CHANGE LOG

autosdk

2023

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Used abbreviations:

- LP — license plate.
- LPR — license plate recognition.
- CLI — command line interface.

1 AUTOSDK 2.17.0 (24.11.2023)

1.1 corrected mistakes

- Fixed a bug in `vpwfetch` variable `{plate-symbols}`
- Fixed a bug in `vpwsrv` that caused system resources loss
- Fixed a bug in building `features.*.xml` files
- Fixed a bug in deserializing `cuda-engine` (`DNN` for `TensorRT`)

1.2 image analisys changes

- Added the `VodiCTL_VPW_CARCANDS_ENABLE` parameter, which allows you to use a special DNN to search for cars in the image and conduct further analysis within the boundaries of the found candidates; this can both speed up the entire analysis and improve its quality
- Added a new method for searching plates `VodiF_VPW_PLATECANDS_BY_2_DNN`, which works on average better than `VodiF_VPW_PLATECANDS_BY_1_DNN` (old name `VodiF_VPW_PLATECANDS_BY_DNN`), but requires more computing resources
- A new method for analyzing the license plate `VodiF_VPW_DNN2AN` has been added, which works better than all previous methods, but requires more computing resources and only works for plates with Arabic numerals and Latin letters; with this analysis method, you don't have to use templates, to do this, just set the analysis level `VodiK_VPW_TEXT_ANALYSE`
- Added support for the parameters `VodiCTL_VPW_PLATE_IMAGE_SIZE` and `VodiCTL_VPW_PLATE_IMAGE_SCALE_FACTOR` for the methods for determining plates `VodiF_VPW_PLATECANDS_BY_1_DNN` and `VodiF_VPW_PLATECANDS_BY_2_DNN`, which makes it possible to directly set the sizes of input images for these DNNs

1.3 general changes

- Added the ability to log SDK settings by setting the environment variable `VPW_LOG_SETTINGS=1`
- Added SDK version logging

- Added symbol `VodiK_O_SYMBOL` for the analysis method `VodiF_VPW_DNN2AN`, which allows you to distinguish between the number 0 and the letter O without templates
- Added parameter `VodiCTL_VPW_TREAT_SYMBOLS_AS_TEXT`, which allows you to interpret recognized symbols as license plate text, even if they do not fall into known templates; this can be useful if there are problems recognizing certain templates or when there is no corresponding template
- Added parameter `VodiCTL_VPW_TEMPLATES_WITH_GEOMETRY`, which allows you to select templates ignoring information about familiarity geometry; this can be useful with the `VodiF_VPW_DNN2AN` license plate analysis method, since it currently has problems with familiarity detection accuracy, which can create problems when choosing templates based on geometry
- Added analysis level `VodiK_VPW_CARCANDS_ANALYSE`, which allows you to stop image analysis after finding candidates on the car; this level of analysis makes sense with the `VodiCTL_VPW_CARCANDS_ENABLE`
- Added the `VodiCTL_VPW_TREAT_CARCAND_AS_CAR` parameter, which allows you to interpret the found candidate for a car as a car, even if its license plate is not recognized; this can be a useful if you need to detect a car without even recognized their license plates
- Added parameter `VodiCTL_VPW_TEXT_WITH_PUNCTUATION`, which allows you to get the text of the plate with puntctuation characters, for example '-'

1.4 sbr and mmr changes

- Improved windshield detection
- Examples of using `mmr` and `sbr` have been rewritten, images are loaded using `stb_image.h` instead of `OpenCV`, which makes them easier to build

1.5 vpwfetch changes

- Added the `-a` option, which allows you to pass the path to the analysis zone mask
- Added support for arithmetic expressions for all numeric parameters
- The meaning of the `-T` option has been expanded to named ones:
  `car` | `plate` | `sym` | `text` | `tmpl` | `full` | `def`
- The algorithm for calculating `fps` has been changed to better meet the requirements

1.6 templates changes

- Czech Republic
  - Changed template 6, allowing letters in 4th position
  - Changed template 13, allowing letters in 3th position
- Uzbekistan
  - Added infrared property to green templates
  - Added one-line template for trailers
  - Allowed MV characters in template 18
- Kenya
  - Added template 13
- India
  - Added templates 23-27
- Latvia
  - Added template 20
- Tanzania
  - Added support for Zanzibar plates
- South Africa
  - Added support for Limpopo plates
- Kazakhstan
  - Added regions 01-20
- Taiwan
  - Added '-' separator
- Germany
  - Added '-' separator
- Myanmar
  - Added template 4 (same as 1, but one-liner)
  - Changed template 1, allowing letters in 4th position
- Spain
  - Added templates 18-26
- Belarus
  - Added EV templates
- Russia
  - Added regions - 252, 277, 299

1.7 compatibility with previous versions

- Changed `VodiK_*_SYMBOL` definition from `define` to `enum` (see `<Vodi/symbolType.h>`)
- Changed structure field `vodi_plate_info_spec` c `pis_outer_rect` on `pis_car_rect` which contains information about the described rectangle of the car
- Transition to `TensorRT-8.4.3.1` for `x86_64` platforms
- Added build for `jetpack-5.1`
- Transition to `OpenVINO-2023.0.1`

2 AUTOSDK 2.15.0 (01.03.2023)

2.1 corrected mistakes

- Added `VodiCTL_VPW_PLATECANDS_METHODS` parameter logging
- Fixed a bug in `vpwsrv` that caused memory loss when establishing a connection with a client

2.2 image analisys changes

- Updated neural networks `plate-detector` и `symbol-detector`

2.3 general changes

- Environment parameter `VPW_DNN_DEVICES` expanded on the syntax `vpwfetch` parameter `-N`
- Added logging functionality (see `<Vodi/Logger.h>`) and implemented `DNN` load events logging into devices
- Added functionality for representing multidimensional arrays / images in memory (see `<Vodi/Array.h>`)
- Added function for copying multidimensional arrays / images (see `<Vodi/services/Arrproc.h>` with possible transformations: changing the element type, changing the size (width and height), changing the color spaces, values range normalization, changing the layout
- Adaptive image histogram equalization function added (see `<Vodi/services/Arrproc.h>:Vodi`
- Added functionality for classifying car brands and models (see usage example `mmr.c`)
- Added functionality for detecting the presence of a driver's and passenger's seat belt (see usage example `sbr.c`)
- Added functionality for working with geometric primitives (see `<Vodi/Geometry.h>`)

2.4 templates changes

- Fixed number size for all templates
- Poland
  - Added template 30
- Czech Republic
  - Corrected character constraints in template 5
- Spain
  - Added template 17
- Abu Dhabi
  - Added templates 14-47
- Ajman
  - Added templates 2-19
- Dubai
  - Added templates 5-51
- Ras al-Khaimah
  - Added templates 3-19
- Fujairah
  - Added templates 1-7
- Umm al-Quwain
  - Added templates 1-8
- Sharjah
  - Added templates 1-18
- Bahrain
  - Added templates 4-8
- Oman
  - Added templates 11-31
- Mexico
  - Added template 38
- Zimbabwe
  - Added templates 1-2
- Indonesia
  - Added templates 14-19
- Armenia

  - Corrected character constraints in templates 7,8,14,17,18
- Sweden
  - Added template 7
- Tunisia
  - Changed order of printing symbols
- Ukraine
  - Added new regions
- Hungary
  - Added templates 11-24
- Belarus
  - Translation into Cyrillic characters for templates 15-18
- Russia
  - Added regions - 155, 977

2.5 compatibility with previous versions

- Transition to `OpenVino-2022.3` and to `TensorRT-8.0.1` for `arm64`
- Support `OpenVino` begins from `VS2017` on `windows` platforms and `glibc-2.27` on `linux` platforms

3 AUTOSDK 2.13.0 (13.10.2021)

3.1 fixed bugs

- Fixed a bug that caused the program to crash on Windows platform, when working with multiple instances of DNN.
- Fixed a bug that caused the program to crash when handling an OpenVINO exception during inference operation.

3.2 changes in image analysis

- Added `VodiK_VPW_TEMPLATE_ANALYSE` analysis level for the `VodiCTL_VPW_ANALYSE_LEVEL` parameter. Now, on the level `VodiK_VPW_TEMPLATE_ANALYSE` a full analysis of the number is carried out, and on levevl `VodiK_VPW_TEXT_ANALYSE` everything except analysis using templates is carried out. `VodiK_VPW_TEMPLATE_ANALYSE` is set by default.

3.3 changes in dynamica

- Added track check for maximum allowable acceleration.
- Changed the maximum allowable angle between adjacent movements in the track to 20 degrees.
- Changed the combining license plates procedure from different frames. Now it works without templates usage, which makes it possible to work dynamics in the analysis mode without templates usage.
- Changed the number plate image creation procedure (`vodi_plate_info_spec::pis_image`).

3.4 general changes

- Added parameter `VodiCTL_VPW_TEXT_TRANSLIT`,which gives the ability to transliterate the text of the number.
- Added function `VodiImageCreateHeader` (please, check `<Vodi/Vodilib.h>`), which makes it possible to transfer an image to `VodiprincProcess` without copy operaton.

- Added support for DNN execution on following devices:
  - `VodiK_HDDL_DEV` - Intel Vision Accelerator Design with Intel Movidius VPUs
  - `VodiK_NVGPU_DEV` - NVIDIA GPU
  - `VodiK_NVDLA_DEV` - NVIDIA Deep Learning Accelerator
- The DNN support functionality moved into separate modules, which are loaded automatically when the user sets the parameters that require working with DNN. This separation causes third-party libraries to be loaded only when they are needed.
- Added the environment variable `VPW_CUDA_ENGINE_CACHE_DIR`, wich allows to store `CUDA-ENGINE` in the specified directory and reuse it. This speeds up the initialization phase of DNN on NVIDIA family devices.
- The `VodiCTL_VPW_DNN_PARMS` parameter has been added, which makes it possible to control loading DNN properties, such as: the devices type and their priorities, which will be used for DNN execution, the device serial number in the system, the number of DNN instances that need to be loaded into the specified device, the data type in which the calculations will be carried out, etc.
  The first argument must be the DNN type for which the parameters will be applied. The following DNN types of are available in this version:
  - `VodiK_VPW_PLATE_DETECTOR_DNN` - plate detector
  - `VodiK_VPW_PLATE_PREDICATE_DNN` - plate filter
  - `VodiK_VPW_SYMBOL_DETECTOR_DNN` - symbol detector

  As the second argument should be passed a pointer to the structures array beginning of `vodi_dnn_conf_t` type, and pass their number as the third argument. Each an element of this array specifies the DNN configuration for one system device. `vodi_dnn_conf_t::dc_type` specifies the type of device, and `vodi_dnn_conf_t::dc_order` specifies the device serial number in the system. The priority of the device is given by the order in this array (the former have a higher a priority). More information about configuration can be found near `vodi_dnn_conf_t` definitions in the file `<Vodi/Types.h>`.

3.5 vpwfetch changes

- The option `--dnn-devices (-N)` syntax was changed. Option implemented via parameter `VodiCTL_VPW_DNN_PARMS`, so please find more information at the description for this parameter.
  Argument grammar:

  ```
  argument -> dnn_parms
  ```

```
          | dnn_kind_parms
          | [ dnn_kind_parms1, .., dnn_kind_parmsN ] (N >= 0)

dnn_kind_parms -> dnn_kind : dnn_parms

dnn_kind -> PD  // plate detector
          | PP  // plate predicate
          | SD  // symbol detector

dnn_parms -> dnn_conf | [ dnn_conf1, .., dnn_confN ] (N >= 0)

dnn_conf -> dnn_conf_mod1 + .. + dnn_conf_modN (N >= 1)

dnn_conf_mod -> devtyp
              | order INT
              | ncaps INT
              | batch INT
              | IGNERR_DEVNOTAVAIL
              | IGNERR_DEVORDNOTSUP
              | IGNERR_DNNGET
              | IGNERR_DNNLOAD
              | IGNERR_NOTCAPS
              | IGNERR_ALL
              | FP16
              | INT8

devtyp -> CPU | iGPU | MYRIAD | HDDL | NVGPU | NVDLA
```

Examples:

- `CPU` - run inference for all DNN types of CPU
- `[NVGPU + FP16, MYRIAD + FP16, CPU]` - run inference for all DNN types with the following priority - NVGPU using FP16, then on MYRIAD using FP16, then on CPU
- `PD : NVGPU + FP16` - run plate detector inference on NVGPU with FP16
- `[DP : NVDLA, PP : MYRIAD + FP16, SD : NVGPU + FP16]` - run plate detector using NVDLA, filter plates using MYRIAD and detect characters using NVGPU

Please, pay attention that vpwfetch will interpret the argument as a string expression, so you should pass the argument as a string literal, like this: `-N "'[DP : NVDLA, PP : MYRIAD + FP16, SD : NVGPU + FP16]'"`

3.6 templates changes

- Malaysia
  - Corrected character constraints in templates 1-9
  - Added template 25
- South Sudan
  - Added templates 1-4
- Tanzania
  - Added templates 1-2
- Kenya
  - Added wagon templates 8-11
- Ghana
  - Added templates 1-7
- Czech Republic
  - Added electric vehicles templates 16-17
- Belarus
  - Added electric vehicles templates 20-21
- Finland
  - Allowed `VodiK_I_SYMBOL` symbol in 1-15 templates
- Russia
  - Fixed format in templates 22-23
- Spain
  - Added police template 15
  - Added taxi template 16
- Tunisia
  - Fixed format in templates 1-15
- Indonesia
  - Added templates 12-13
- Brunei
  - Added templates 1-17
- India
  - Added templates 18-22
  - Corrected character constraints in templates 1-2,4-13,15

3.7 protection changes

- Allowed to work with remote keys

3.8 compatibility

- Transition to `Bo-2.8.2`, `Vipm-0.0.11`, `TensorRT-7.2.2.3` (on `windows` and `linux-x86_64` based on `>=glibc-2.23`).

4 AUTOSDK 2.11.0 (24.11.2020)

4.1 fixed bugs

- Fixed an access to unaligned memory, that could lead to program emergency stop on ARM platforms

4.2 templates changes

- Azerbaijan
  - Added character E for template 11
  - Added character Y for templates 2, 15, 16
  - Added regions 73-75
  - Added police template 19
- Zambia
  - Fixed character constraints in templates 1-3
- Iran
  - Fixed character constraints in template 1
- Qatar
  - Added templates 8-28
- Kenya
  - Added template 7
- Korea
  - Fixed filtering of symbols by geometry.
  - Recognition for the license plates with 2 lines has been improved.
- Latvia
  - Added template 19
- Malaysia
  - Added templates 9-24
- South Africa
  - Fixed geometry in templates 9, 11

4.3 compatibility

- Reduced image files size - `share/Vodi/platesdef//*.png`

5 AUTOSDK 2.9.0 (02.10.2020)

5.1 fixed bugs

- Fixed the error in the `LpvlibReadPlateid` function, that led to incorrect result in case the input identifier consisted of three components.
- Fixed the error with duplicate results in an ensemble, that could occur during analysis with multiple threads in the dynamic mode.
- Fixed the error not loading module `vpwi-au-nsw` by module `vpwi-au`.
- Fixed the bug in the composition of affine transformations, which under some conditions could lead to incorrect results.
- Fixed the error in logging settings (`VodiCTL_VPW_LOG_SETTINGS`), which caused a memory leak, when there is no directory to store log.
- On linux platforms the bug has been fixed in the modules `vpwi-jp` and `vpwi-qa`, which made it impossible to load them under some conditions.
- Fixed the error, while working with modules based on convolutional neural networks (DNN). It could lead to a crash, if several principals created with different settings.

5.2 image analysis changes

- Added the `VodiCTL_VPW_DNN_DEVICES` parameter, which makes possible to specify a list of devices on which DNN calculations will be performed. The available devices set is defined in the `<Vodi/devType.h>` file.
- Added the `VodiCTL_VPW_PLATECANDS_METHODS` parameter, which allows you to specify methods set for obtaining candidates for numbers.
  Available methods:
  - `VodiF_VPW_PLATECANDS_BY_MORPH` — old method, default;
  - `VodiF_VPW_PLATECANDS_BY_DNN` — new method based on deep neural networks (DNN).
- Added the `VodiCTL_VPW_ANALYSE_LEVEL` parameter, which makes possible to stop the license plate analysis at a given level.
  The following levels of analysis are available:
  - `VodiK_VPW_PLATECANDS_ANALYSE` — at this level only candidates for license plates will be found, i.e. their bounding rectangles;

  - VodiK_VPW_SYMCANDS_ANALYSE — at this level additionally will be found candidates for characters on license plates, i.e. their bounding rectangles;
  - VodiK_VPW_TEXT_ANALYSE — at this level additionally candidates for characters will be processed by character recognizer.

  Level VodiK_VPW_TEXT_ANALYSE performs a full license plate analysis and is set by default.

- Added the VodiCTL_VPW_PLATE_ANALYSE_METHODS parameter, which makes possible to specify methods set for analyzing candidates for license plates. Available methods: VodiF_VPW_BLURAN, VodiF_VPW_NAN, VodiF_VPW_TMPLAN, VodiF_VPW_DNNAN, VodiF_VPW_OTSUAN. The default are VodiK_VPW_PLATE_ANALYSE_METHODS_D methods.
  VodiF_VPW_DNNAN — a new method of number analysis based on a deep neural network. Disabled by default.
  VodiF_VPW_BLURAN | VodiF_VPW_DNNAN | VodiF_VPW_TMPLAN — the methods set, that gives the highest number of correctly recognized results.
- Added the VodiCTL_VPW_PLATE_DNN_FILTER_ENABLE parameter, which makes possible to filter candidates for license plates by a deep neural network (DNN).
- Added the VodiCTL_VPW_TREAT_PLATECAND_AS_PLATE parameter, which makes possible to count each candidate as a — license plate. This means, that in case, the candidate analysis for some reason was unsuccessful (for example, it was not possible to recognize the license plate characters), then such candidate will be issued as a license plate result, with partial information about it. All of such results will have pis_plate_variantc equal to 0.
- Added the VPW_RECOGN_OUTSIDE_PLATECAND environment variable, which makes possible to prohibit the analysis of a license plate outside the rectangular area found by the license plate detector. This is an experimental parameter and could be removed in future.
- The license plate minimum ratio value (relation width to its height) has been changed. This value is reduced to 0.6, in case templates with more, than 2 lines are enabled. This change improves the detection for license plates with 3 lines or more.
- The algorithm for determining the order of points of the license plate rectangle was changed to a more reliable one for narrow license plates. This improves the recognition result for narrow license plates, such as numbers with 3 lines.
- Added a new deep neural network (DNN) license plate detector.
- Added a new character recognizer for China.
- Changed character recognizer for USSR (us).

5.3 changes in tracking algorythm

- The tracking algorythm was adapted to work with partially recognized license plates, in which the `pis_plate_variantc` equals to 0. Such license plates appear, when the `VodiCTL_VPW_ANALYSE_LEVEL` parameter is set to the `VodiK_VPW_PLATECANDS_ANALYSE` value, or `VodiCTL_VPW_TREAT_PLATECAND_AS_PLATE` parameter is set.

5.4 general changes

- Changed semantics of VodiprincProcess state.
  Possible values:
  - `<0 (BoS_ERR)` — as before, this indicates an error.
  - `0 (BoS_NORMAL)` — the operation was successful (as before); there is no result yet, the frame is being analyzed.
  - `>=1 (BoS_OK)` — the operation was successful (as before); the analysis result (ensemble) is ready.

  This provides possibility in multi-threaded mode to understand, when a frame that was submitted earlier has already been processed, and thereby understand from which frame the result (ensemble) was obtained.
- Added the `VodiCTL_VPW_SEQUENTIAL_FLUSH_ENABLE` parameter, which makes possible to change the behavior of the operation `VodiprincFlush`.
  Without this parameter, the process waited the analysis completion for all frames, transferred the results to the tracking module (if it was enabled), accumulated the results, performed the `flush` operation for the tracking module, and then returned the accumulated result.
  With this parameter, the process waits the analysis completion for the earliest frame, transfers its result to the tracking module (if it is enabled) and returns its result. Thus, to get all the results that are still being analyzed, it is necessary to call the `VodiprincFlush` operation, while it returns status `>=BoS_OK`.
- Recognition Server (vpwsrv) added.
  There are two options for working with it:
  - on the client, replace the `vpw` module loading to `vpwr` module and replace the `VpwprincOpenXXX` to `RvpwprincOpen`;
  - or replace the `vpw` module loading to `vpwri` module.

  By default, the client will connect to the server on `localhost:3000`. This behavior can be changed by setting the client environment variables: `VPW_HOST`, `VPW_PORT` or by setting explicitly using the `RvpwprincOpen` operation arguments.

Working with the server adds possibility to run the client application under the debugger, since the required modules set (for working with the server) are not protected from debugging.
Working with the server also makes possible to analyze frames on one platform, and launch the client on another. This can solve the problem, when DNN calculations are not available on the client platform.

5.5 vpwfetch changes

- Added the possibility to work with the recognition server (`vpwsrv`). For this case, it is necessary to specify using the `--principal` argument the address and, if necessary, the port on which the `vpwsrv` server is running.
  For example:
  - `--principal localhost`
  - `--principal localhost:3030`
  - `--principal 192.168.100.196:3333`
- Added the possibility to specify a list of devices, that will be used for DNN inference using the `-N` parameter. Possible values: `CPU`, `GPU`, `MYRIAD`.
- Added the possibility to set methods for the license plate detection using `-C` parameter.
  Possible values:
  - 1 — `VodiF_VPW_PLATECANDS_BY_MORPH`, old method;
  - 2 — `VodiF_VPW_PLATECANDS_BY_DNN`, new method, using DNN;
  - 3 — `VodiF_VPW_PLATECANDS_BY_MORPH | VodiF_VPW_PLATECANDS_BY_DNN` (both options).
- Added the possibility to set the license plate level analysis using the `-T` parameter.
  Possible values:
  - 0 — `VodiK_VPW_PLATECANDS_ANALYSE`, only license plate detection;
  - 1 — `VodiK_VPW_SYMCANDS_ANALYSE`, additionally characters detection;
  - 2 — `VodiK_VPW_TEXT_ANALYSE`, full analysis.
- Added the possibility to set methods for analyzing license plates candidates using the `-A` parameter.
  Possible values:
  - `bluran, 0x1`
  - `nan, 0x2`
  - `tmplan, 0x4`

  - `dnnan, 0x8`
  - `otsuan, 0x10`
- Added the possibility to filter license plates candidates using deep learning network (DNN) via the `-P` parameter.
- Added the possibility to repeat the processing of input files via parameter `--repeat`. Zero means indefinitely repeating. The default value is 1.
  For example:
  - `--repeat 0` — repeat unlimited times
  - `--repeat 10` — analyze the input sequence 10 times
- Added the possibility to save the "interesting" frames using `--interesting-frame` parameter. "Interesting" frames are considered as that, for which a non-empty result (ensemble) was obtained, i.e. when at least one license plate number was found.
  Usage examples:
  - `--interesting-frame 'output/${src-seqnum}.bmp'`
  - `--interesting-frame 'output/${src-seqnum}_${src-name}.bmp'`
- Added the possibility to set analysis zones using the `--analyse-zone` parameter.
- Fixed the bug, that could lead to a memory leak.
- The interpretation of unnamed arguments (input files) has been changed. Now they are not considered as string expressions, but simply strings.

5.6 templates changes

- Angola
  - Added template 2
- Armenia
  - Changed mask for 19-24 templates
- Belarus
  - Added template 19
  - Corrected temporary templates 10 and 14
- Hong Kong
  - Added templates 2-6
- Zambia
  - Geometry for template 3 was fixed
- Indonesia

  - Geometry for template 2 was fixed
- Spain
  - Added scooter template
- Kazakhstan
  - Changed image and character constraints for template 4
  - Changed character constraints for 15, 18, 19 templates
- Kenya
  - Added trailer templates 5-6
  - Changed character constraints for 1-2 templates
  - Main and trailer templates adapted for use in Uganda and Rwanda
  - Main templates adapted for use in Tanzania and South Sudan
- Congo
  - Added template 1
- Cyprus
  - Added templates 2-17
- Kyrgyzstan
  - Added templates 18-22
- China (PRC)
  - Added templates 5-7
  - Changed symbols translation table for templates 2-4
- Korea
  - Added templates 9-11
- Myanmar
  - Added templates 1-3
- Netherlands
  - Added templates 20-21
- Russia
  - Changed mask for 20, 23, 25 templates
  - Added regions 122, 702, 193, 147, 156, 774, 790, 797
  - Added templates types
- Slovenia
  - Added template 18
- Taiwan
  - Changed symbols translation table for templates 13

  - Geometry for templates 5 and 13 was fixed
- Ukraine
  - Suppored DSTU 4278:2019
  - Added military templates 23-24
  - Changed character constraints for main templates
  - Characters output was changed to Latin
  - Added new diplomatic templates
  - Added templates types
  - Added individual template CIKLUM
- Sri Lanka
  - Added templates 4-11
  - Changed templates 1-3

5.7 protection changes

- Transition to `hasp-api-7.100`, `hasp-rt-7.103`
- Added more informative error messages in the protection system

5.8 new platforms

- Added support for ARM64 platform

5.9 compatibility

- Transition to `OpenVino-2019.3.334`, `hasp-api-7.100`, `hasp-rt-7.103`, `ProjMajster-1.0.5`, `hProjMajster-0.0.0`, `Bo-2.8.1`, `Vipm-0.0.10`
- `Vpwres` and `Vpwens` implementations were moved from the `vpw` to the `vpws` module
- Removed symbols export from archive libraries, such as `OpenCV`
- File `templates_map.txt` location was changed, from `share/Vodi/templates/templates_map.` to `share/Vodi/templates_map.txt`
- Folder `share/Vodi/templates` moved to `share/Vodi/platesdef/templates` and its subdirectories was renamed
- The countries flags images was placed in a separate directory `share/Vodi/platesdef/countryf`

- File `features.xml` was renamed to `features.{SERIE}.xml`, where SERIE corresponds HASP serie

6 AUTOSDK 2.7.3 (22.08.2019)

6.1 general information

- Added new license plate templates of the following countries:
  - Ukraine [22].
- vpwfetch supports an archived (with delay) license,
- Improved recognition of O and Q characters for Belgium,
- Minor improve and fix bugs in a plate analyse algorithms.

7 AUTOSDK 2.7.2 (10.06.2019)

7.1 general information

- Added new license plate templates of the following countries:
  - Pridnestrovian Moldavik Republic [5,6],
  - Bahrain [3],
  - Korea [8].
- Changed license plate recognizer for Iran,
- New constraints for Korean templates,
- Added 761 region to Russian Federation,
- Deleted letter O from Czech Republic recognition.

8 AUTOSDK 2.7.1 (06.04.2019)

8.1 information for developers

8.1.1 Fixed bugs

- Fixed memory leak

9 AUTOSDK 2.7.0 (25.03.2019)

9.1 general information

- Added new license plate templates of the following countries:
  - Kazakhstan [30],
  - India [10-17],
  - Sweden [5-6],
  - Russian Federation [22-25],
  - Croatia [9-11],
  - Macedonia [8],
  - Kosovo [11],
  - Ukraine [19-21].
- Changed license plate recognizer for Russian Federation.

10 AUTOSDK 2.6.1 (18.01.2019)

10.1 general information

- Added new license plate templates of the following countries:
  - Oman [6-10],
  - Nigeria [3-4],
  - Russian Federation [18-21],
  - Korea [5-7],
  - Armenia [19-25].

11 AUTOSDK 2.6.0 (23.11.2018)

11.1 general information

- Added new license plate templates of the following countries:
  - Belgium [17-20],
  - Bulgaria [14-17],
  - Germany [68-92],
  - Great Britain [15-25],
  - Liechtenstein [1-4],
  - Luxembourg [10],
  - Mexico [37],
  - Monaco [1-8],
  - Netherlands [16-19],
  - New South Wales (Australia) [14-29],
  - Qatar [2-7],
  - Queensland (Australia) [11],
  - Saudi Arabia [1-9],
  - Slovakia [11],
  - Spain [13],
  - Victoria (Australia) [23-51],
  - Zambia [1-3],
  - Iran [3-7],
  - Tajikistan [8],
  - Botswana [1-6].

11.2 information for developers

11.2.1 Improvements

- Added alternative method to search a plate numbers, which is switched on by the environment variable VPW_PLATES_BY_BLUR=1. In some cases it works

better than the current method, for instance, numbers on trucks. But it decrieses a total performance to 50%. This depends on an analyzed image and searched plate sizes (VodiCTL_VPW_PLATE_SIZE_MIN, VodiCTL_VPW_PLATE_SIZE_MAX).

- Added the ability to recognize the characters Ö and Ü, which improves number recognition for countries where they can meet
- Updated templates California (USA) [6]
- Updated templates Switzerland [3]
- Updated templates Luxembourg [4]
- Added 198 region to the ru.1 template and updated ru.11 template
- Updated templates Kazakhstan [11-12]
- Updated templates Victoria (Australia) [23]
- Updated templates Western Australia [1-2]

11.2.2 Fixed bugs

- Fixed error which can lead to abort program when use recognition for Korea and Iran
- Fixed error which in some cases can lead to decreases a performance comparing to 2.5.25 and 2.5.26 versions

11.2.3 Compatibility

- Added the vodi_bool_t type for better compatibility with C++

12 AUTOSDK 2.5.26 (11.07.2018)

12.1 general information

- Added new license plate templates of the following countries:
  - Great Britain [14],
  - India [5-6],
  - Croatia [14-17],
  - Mexico [33-36],
  - California [6-13],
  - Florida [8-12],
  - Madagascar [1-8],
  - Norway [7-8],
  - South Africa [30-59],
  - Turkey [26].

12.2 information for developers

12.2.1 Improvements

- Improvemented analyzing in the VodiCTL_VPW_PLATE_PRECISE_ANALYSE mode.

12.2.2 Fixed bugs

- Fixed error which can lead to abort program.

12.2.3 Compatibility

- Protection with 3995 feature on ARM platforms
- Renamed the module vipm to vipm-def
- Renamed "Taiwan, Province of China" to "Taiwan"
- Changed the coordinate system of symbols to relative original image

13 AUTOSDK 2.5.25 (28.03.2018)

13.1 general information

- Added the parameter VodiCTL_VPW_PLATE_EXTRA_RANGES_ANALYSE, which enable more accurate finding candidates of plates.
- Added templates type of trailer: by.3 dk.3 gr.2 ie.3 lt.2 lv.6 no.3 si.6
- Added support partial inversed plates, like az.11
- Added ability to set default parameters by the environment variables.
- Added new license plate templates of the following countries:
  - Albania [7-13],
  - Arab Emirates Ajman.2,
  - Armenia [9-18],
  - Austria [18-68],
  - Bosnia and Herzegovina [3-5],
  - Croatia [5-8,12-13],
  - Finland [12-15],
  - France [20-23],
  - Germany [21-67],
  - Greece [5-7],
  - Iceland [4-5],
  - Ireland [14-39],
  - Latvia [13-18],
  - Lithuania [20-23],
  - Luxembourg [8-9],
  - Macedonia [2-9],
  - Malaysia [6-9],
  - Malta [4-9],
  - Moldova [22-25],
  - Mongolia [6-7],
  - Montenegro [2-8],

- Norway [6],
- Portugal [10-13],
- Romania [11-17],
- Serbia [10-12],
- Singapore [1-14],
- Slovakia [5-10],
- Slovenia [15-17],
- Turkey [9-25],
- Uruguay [4,9],
- Vatican [3-4].

13.2 information for developers

13.2.1 Improvements

- A new recognition algorithm for a large number of countries has been obtained.
- Improved and applied a number of algorithms for analyzing the plate, which increased the average probability of recognition by 10 percent.
- Static image analysis works completely without dynamics. Thus, only one result per plate falls into the dynamics.

13.2.2 Fixed bugs

- Fixed a bug in the dynamics of the accumulation of information about the symbols, which sometimes led to incorrect results.
- Added entry in the configuration log for the value of the parameter VodiCTL_VPW_PLATE_PREC
- The value of the field vodi_plate_info_spec::pis_inversed has always been false.

14 AUTOSDK 2.5.24 (30.10.2017)

14.1 general information

- Added ability to read video files by the vpwfetch on linux.
- Added the command VodiCTL_PRINT_APPLIED_SETTINGS, which prints string of settings.
- Added new license plate templates of the following countries:
  - Bulgaria [13],
  - Poland [25-29],
  - Serbia [6-9].

14.2 information for developers

14.2.1 Improvements

Improved template selection.

14.2.2 Fixed bugs

- Fixed errors in the following templates: ae.aj.1 de.[1-18] ua.3 kz.[14-15,17-19].
- Fixed a bug in vpwfetch, which could result inappropriate geometry in output.
- Fixed a bug in the printing '*' for some templates.
- Fixed a bug in the analysis of the number plate that could cause to crash the application.

14.2.3 Compatibility

- The format for parameter logging has been changed, you can now use it as config for vpwfetch.
- Internal modules removed: vpwps, vpwsr, simlib.

15 AUTOSDK 2.5.23 (22.09.2017)

15.1 general information

- Added the option --hide-abnormal-keys into the command lsvpwc, which doesn't view keys without ability to use.
- Updated license plate recognizer for Guatemala.
- Added new license plate templates of the following countries:
  - Bulgaria [9-12],
  - Poland [22-24].

15.2 information for developers

15.2.1 Improvements

Improved the vehicles trajectories analysis when Dynamics mode is on. This reduces the possibility of sudden trajectory merge.

15.2.2 Fixed bugs

- Fixed the bug in the analysis of the options for the lsvpwi and lsvpwc commands.
- Fixed the bug in the operation LpvlibMinus.
- Fixed errors in the following templates: pl.[18-19] tw.11.

15.2.3 Compatibility

The feature 4048 now allows you to work with templates of all the Arab Emirates.

16 AUTOSDK 2.5.22 (14.08.2017)

16.1 general information

- Added ability for Korea's license plate recognition (templates 1-4).
- Updated license plate recognizers for Cuba, Kuwait, Luxembourg, Andorra, Austria, Italy, Netherlands, Portugal, Sweden, Tunisia, Peru, Uzbekistan, Iran.

16.2 information for developers

16.2.1 Improvements

- Optimized parallel analysis of the image.
- Added regions 716, 799 and deleted 188 for Russian's templates.
- Improvemented analysis with the VodiCTL_VPW_PLATE_PRECISE_ANALYSE parameter.

16.2.2 Fixed bugs

Fixed errors in the following templates: md.[11,13,14,16-21].

16.2.3 Compatibility

- Now for selection license with delay (archive) feature needs to use new version for open the principal with required parameters.
- Now there is a difference between 0 and 1 values of the ThreadCountMax parameter; at 0 - the image process will be in the same thread that calls it; at 1 - the image process will be in the separate thread.
- Changed the value by default of the VodiCTL_VPW_IMAGE_THRESHOLD parameter from 21 to 40, which is optimal for the tests we conducted.

17 AUTOSDK 2.5.21 (26.06.2017)

17.1 general information

- Added new license plate templates of the following countries:
  - Israel [19-21],
  - Taiwan [34],
  - Belarus [14].
- Updated license plate recognizers for Algeria, Austria, Belgium, Bosnia and Herzegovina, Costa Rica, Cuba, Cyprus, Czech Republic, Dominican Republic, Equatorial Guinea, Georgia, Greece, Guatemala, Honduras, Hungary, Ireland, Kazakhstan, Kuwait, Luxembourg, Macedonia, The Former Yugoslav Republic of, Malta, Montenegro, Netherlands, Nigeria, Norway, Paraguay, Peru, Philippines, Portugal, Romania, South Africa, Spain, Sweden, Venezuela, Bolivarian Republic of, Viet Nam.

18 AUTOSDK 2.5.20 (19.04.2017)

18.1 general information

- Added new license plate templates of the following countries:
  - Kuwait [8-11],
  - Jordan [9-10],
  - The Philippines [14-15],
  - Ethiopia [1-10],
  - Belgium [14-15],
  - Netherlands [11-12].
- Updated license plate recognizers for Bulgaria, Azerbaijan, Germany and other countries.

18.2 information for developers

18.2.1 Improvements

Simplified processing of narrow fonts' symbols.

18.2.2 Fixed bugs

- Fixed an error when VodiCTL_VPW_PLATE_FILTER_SYMCOUNT parameter was used.
- Fixed errors in description of the following templates: kw.[5-7], ke.[3-4], ca.ab.[3], kz.
- Fixed an error that occured with the "Dynamics" mode on. The error led to program's crash when specific templates set was chosen.

19 AUTOSDK 2.5.19 (07.03.2017)

19.1 general information

Added new license plate templates of the Netherlands [5-10].

19.2 information for developers

19.2.1 Fixed bugs

Fixed the error in license plate image analysis, which led to increase in overall recognition quality.

19.2.2 Compatibility

Introduced the new Vipm library to be used for image processing.

20 AUTOSDK 2.5.18 (17.02.2017)

20.1 general information

- Added new license plate templates of the following countries:
  - France [18-19],
  - Great Britain [6-9].
- Improved the recognition algorithm's performance, which gave the gain in frames processing speed.
- Updated the recognizer of French license plates.

20.2 information for developers

20.2.1 Improvements

Improved the algorithm of automatic tempate selection when recognizing symbols (from the templates set specified by user). Decreased the affect brought by perspective distortions.

20.2.2 Fixed bugs

Fixed the error in template selection algorithm which led to application crash.

20.2.3 Compatibility

Dynamic libraries of OpenCV are now used on ARM platforms.

21 AUTOSDK 2.5.17 (16.01.2017)

21.1 general information

- Added new license plate templates of the following countries:
  - Bahrain [2],
  - Indonesia [8-11].
- Protected the functionality of ADR pictograms recognition, which is now a parameter of license.

21.2 information for developers

21.2.1 Improvements

- Improved the algorithm of automatic identification of tracked vehicle loss (when the vehicle is out of the frame).
- Added the VodiCTL_VPW_DYNAMIC_LOSTALG_ENABLE parameter. It allows to enable/disable the algorithm of automatic identification of tracked vehicle loss. The parameter is enabled by default. Within the **vpwfetch** utility, the --with-lost-alg option is used to set the parameter.
- Improved the vehicles trajectories analysis when Dynamics mode is on. This reduces the possibility of sudden trajectory merge.

22 AUTOSDK 2.5.16 (05.12.2016)

22.1 general information

- Added new license plate templates of the following countries:
  - the Philippines [13],
  - Kyrgyzstan [16-17],
  - Slovakia [2-4].
- Added new feature to **vpwfetch** utility: now tracked vehicles' movement trajectories can be marked on the output frames.

22.2 information for developers

22.2.1 Improvements

- Improved description of the following templates: br.[3-6].
- Advanced license plates analysis with the VodiCTL_VPW_PLATE_PRECISE_ANALYSE flag activated.
- Updated the recognizer of Mexican license plates.

22.2.2 Fixed bugs

Incorrect line quantity of the following licence plate templates: jo.[2-3,7].

22.2.3 Compatibility

Removed the VodiK_VPW_TYPE_MAX constant.

23 AUTOSDK 2.5.15 (01.11.2016)

23.1 general information

Added new license plate templates of the following countries:

- the Philippines [11-12],
- Panama [6-9],
- Costa Rica [14-18],
- Nicaragua [4-8],
- El Salvador [12],
- Honduras [6],
- Puerto Rico [3-11],
- Dominican Republic [3-4],
- Cuba [7-9],
- Jordan [2-8].

23.2 information for developers

23.2.1 Improvements

- Added the ${plate-track} variable into **vpwfetch** utility.
- Improved the algorithms of inversed license plates analysis and dynamics.
- Supplemented the internal information about several license plate templates of Russia, Canada, Panama, Costa Rica and Guatemala, which facilitates for greater accuracy of recognition of the corresponding license plate types.

23.2.2 Fixed bugs

Changed encoding of **doc/templates//*.png** files from JPEG to PNG.

23.2.3 Compatibility

- Changed the behavior of **vpwfetch** utility: now the default output data encoding is UTF-8.

- Changed the name of **vpwfetch-oa2410** utility to **vpwfetch** (for UNIX-like OSs).
- Changed the callback interface for the VodiCTL_VPW_DYNAMIC_COMPARE_CALLBACK function.
- Changed the structure of usage examples and added the new ones: track.c, bestframe.c.
- Rewrote the functionality that used ImageMagick with the help of OpenCV.

24 AUTOSDK 2.5.14 (04.10.2016)

24.1 general information

- Added new LP templates of the following countries: Indonesia [1-7], Venezuela [3-9], Bahrain [1], Qatar [1], Kuwait [5-7], Kyrgyzstan [7-15], Kazakhstan [21-23].
- Added the 'type' parameter for LP templates (e.g. for the LP to be specified as police or diplomatic).[1]

24.2 information for developers

24.2.1 Improvements

- Added the VODI_IMAGE_WStride macro function[2].
- Advanced the analysis of license plates that were only partially "captured" during the detection.
- Changed symbols constraints of kz.[11-12,14-15,18-20] templates (which allows for more precise recognition).
- Added a new neural network[3] for recognition of LPs of the following countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay.

24.2.2 Fixed bugs

- Fixed the description of es.2 and su.[1-3] templates, which makes for more efficient usage of them during the recognition.
- Fixed the translation of Arabic symbols.

[1] In the current AutoSDK release, the LP templates' types can be viewed with help of **lsvpwi** utility.
[2] _opt\include\Vodi\Types.h
[3] aka "Imperial recognizer"

25 AUTOSDK 2.5.13 (29.08.2016)

25.1 general information

- Added new license key *features* which enable recognition of LPs of specific groups (for example, Europe, Asia). [1]
- Added LP templates of Ecuador [3-4].

25.2 information for developers

25.2.1 Fixed bugs

Fixed masks for ru.[13-16] templates.

[1] For information on AutoSDK licensing, visit VIT wiki. For more detailed description of Sentinel LDK solution, see the Gemalto documentation.

26 AUTOSDK 2.5.12 (19.08.2016)

26.1 general information

- Added the **lsvpwc** CLI application, which prints the information on the licensing keys that are currently available on the local machine.
- Added an opportunity to receive recognition results with 30-second delay.

26.2 information for developers

26.2.1 Fixed bugs

- Fixed error in the **lsvpwi** application, due to which the information on the "real_size" field could not be received.
- Fixed values of the former sg.[27-28] template identifiers, as they caused conflicts with the current (new) ones.

27 AUTOSDK 2.5.11 (01.08.2016)

27.1 general information

- Added new license plate templates for the following countries:
  - Georgia [8-24],
  - Peru [8-12],
  - Russia [17].
- Excluded the license plate templates of Peru [6-7].

28 AUTOSDK 2.5.10 (27.06.2016)

28.1 general information

- Added new license plate templates for the following countries:
  - Mexico [13-14,16,18-32],
  - Uruguay [5-8],
  - Peru [6-7],
  - Chile [3-16],
  - Brazil [7-8],
  - Argentina [9],
  - Vietnam [2-15],
  - Latvia [9].
- Excluded obsolete license plate templates for the following countries:
  - Uruguay [4],
  - Argentina [2].
- Added a CLI application (**lsvpwi**) which prints information on the available LP templates. The application is an alternative to **doc/templates/templates_map.txt** file.

28.2 information for developers

28.2.1 New opportunities

- Added the **Vodi/services/Lpvlib.h** file with the following functions:
  - LpvlibModulesOf
  - LpvlibCanonize
  - LpvlibIselemof
  - LpvlibIsnull
  - LpvlibIsuniverse
  - LpvlibEq
  - LpvlibProsubset

  - LpvlibSubset
  - LpvlibProsuperset
  - LpvlibSuperset
  - LpvlibUnion
  - LpvlibMinus
  - LpvlibIntersec
  - LpvlibComplement
  - LpvlibShowPlateid
  - LpvlibReadPlateid
- Added a list of elements which represent the countries and their subdivisions in accordance with ISO3166. With the help of new VodiISO3166children function, you can get a list of all children elements (subdivisions) of a specific parent element (country).
- Added pv_tmpl_id field into vodi_plate structure.
- Implemented the automatic loading of needed country modules (**vpwi-[country_code]**) when using the **vpwfetch** application (depending on the set of selected templates).

  > For detailed functionality description, see the AutoSDK guide for developers.

28.2.2 Improvements

- Added a new classifier for Mexico.
- Added the "infrared" attribute for Ukraining police LP template [3], as well as the rule for emblem recognition.

28.2.3 Fixed bugs

- In table of outlines-to-symbols translation for Ukrainian LP templates [7,8].
- In table of Cyrillic-to-Latin translation for LP templates of the following countries: UAE, USA, Argentina, Australia, Canada, Oman, El Salvador [9,11].
- When setting a non-zero value to VodiCTL_VPW_PLATE_FILTER_SYMCOUNT parameter of the VodiprincSetparam function.
- In translation of 'Ү' symbol (for Mongolian LP templates).

29 AUTOSDK 2.5.9 (25.04.2016)

29.1 general information

- Added new double-line license plate templates for Georgia.
- Added new license plate templates for Argentina.

29.2 information for developers

29.2.1 Improvements

- Added unit tests for **vipm** service operations.
- Added test for recognition of license plate images which were automatically generated in accordance with random templates and alphanumeric strings.
- Added specific classifier of symbols for Belarus, Kazakhstan, Russia and Mongolia.
- Improved recognition of region codes on Russian license plates.
- Improved overall recognition quality for all supported issuer-states due to increase in the symbol height limit.

29.2.2 Fixed bugs

- In assert expression within the template initialization operation.
- In **vpwfetch-srv** utility (which led to recognition information loss).
- In translation of Cyrillic Capital Letter Abkhazian Dze symbol for Mongolia.
- When performing the additional recognition of symbols after templates determination.

30 AUTOSDK 2.5.8 (01.03.2016)

30.1 general information

- Added support of ARM v8 x32 (AArch32) architecture.
- Added new templates of Ukrainian license plates.

30.2 information for developers

30.2.1 New opportunities

- Additional modules for USA (**vpwi-us**), Canada (**vpwi-ca**), Australia (**vpwi-au**) and UAE (**vpwi-ae**) were added. They were implemented for loading all the administrative region modules of listed countries.
- The **templates_map.txt** file was added to the **doc/templates/** directory. It contains the listing of old LP template identifiers with corresponding new ones.

30.2.2 Improvements

- Basic error handling functionality was added into **vpwfetch-srv** utility.
- Geometry of Ukrainian double-line LP templates was optimized.
- Ukrainian military LP templates were updated.

30.2.3 Fixed bugs

- When accessing to un-alligned memory.
- In **vpwi-us** module.
- In operations of matrix multiplication by a constant.

31 AUTOSDK 2.5.7 (18.12.2015)

31.1 general information

- Added new license plate templates for the following countries:
  - Singapore;
  - Ukraine (including the double-line LPs);
  - Azerbaijan (including the double-line LPs).
- Improved the quality of Great Britain license plates recognition.
- Raised the speed of AutoSDK operation on the ARM platform.
- The advanced frame analysis can be activated when recognizing number plates under adverse conditions (e.g. bad weather or camera characteristics/settings not fully corresponding to requirements). This leads to increase in recognition quality, but requires more time for image processing (20-30% longer, depending on frame resolution).

31.2 information for developers

31.2.1 New opportunities

- Added support of Intel IPP 8.2.
- Extended the collection of math operations which are supported by the **vipm-opencv** module (on the basis of OpenCV library).
- Added histogram equalization in process of license plate recognition.
- Added the VodiCTL_VPW_PLATE_PRECISE_ANALYSE parameter which is used for activation of advanced LP analysis mode (see "General Information").
- Added the new fields to the vodi_plate_symbol structure:
  - ps_bcolor (symbols background color);
  - ps_color (symbols color).
- Added the new field (pv_subdivision_id) to the vodi_plate structure. It describes the administrative unit where the recognized license plate belongs. The field is reserved for recognition of USA, Canada, Australia and UAE license plates.

31.2.2 Improvements

- The **vpwfetch** utility loads the **vpw** module by default.
- The **vpwfetch-srv** utility doesn't recreate the recognition object every time it gets the new configuration.
- The internal structure of LP templates is simplified.
- The creation process of internal dynamics objects is changed. The vpwresOpen procedure is performed for each object.

> For more information, see the AutoSDK user manual.

31.2.3 Fixed bugs

- Incorrect recognition of Ukrainian diplomatic license plates.
- Incorrect license checkout (performed by protection modules).
- Incorrect license plate templates protection.
- Incorrect conditions of recognition result returning (with "Dynamics" mode on).
- Incorrect implementation of math operations modules.
- Incorrect set of allowed symbols for Great Britain LP templates.
- Incorrect recognition of license plates which are small-sized relatively to frame size (with the help of filters by symbol height).
- Incorrect operation of _Bool.
- Incorrect principal object opening with the **vpwfetch-srv** utility.
- Incorrect information on symbols displayed with the **vpwfetch** utility.
- Incorrect usage of images which don't have the Retain/Release interface.

31.2.4 Known bugs

- Incorrect recognition of Ukrainian police license plates at night (when using the IR projectors).
- Incorrect license plate coordinates with "Dynamics" mode on (in some cases).
- Incorrect recognition of Russian license plates which have the bolt near the administrative region ID.

31.2.5 Compatibility

Binary compatibility with the 2.5.6 version is lost.

32 AUTOSDK 2.5.6 (30.05.2015)

32.1 general information

- Added support of double-line license plate recognition for the following countries: Brazil, Mongolia, Russian Federation, Kazakhstan, Moldavia.
- Added functionality for specifying license plate templates of country's administrative divisions. This feature is available for USA, Canada, Australia and UAE number plates.
- Added support of ARM v7 architecture (accelerated processing units).
- Added the **TLW** service for traffic lights state recognition.
- Implemented the automatic activation of inverse LPs recognition based on templates selected by user.
- Optimized the internal algorithms which led to increase in recognition speed and quality.
- Added intellectual filters by symbol height to decrease the number of wrong detections during recognition.

32.2 information for developers

32.2.1 Information for developers

- Modules of mathematical operations are added:
  - **vipm-ipp** — based on Intel IPP library;
  - **vipm-opencv** — based on OpenCV library.
- The **vpwi-almost** module is added for loading of all the country modules.
- New AutoSDK protection modules (**vpwc**) are implemented.
- The following functionality is moved to separate modules:
  - Identification of administrative divisions where the recognized license plates belong.
  - Mathematical operations on images and matrices (the **vipm** module).
- Modified and optimized functionality of symbols recognition module (**vpwsr**).
- The new LP templates naming (within each module) is introduced.

- In general, the number of modules required for loading decreased to two (**vpw** and **vpwi-...** modules).
- Simplified API usage:
  - there is no more need to harmonize the values of frame resolution parameters between different interfaces;
  - while recognition object opening (VpwprincOpen):
    * all available templates are selected automatically;
    * there is an opportunity to specify the recognition mode (freeflow or parking);
    * passing the structure with parameters is not necessary.
- Symbols recognizer specification (based on activated templates) is implemented.
- Utilities for testing the image processing functions are added.
- **VodiUTILS** library, which now supplements the **libVodi** library with the new functionality (e.g. image reading/saving), is added.
- New controllers for handling the active templates are added:
  - VodiCTL_GETVPWI;
  - VodiCTL_ADDVPWI;
  - VodiCTL_SETVPWI;
  - VodiCTL_DELVPWI.
- The vodi_plate_info_spec structure is extended with the pis_exact_quad field (the rectangle which specifies the license plate coordinates within the frame).
- Recognition mask logging is added.
- Condition of results returning in "Dynamics" mode is changed. If with_dublicate parameter is set to true, there won't be strict orientation on recognition quality.

> See the AutoSDK user documentation for detailed functionality description.

32.2.2 Improvements

- Optimized the function for identifying the contours within the image.
- Eliminated the **vpw** recognition module's direct dependency on OpenCV library.
- Added the new operations to **Vodiens** service (e.g. VodiensForeach).
- Improved the accuracy of license plates coordinates determination within the image.

32.2.3 Fixed Bugs

- Incorrect positioning of recognition zones within the frame (not corresponding to the settings).
- Incorrect license plate templates selection (in some cases).
- Incorrect logging of AutoSDK settings.
- Incorrect determining of symbols coordinates.
- Incorrect symbols filtering by height.
- Incorrect detection of double-line numbers.

32.2.4 Known Bugs

In rare cases the incorrect license plate coordinates are returned (with "Dynamics" mode on).

32.2.5 Main difference from 2.4.x versions

- The AutoSDK package size decreased due to elimination of modules number, as well as the new protection system. Unused files are removed (Vodi/VimgGrabber.h, platesdef.xml).
- It is not necessary to load the **vpwc-*** and **vipaz-mlnn** libraries.
- The new naming of LP templates is established. The former numeration is marked as obsolete.
- Recognition quality decreased for the following license plate issuers: Uzbekistan, Mexico, Netherlands, Costa Rica, Belgium. As for the rest of the supported countries, the recognition quality increased.
- Half-inversed license plates of Azerbaijan (ID 1233) are removed.
- The Arabic LP templates don't have the escape character.
- Several controllers are marked as obsolete and will not be used in the future:
  - VodiCTL_VPW_PRINCIPAL_ENABLE;
  - VodiCTL_VPW_RUNNING_TIME;
  - VodiCTL_VPW_IMAGE_WIDTH;
  - VodiCTL_VPW_IMAGE_HEIGHT;
  - VodiCTL_VPW_IMAGE_BRIGHTNES;
  - VodiCTL_VPW_IMAGE_CONTRAST;
  - VodiCTL_VPW_IMAGE_REVERSED;
  - VodiCTL_VPW_IMAGE_ANGLE;

  - VodiCTL_VPW_MD_ENABLE;
  - VodiCTL_VPW_MD_CELL_SIZE;
  - VodiCTL_VPW_MD_THRESHOLD;
  - VodiCTL_VPW_MD_SQUARE_MIN;
  - VodiCTL_VPW_MD_MASK;
  - VodiCTL_VPW_MD_MASK_H_SIZE;
  - VodiCTL_VPW_MD_MASK_V_SIZE.
- Wide ranges recognition is not supported now, so the following controllers were deleted:
  - VodiCTL_VPW_PLATE_EXTRA_RANGES_ANALYSE;
  - VodiCTL_VPW_PLATE_CLOSE_MASK_SIZE;
  - VodiCTL_VPW_PLATE_BHAT_MASK_SIZE.
- Number of binarization levels cannot be set (VodiCTL_VPW_PLATE_BIN_LEVEL_COUNT.).
- The principal (recognition object) opening interface is changed.