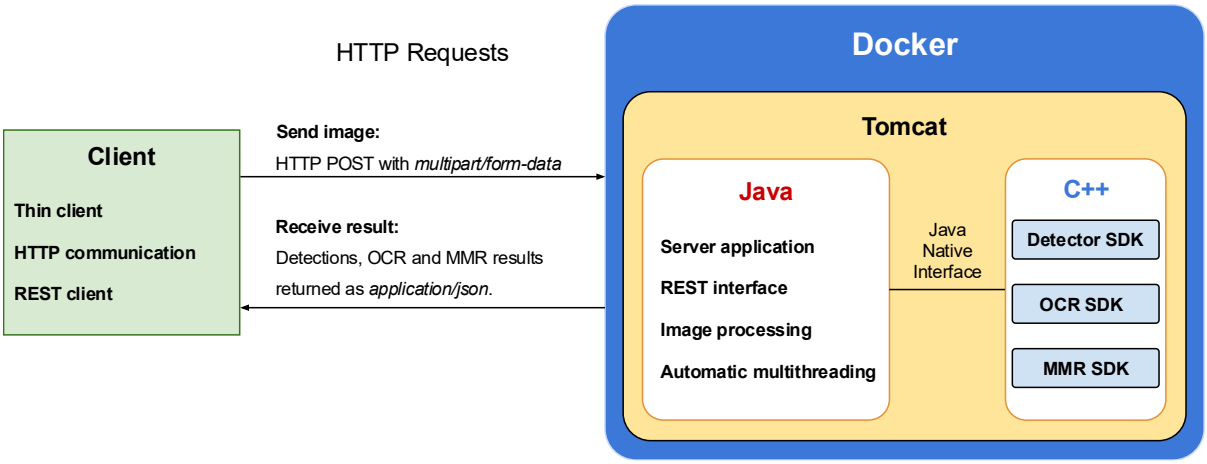
MMR+ANPR REST Server 4.7

Technical Specification



Description

- **Client-Server** architecture with **REST API** written in **Java**.
- The server accepts input images (**JPG, JPEG**, **PNG**, **BMP, TIFF, WEBP, AVIF**) and returns processing results:
  - Detected road users and their components (vehicles, plates, windshields, wheels)
  - Type and text of detected plates (OCR)
  - Vehicle classifications (MMR)
- **Input** image is supplied to the server using **HTTP POST** request:
  - The content type is ***multipart/form-data***
    and the image file data is contained as a parameter.
  - Optionally, the request may contain positions of road users (manual detections)
    and the specification of the requested analyses.
- **Output** road user detections, OCR texts and vehicle classifications:
  - Returned as ***application/json*** media type.

Technologies

- System running as **Docker** image allows scalability.
- Application running on **Tomcat** web server.
- Application itself is written in **Java** and uses **JNI** (Java Native Interface)
  for communication with image processing SDKs.
- Image processing SDKs are written in **C/C++**.

Contained SDKs

- **LPM SDK**
  - Box (vehicle), plate, windshield and wheel detector running on input images.
  - Plate OCR running on detected plates.
- **MMR SDK**
  - Vehicle classification (view, category, make, model, generation, variation, color, and tags recognition) running on detected license plates or vehicle boxes.
- All current SDKs support GPU computation.

Supported Operating Systems

- **Linux**
  - Ubuntu 20.04 and higher – x86_64 platform

Minimal Hardware Requirements

- Processor: 2 GHz, 4 cores (e.g., Intel Core i5)
- RAM: 8 GB
- Hard disk: 32 GB free space
- GPU (optional): NVIDIA Driver version >= 410.48 compatible (e.g., GeForce RTX 30-series)

Performance Test Configuration

The performance test was executed using the following hardware and dataset:

- **GPU:** NVIDIA® GeForce® GTX 1660, 6 GB GDDR5
- **CPU:** Intel® Core™ i5-9400F @ 2.90 GHz, 6 cores, 32 GB RAM
- **Dataset:** 800 JPG images, Full HD resolution (1920 × 1080 pixels)
  - 800 detection tasks
  - 786 OCR tasks
  - 809 MMR tasks
  - Ground truth content:
    - 809 road users detected
    - 792 bounding boxes
    - 786 license plates
- **Load profile:** 10 concurrent requests processed in parallel
- **SDK configuration:** Default settings
  - **Detector:** LPM module 802 (802-generic.gen-gen-v7.16), all object types enabled; segmentation enabled only for segmentation tasks
  - **OCR:** LPM module 801 (801-generic.gen-gen-v7.20), worldwide model
  - **MMR:** VCMMGVCT with BOX preference
    - acce: MMRBOX_VCMMGVCT_ACCE_2026Q2.dat / MMR_VCMMGVCT_ACCE_2026Q2.dat
    - fast: MMRBOX_VCMMGVCT_FAST_2026Q2.dat / MMR_VCMMGVCT_FAST_2026Q2.dat
  - **Processing instances:** 1 per SDK instance
  - **Internal threads per processing instance:**
    - GPU mode: 1 thread
    - CPU mode: 4 detector threads, 2 OCR/MMR threads

Performance Results

The following table summarizes the measured throughput and latency for individual task combinations on the test dataset under a constant load of 10 concurrent requests.

- **Throughput** is expressed in requests per second (req/s).
- **p95 latency** represents the 95th-percentile end-to-end request latency.
- **Seg.** denotes segmentation.

Performance results may vary depending on hardware, workload characteristics, SDK configuration, and deployment environment.

	GPU computation		CPU computation	
Tasks	**Throughput [req/s]**	**p95 latency [ms]**	**Throughput [req/s]**	**p95 latency [ms]**
Detection	90	112	21	185
Detection + OCR	86	123	19	580
Detection + MMR fast	79	169	19	559
Detection + MMR acce	52	298	-	-
Detection + OCR + MMR fast	71	192	14	816
Detection + OCR + MMR acce	50	317	-	-
Detection + Seg.	66	152	15	670
Detection + Seg. + OCR	63	166	14	806
Detection + Seg. + MMR fast	61	190	14	778
Detection + Seg. + MMR acce	47	315	-	-
Detection + Seg. + OCR + MMR fast	54	216	11	1030
Detection + Seg. + OCR + MMR acce	45	341	-	-
OCR	179	66	48	210
MMR fast	159	72	124	89
MMR acce	89	123	-	-
OCR + MMR fast	142	77	47	225
OCR + MMR acce	80	133	-	-