Eyedea Anonymzier

Technical Sheet   Version 7.0

eyedea

RECOGNITION

Contact:

Address:	Eyedea Recognition, s.r.o.
	Vyšehradská 320/49
	128 00, Prague 2
	Czech Republic
web:	www.eyedea.cz
email:	info@eyedea.cz

Table of Contents

1   Product Description

The Anonymizer SDK is a versatile, cross-platform software library designed for seamless anonymization of RGB images. It detects and blurs faces and car license plates at various scales and orientations, including support for high-resolution spherical images. The package includes a command-line application for batch image processing. It supports both single-line and multi-line license plates of EU and North America (Mexico, US, Canada) sizes or similar dimensions. Detection of other types of license plates is available upon request.

Example of anonymized image (left) and image with highlited detections for better inspection (right).

1.1   Technical Details

The Anonymizer SDK is a comprehensive tool that now includes multiple detection modules for enhanced privacy and data security in images. It comprises a face detector and an advanced detector for license plates and other objects such as car boxes and windshields. This modular approach allows for the adaptability of the SDK, with the potential to include additional detection modules as needed. Detected areas are then processed according to the user's requirements: they can be seamlessly blurred for privacy or highlighted to facilitate a thorough visual inspection of the results.

The Anonymizer library provides following APIs:

- C native API

Officially supported operating systems and platforms:

- Windows 10 and 11, 64 bit
- Ubuntu 20.04 and higher, 64 bit
- Other platforms on request
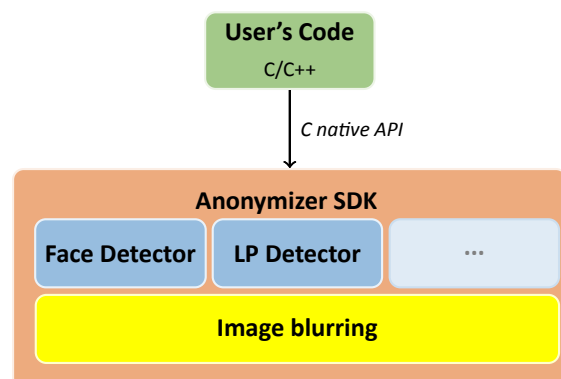
2 Distribution Contents

The following list is an excerpt from the LPM SDK directory structure, highlighting the most important directories and files contained in the software distribution. A brief description of the items is provided.

📂 [AnonymizerSDK] . . . . *distribution main folder*

    📂 sdk . . . . *Anonymizer engine folder*

        📁 include . . . . *Anonymizer header files*

        📁 lib . . . . *Anonymizer libraries*

        📁 plugins . . . . *Anonymizer backend plugins for detection*

        📁 models . . . . *Anonymizer detectors models folder*

    📂 applications . . . . *Anonymizer applications folder*

        📁 anonymizer-cli . . . . *Batch processing application folder*

    📂 examples . . . . *Anonymizer examples folder*

        📁 example-files . . . . *Files processing example folder*

        📁 example-buffers . . . . *Buffers processing example folder*

    📁 hasp . . . . *license management software folder*

    📂 documentation . . . . *SDK documentation folder*

        📁 3rdparty-licenses . . . . *Licenses of used 3rd party backend libraries*

    📁 data . . . . *Example data folder*

    📁 tools . . . . *Folder with utilities for GPU devices listing, TensorRT model conversion*

    📄 LICENSE.txt . . . . *SDK license*

    📄 RELEASE_NOTES.txt . . . . *file with release notes for each SDK version*

    📄 README.txt . . . . *SDK readme file*

3 Hardware Requirements

3.1 Minimal Requirements

Processor 1GHz, single core x86 platform 64bit
RAM 2GB

3.2 Recommended Requirements

Processor 3+GHz, 12+ core (Intel i7, AMD Ryzen 7)
RAM 16GB
GPU NVIDIA GeForce RTX 3090

3.3 Supported Operating Systems

Microsoft Windows 10/11 x64 platform

Ubuntu 20.04 and higher x86_64 platform

4 Performance

This section shows performance of Anonymizer SDK. Processing speed for different hardware is shown to illustrate hardware requirements.

4.1 Evaluation Speed

Approximate processing times for anonymization with default parameters for different CPUs and resolutions are shown in the tables below. CPU speed is the main factor affecting processing times; other factors include processor architecture, size of the CPU cache, and speed and latency of RAM. Additionally, Anonymizer configuration can greatly affect processing speed.

All performance values in the tables below correspond to configurations that split large images into tiles with an approximate resolution of a FullHD image per tile, and process tiles independently. Table 1 shows the tile layout for FullHD, 4K, 8K, and 12K images used for performance measurement.

	fullHD	4K	8K	12K
Tiles Layout	1x1	2x1	4x2	6x3
#tiles	1	2	8	18

Table 1: Image tiles layouts.

For optimal speed, system should have enough RAM to avoid swapping. In Tables 2, 3 are shown values of memory usage.

RAM Memory Usage - CPU processing				
resolution	fullHD	4K	8K	12K
RAM	220 MB	277 MB	937 MB	1263 MB

Table 2: Anonymization memory use using image buffer to buffer method and CPU only processing.

Memory Usage - GPU processing				
resolution	fullHD	4K	8K	12K
RAM	373 MB	438 MB	1085 MB	1391 MB
GPU	633 MB	633 MB	633 MB	633 MB

Table 3: Anonymization memory use using image buffer to buffer method and CPU only processing.

On systems with multicore CPUs, performance can be increased by running two or more instances of Anonymizer in parallel. However, this setup will require sufficient memory for each running instance of Anonymizer. It is important not to overload CPU usage, as performance drops rapidly when the CPU is overburdened. It is recommended to keep 10-20% of CPU cores free for the system and other tasks.

Tables 4 and 5 show anonymization times for typical image resolutions and appropriate settings. Times are shown for both CPU and GPU evaluations using the image buffer interface (excluding I/O duration for image file read and write).

Processing CPU time on AMD EPYC 7402P (3.3GHz, 12 threads)				
	fullHD	**4K**	**8K**	**12K**
v7.0	66 ms	132 ms	660 ms	1526 ms

Table 4: Anonymization speed using image buffer to buffer method and CPU - 12 threads processing.

Processing GPU time on NVIDIA GeForce RTX 3090				
	fullHD	**4K**	**8K**	**12K**
v7.0	15 ms	57 ms	272 ms	704 ms

Table 5: Anonymization speed using image buffer to buffer method and GPU processing.

4.2   Anonymization accuracy

We have an internal dataset for testing, consisting of approximately 2,500 360-degree images from the EU region, each with a resolution of 10K. This dataset includes annotations for faces (over 7700 of annotated faces) and license plates (over 8000 anotated LP), which are categorized as either "certain" or "maybe." License plates are tagged as "maybe" if only up to two letters are readable. Faces are tagged as "maybe" if they have a small resolution (approximately less than 15 pixels) or are partially anonymized by the scene (e.g., obstructions). For false detection, we use the metric of the percentage of falsely anonymized image pixels.

Table 6 shows the accuracy and false detections (FP) on the dataset, comparing Anonymizer v7.0 with Anonymizer v6.0.

		Certain	**Maybe**	**FP**
v7.0	**FACE**	96.9%	75.8%	0.009%
	LP	96.8%	91.8%	0.116%
v6.0	**FACE**	83.0%	54.3%	0.057%
	LP	86.6%	62.3%	0.28%

Table 6: Anonymization accuracy on spherical street-view like images.