where in the image the application should detect faces. Click the Setup button and change the size of the yellow rectangle so that it fits in the scene. You can also change the green rectangle to only detect faces of a defined size. See below picture.



Notice! In order to get as many Frames Per Seconds (FPS) you should try to setup the yellow region only at the area of interest.

Smaller yellow box = higher FPS.

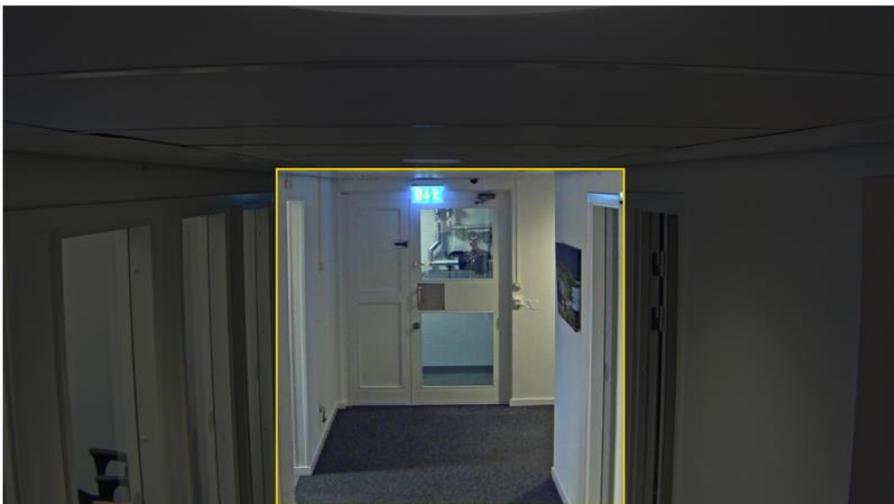
Also try to set the size of the green box at the size of the face you would like to detect.

Larger green box = higher FPS.

You can check the FPS used by the Demographics algorithm via below API:

`http://<IP address>/demographics/.api?fps.json`

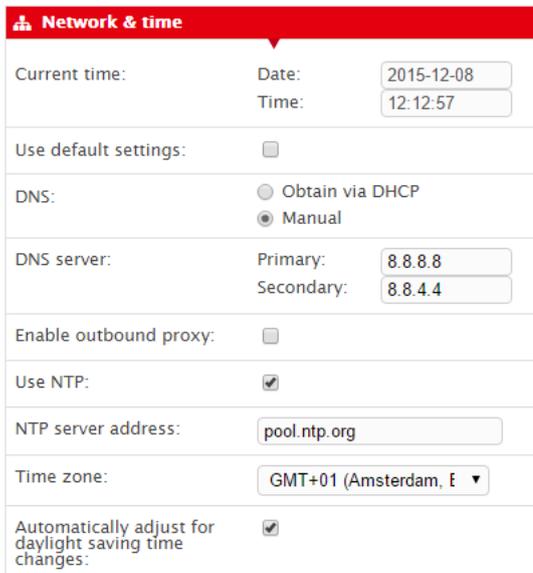
- In the Live View page you will now see the yellow area clear and the rest of the image darker. The yellow area is the detection area.



Network & time

- If the network and time settings have not been configured in the Axis camera menu, you can setup some network and time settings from the “Network & time” section within the Demographics settings page.

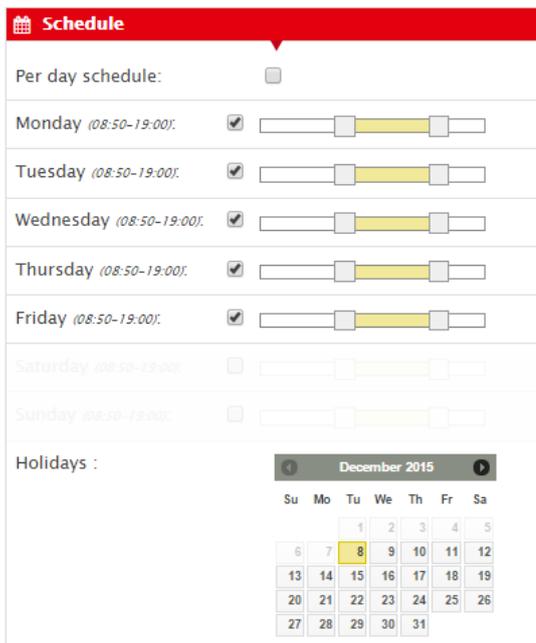
It is important to have a working DNS and NTP sever configured in order to get a correct timestamp on the output statistics. See below picture.



| Network & time | |
|--|--|
| Current time: | Date: 2015-12-08 Time: 12:12:57 |
| Use default settings: | <input type="checkbox"/> |
| DNS: | <input type="radio"/> Obtain via DHCP <input checked="" type="radio"/> Manual |
| DNS server: | Primary: 8.8.8.8 Secondary: 8.8.4.4 |
| Enable outbound proxy: | <input type="checkbox"/> |
| Use NTP: | <input checked="" type="checkbox"/> |
| NTP server address: | pool.ntp.org |
| Time zone: | GMT+01 (Amsterdam, E) ▼ |
| Automatically adjust for daylight saving time changes: | <input checked="" type="checkbox"/> |

Schedule

- You can configure a schedule for when the application should be active or not. See below picture.



| Schedule | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|--|----|----|----|----|----|----|----|--|--|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|
| Per day schedule: | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monday (08:50-19:00): | <input checked="" type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tuesday (08:50-19:00): | <input checked="" type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wednesday (08:50-19:00): | <input checked="" type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Thursday (08:50-19:00): | <input checked="" type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Friday (08:50-19:00): | <input checked="" type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Saturday (08:50-19:00): | <input type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sunday (08:50-19:00): | <input type="checkbox"/> [Slider: 08:50-19:00] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Holidays : | <div style="text-align: center;"> <p>December 2015</p> <table border="1"> <thead> <tr> <th>Su</th><th>Mo</th><th>Tu</th><th>We</th><th>Th</th><th>Fr</th><th>Sa</th> </tr> </thead> <tbody> <tr> <td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td> </tr> <tr> <td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td> </tr> <tr> <td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td> </tr> <tr> <td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td> </tr> <tr> <td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td></td><td></td> </tr> </tbody> </table> </div> | Su | Mo | Tu | We | Th | Fr | Sa | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | |
| Su | Mo | Tu | We | Th | Fr | Sa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 28 | 29 | 30 | 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

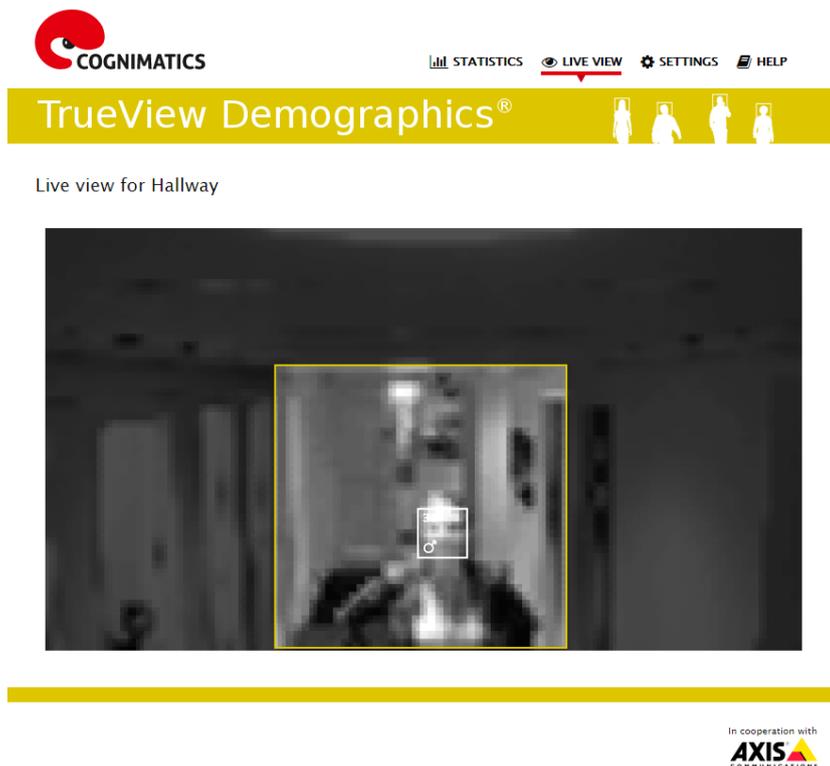
Help Page

Maintenance

- In the maintenance page you can:
 - Restart the camera. (Restart)
 - Reset the stored statistics. (Reset)
 - Make the image anonymized. (Anonymize)
 - Backup and restore parameter settings. (Parameter backups)
 - Generate logs. (Logs)
 - Video recording. (Record video)
 - Handle the registration of the product. (Registration)

Anonymization

- The anonymization function can be set to hard and soft.



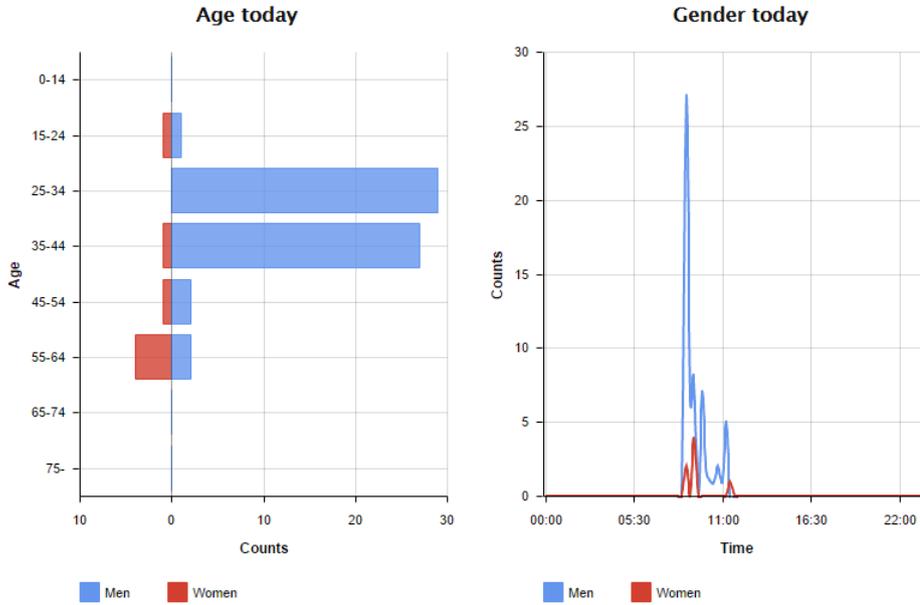
Hard anonymization means that the video stream is scrambled and that the Administrator accounts in the camera are locked. The only way to get back the standard image is to hardware reset the camera.

Soft anonymization means that the video stream is scrambled. The Administrator has the possibility to switch back to the normal image without doing a hardware reset on the camera.

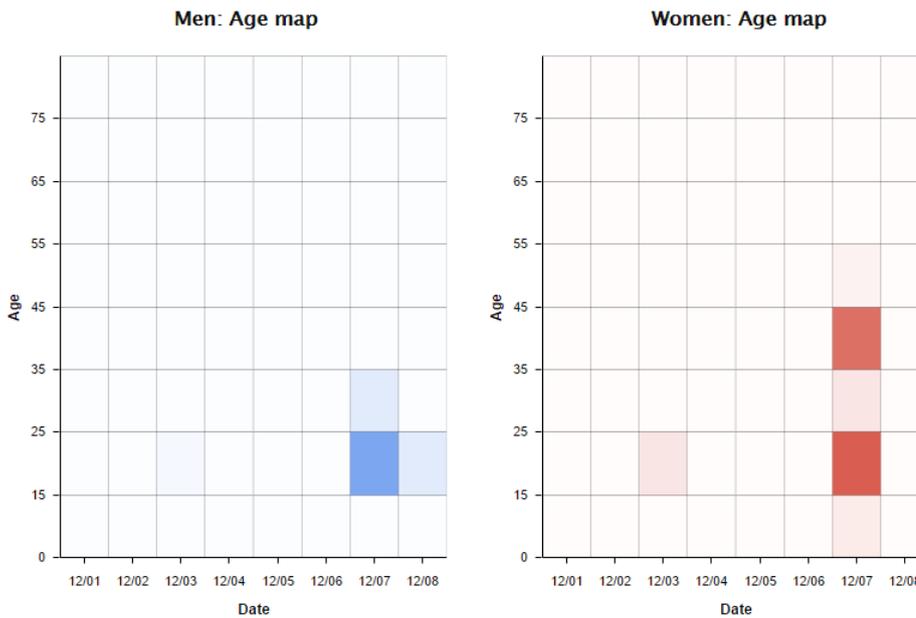
Statistics page

On the statistics page you get a graphical representation for the collected statistics in some different forms. You can also make a manual export of the statistics in XML, JSON and CSV format.

- Age and gender graphs for the current day.



- Age and gender maps for the past 7 days. (Hover over the coloured squares and you will get more information).



- In the Download data section, you can export the statistics for the last month in 15 minutes resolution.
Export all collected data (past 3 month) or click on the date that you want to export data for.

Download data

| | | | |
|-----------------|---|-----|--|
| Format | <input checked="" type="radio"/> xml | All |  |
| | <input type="radio"/> csv | All | |
| | <input type="radio"/> json | All | |
| Time resolution | <input checked="" type="radio"/> 15 minutes | | |
| | <input type="radio"/> hour | | |
| | <input type="radio"/> day | | |

How does it work?

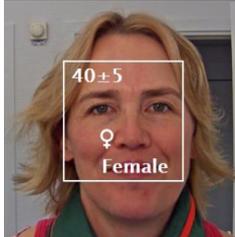
Gender and age detections and tracks

Each face track, consisting on several face detections, will result in one gender and one age estimate.

In order to detect a face, the size of the face needs to be at least 50 pixels.

A face detection is one box of the face found in the image, see picture below.

In theory, the algorithm can detect up to 100 boxes (faces) per image.



The Frames Per Second (FPS) in the camera, determines how many images that are processed with the face detection algorithm. A higher FPS will result in a higher amount of captured faces. Higher FPS is therefore preferred. A proper installation and setup of the application is therefore important, see general settings in this manual.

A face track can be 1 second, 10 minutes, or any duration long, all depending on the amount of time the face is captured by the camera. Hence, a face track can consist of 5 face detections, 10 000 detections or any amount of detections.

Notice! *The output result, age and gender estimate, will **not** necessarily be better if the track is longer.*

Statistics stored

The gathered statistics from the Demographics application is divided into Gender and Age information.

The gender and age data is stored on the camera's memory in two different formats.

1. Stored by age and gender category in 15 minutes intervals.

Each face track is saved to the memory in age and gender categories as is shown in below example:

| Interval start | Interval stop | M tot | M (0-14) | M (15-24) | M (25-34) | M (35-44) | M (45-54) | M (55-64) | M (65-74) | M (75-) |
|------------------|------------------|-------|----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| 2015-12-02 08:15 | 2015-12-02 08:30 | 3 | | | 1 | 1 | 1 | | | |

| Interval start | Interval stop | W tot | W (0-14) | W (15-24) | W (25-34) | W (35-44) | W (45-54) | W (55-64) | W (65-74) | W (75-) |
|------------------|------------------|-------|----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| 2015-12-02 08:15 | 2015-12-02 08:30 | 4 | | | 1 | 2 | 1 | | | |

2. Stored by track

Each face track is stored to the camera's memory. There are room to store 20 000 tracks on the camera's memory. The tracks are stored in a cycle buffer. E.g. when reaching track 20 001, it will overwrite the first track, etc.

The tracks are stored in JSON format as explained in the HTTP API section.

HTTP API

There is several APIs that can be used in the Demographics application. See below list of some of the most useful ones.

`http://<IP address>/demographics/.api?fps.json`
(Check the FPS used by the Demographics algorithm)

`http://<IP address>/local/demographics/.api?restart`
(Restarts the Demographics service)

`http://<IP address>/local/demographics/.api?reboot`
(Reboots the camera)

`http://<IP address>/local/demographics/.api?export-json&date=today&res=24h`
(Fetches today's statistics)

The main data output API handles returns from two modes, live tracks and ended tracks.

Live tracks:

Are face tracks (boxes) currently seen by the camera which are active.

Ended tracks:

Are tracks that have been detected by the camera previously in which the tracks have ended.

Three main API calls can be used to fetch JSON information about the tracks, these are described below in live, ended, and live + ended.

Live API

API call:

<http://<IP>/local/demographics/.api?tracks-live.json>

Description of parameters

Each track in live has 8 parameters:

- `time_start`: Time the track first observed a face in seconds in form of UTC (Coordinated Universal Time)
- `time_end`: Time the track last observed a face in seconds.
- `gender_average`: -1 for female estimate and 1 for male estimate on average so far.
- `age_average`: Estimated age over the track so far.
- `boxsize_average`: Average box size over the track so far.
- `gender_last`: -1 for female guess and 1 for male guess on last observation.
- `age_last`: Estimated age on last observation.
- `boxsize_last`: Boxsize on last observation.

Examples of returns:

No active track found

```
-----  
{  
  "live": {  
    "tracks" : [  
    ]  
  }  
}
```

One active track found

```
-----  
{  
  "live": {  
    "tracks" : [  
      {  
        "time_start" : 1447749079.091622,  
        "time_end"   : 1447749081.011605,  
        "gender_average" : 1,  
        "age_average"   : 20,  
        "boxsize_average" : 177,  
        "gender_last"   : 1,  
        "age_last"      : 21,  
        "boxsize_last"  : 180  
      }  
    ]  
  }  
}
```

Two active tracks found

```
{
  "live": {
    "tracks" : [
      {
        "time_start" : 1447749104.451576,
        "time_end"   : 1447749109.451567,
        "gender_average" : 1,
        "age_average"   : 20,
        "boxsize_average" : 198,
        "gender_last"   : 1,
        "age_last"      : 18,
        "boxsize_last"  : 195
      },
      {
        "time_start" : 1447749107.811568,
        "time_end"   : 1447749109.451567,
        "gender_average" : -1,
        "age_average"   : 21,
        "boxsize_average" : 160,
        "gender_last"   : -1,
        "age_last"      : 23,
        "boxsize_last"  : 158
      }
    ]
  }
}
```

Ended API

API call:

<http://<IP>/local/demographics/.api?tracks-ended.json>

Description of parameters

Each track in ended has 5 parameters:

- `time_start`: Time the track first observed a face in seconds in form of UTC (Coordinated Universal Time)
- `time_end`: Time the track last observed a face in seconds.
- `gender_average`: -1 for female estimate and 1 for male estimate for the track.
- `age_average` : Estimated age over the track.
- `boxsize_average` : Average box size over the track.

Example of return:

No active track found

```
-----  
{  
  "ended": {  
    "time_start": 1447748743.039911,  
    "time_end": 1447749643.039911,  
    "tracks": [  
      ]  
    }  
  }  
}
```

`time_start` and `time_end` are seconds (UTC) and will be the time range one looks for tracks that ended.

Notice! The default call to `tracks-ended.json` will give you the last 15 minutes range. If you want to control how far back you want to look from now, then use the below API and set the time in seconds.

API call:

<http://<IP>/local/demographics/.api?tracks-ended.json&time=60>

More examples:

One ended track found

```
{
  "ended": {
    "time_start": 1447749887.539835,
    "time_end": 1447749947.539835,
    "tracks": [
      {
        "time_start": 1447749942.930319,
        "time_end": 1447749946.210321,
        "gender_average": 1,
        "age_average": 21,
        "boxsize_average": 219
      }
    ]
  }
}
```

Two ended tracks found

```
{
  "ended": {
    "time_start": 1447750011.470372,
    "time_end": 1447750071.470372,
    "tracks": [
      {
        "time_start": 1447750064.890142,
        "time_end": 1447750067.690133,
        "gender_average": 1,
        "age_average": 22,
        "boxsize_average": 217
      },
      {
        "time_start": 1447750066.130135,
        "time_end": 1447750067.690133,
        "gender_average": -1,
        "age_average": 18,
        "boxsize_average": 192
      }
    ]
  }
}
```

Live and ended API

A combination of live and ended in a single api can be performed:

API call:

<http://<IP>/local/demographics/.api?tracks-live-and-ended.json&time=60>

This will result in both live information, as well as ended tracks, the time variable will be identical to the one used for ended api.

Example of result, two live and one ended track

```
{
  "live": {
    "tracks": [
      {
        "time_start": 1447750516.809464,
        "time_end": 1447750523.329454,
        "gender_average": 1,
        "age_average": 19,
        "boxsize_average": 218,
        "gender_last": 1,
        "age_last": 19,
        "boxsize_last": 218
      },
      {
        "time_start": 1447750521.569459,
        "time_end": 1447750523.329454,
        "gender_average": -1,
        "age_average": 17,
        "boxsize_average": 222,
        "gender_last": 260,
        "age_last": 19,
        "boxsize_last": 217
      }
    ]
  },
  "ended": {
    "time_start": 1447750463.936758,
    "time_end": 1447750523.936758,
    "tracks": [
      {
        "time_start": 1447750514.249470,
        "time_end": 1447750515.329465,
        "gender_average": 1,
        "age_average": 20,
        "boxsize_average": 239
      }
    ]
  }
}
```

Supported cameras

The Demographics application works on Axis cameras that have an ARTPEC-5 processor, full HD capability and support for Axis Camera Application Platform (ACAP).

Some recommended models and lenses can be found below:

Axis F41 main unit with one of the sensor units:

- F1015 (Optical zoom, 53° - 108° horizontal field of view)
- F1025 (Pinhole camera, 92° horizontal field of view)
- F1004 (Low price, 102° horizontal field of view)



The height strip camera **P8535** is perfect to use together with the Demographics application since it is installed at eye level.

