Kapsch TrafficCom

Deep Learning Versatile Platform
Manage Traffic Flow with Artificial Intelligence.

Introduction.
Product Features.

The Kapsch Deep Learning Versatile Platform (DLVP) is a comprehensive ecosystem enabling complex traffic monitoring and traffic management applications driven by artificial intelligence. The system has been built in a highly flexible way; its deep learning component can be trained quickly and efficiently to customer specific needs. The platform translates visual input into digital data – this data is analyzed and processed in real time to trigger manifold actions and generate dynamic reports.

DLVP uses highly flexible deep learning frameworks to detect and classify road users (vehicles of all kinds, pedestrians and persons with personal mobility devices). DLVP can be customized with virtual segments to detect client specific rules, such as zones to look for stopped vehicles, driving directions and specific vehicle classes. In addition to the virtual segments, the platform can be customized with virtual lines count the number of passing vehicles / road users, compare entry and exit points, trigger actions and many more.

DLVP is best utilized to support the following purposes:

Increase road safety.
> Detect dangerous road situations (incidents, near incidents).
> Support road infrastructure and road users to protect vulnerable road users.

Optimize urban and highway traffic flows.
> Reduce congestion.
> Optimize travel times.
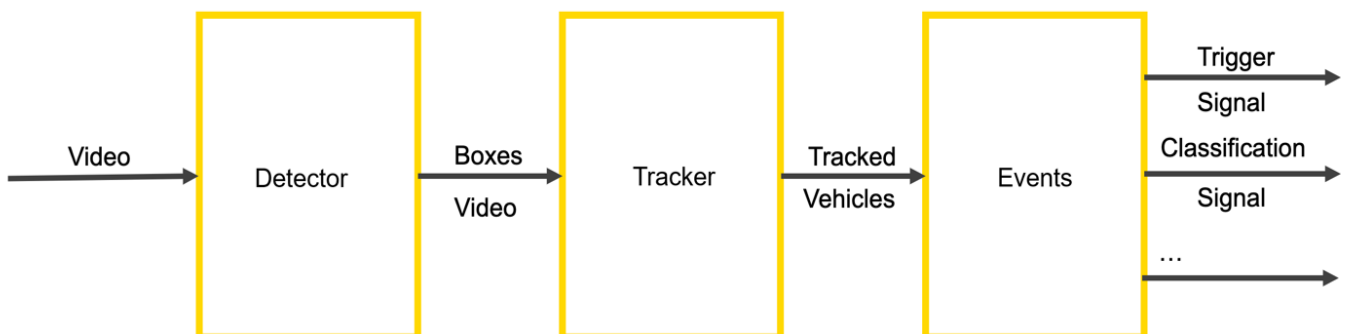> Reduce pollution through minimizing CO_2 emissions.

Figure 1: DLVP Deep Learning Pipeline

DLVP as a software solution is hardware agnostic in both the data input (via video cameras) and processing (computing device) areas. The system can consume incoming digital video streams with as low as 352 x 288 pixels, various video formats and frame rates (fps). Camera mounting positions (left or right side of roads, above roads, various mounting heights, etc.) are supported through intense training of the artificial intelligence, which can be extended any time through the Kapsch in-house data annotation and A.I. training team.

Through the platform approach, DLVP can be set up with various neural network detectors (detecting trained objects in every frame of a video stream) and trackers (establishing the relationship of the same object across multiple frames) to best serve and address the goals and specifics of individual projects.
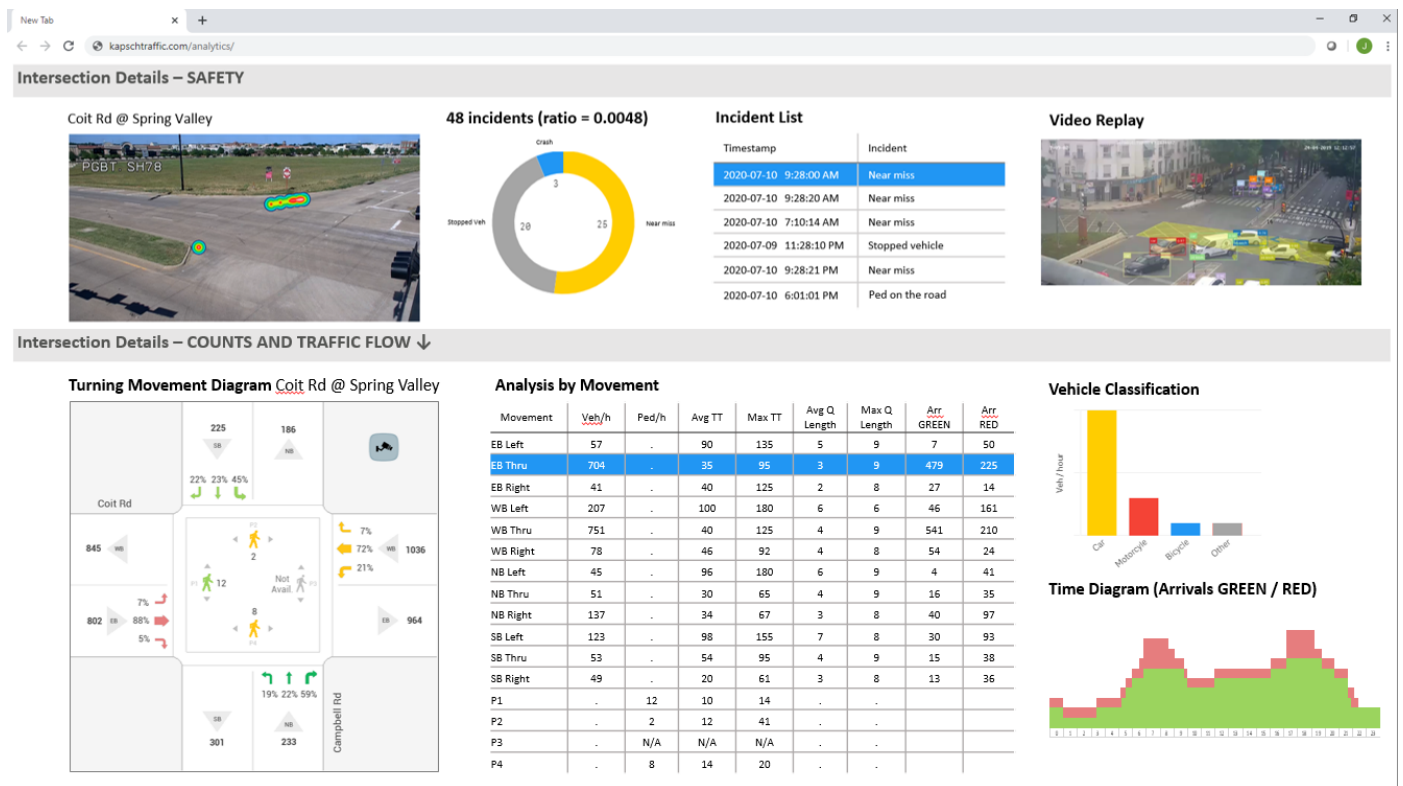

Figure 2: Traffic and Safety Analytics, based on DLVP generated data

The DLVP software can be deployed and operated on edge / fog / server and cloud devices, providing maximum flexibility to our customers.

DLVP comes with a flexible RESTful reporting interface, which pushes data (statistical data like counts, vehicle classes, travel speed, etc. / triggers / alarms) in JSON format to configurable reporting endpoints – making the integration of DLVP into Traffic Light Controllers (TLCs), Advanced Traffic Management Systems (ATMS) and Data Management Systems easy.

Functionality.
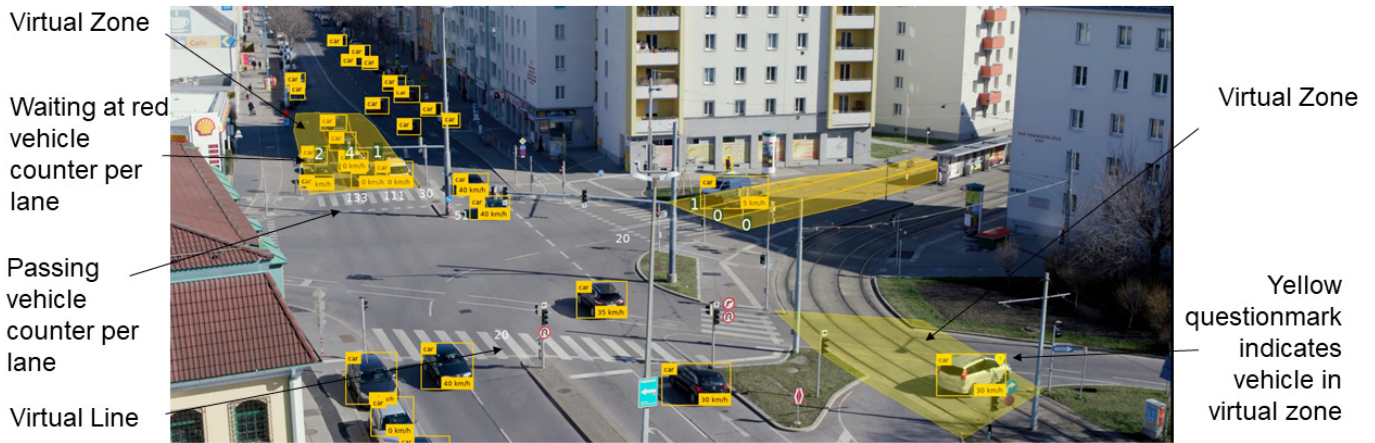## How DLVP uses AI to monitor traffic.

Virtual Zone

Waiting at red vehicle counter per lane

Passing vehicle counter per lane

Virtual Line

Virtual Zone

Yellow questionmark indicates vehicle in virtual zone

Figure 3: Object detection through deep learning

MRKTINT/Rel/Collateral/Brochures/Kapsch-KTC-NAM-BR_DLVP

Virtual Zone

Waiting at red vehicle counter per lane

Passing vehicle counter per lane

Virtual Line

Vehicle classification

Speed estimation
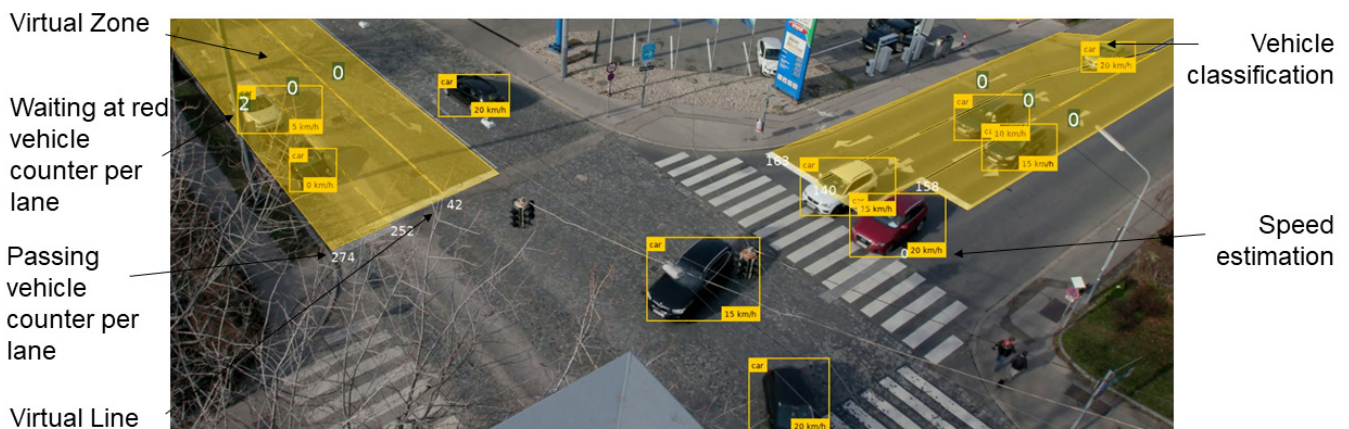
Figure 4: Virtual segmentation of the camera's field of view
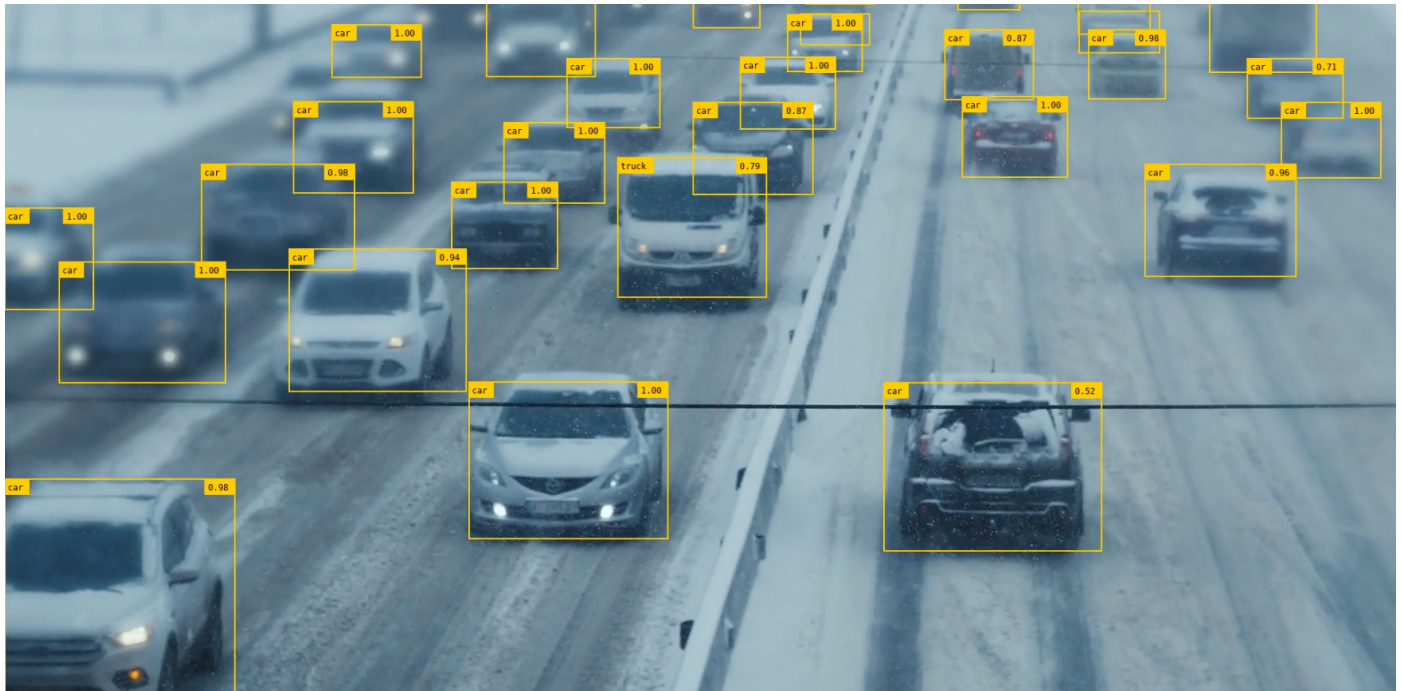
Figure 5: DLVP highway example

Road user
classification

Pedestrian
detection and
classification

Micro origin /
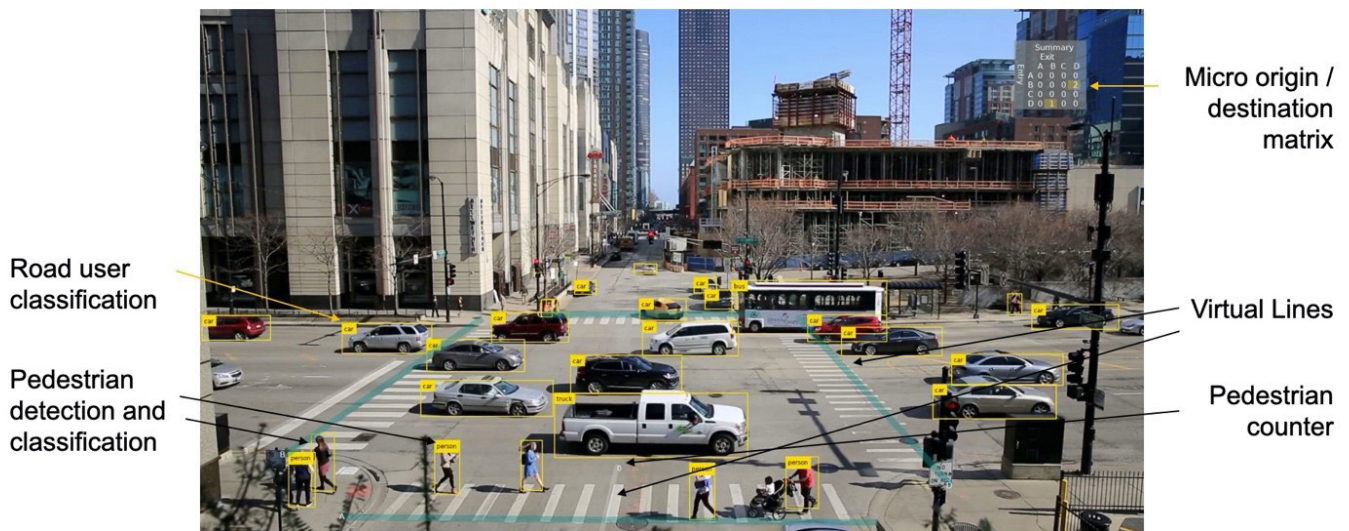destination
matrix

Virtual Lines

Pedestrian
counter

Figure 6: DLVP intersection example

DLVP Supported Functional Use Cases

Vehicle Detection

Person Detection
For pedestrian, cyclist, and persons with personal mobility devices

Vehicle and Person Classification
23+ classes based on TLS 8+1

Travel Speed Estimation

Counting
> Road usage volume
> Per lane
> Per class
> Red light occupancy
> Green light throughput
> Turn count (micro origin / destination matrix)

Cycle Length Calculation

Micro Travel Time Calculation

Zone Monitoring
> Yellow zone
> Travel direction
> Vehicle class in lane

Incident and Anomaly Detection
> Rule violation
> Tailgating detection
> Wrong way driver detection
> Slow zone / congestion detection
> Stopped vehicle detection
> Pedestrian-on-roadway detection

Data Enablement for BSM Generation
[Basic safety message]

Third Party Component Trigger
> ALPR camera trigger

Predictions
> Travel path prediction
> Collision course detection

Kapsch TrafficCom

Kapsch TrafficCom is a globally renowned provider of
transportation solutions for sustainable mobility.
Our innovative solutions in the application fields of Tolling,
Traffic Management, Demand Management and Mobility
Services contribute to a healthy world without congestion.
We have brought projects to successful fruition in more than
50 countries around the globe.

With our one-stop solutions, we cover the entire value chain
of our customers, from components and design to the
implementation and operation of systems. As part of the
Kapsch Group and headquartered in Vienna, Kapsch
TrafficCom has subsidiaries and branches in more than 30
countries. It has been listed in the Prime Market of the Vienna
Stock Exchange since 2007 (ticker symbol: KTCG). Kapsch
TrafficCom's about 5,100 employees generated revenues of
EUR 731 million in fiscal year 2019/20.

>>> www.kapsch.net

Visit us on:

Kapsch TrafficCom North America | 8201 Greensboro Drive, Suite 1002 | T +1 703 885 1976 | F +1 703 790 9100
ktc.na@kapsch.net | www.kapsch.net