Genetec™

Smart City Berlin

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Dr. Ing. Habil Manzoor Ahmed Khan, Director of Network & Mobility at the Distributed Artificial Intelligence Laboratory (DAI)

Traffic management of the future: Berlin leverages traffic data from KiwiVision

Using KiwiVision™ software, Berlin researchers conduct detailed traffic analyses in the German capital, without interfering with the personal rights of civilians. GRAEF Gruppe (www.graef-gruppe.de) was responsible for the implementation. The Genetec™ partner specializes in consulting, planning, installation, and maintenance of video, alarm, time recording, and IT technology. Customers of GRAEF include Siemens, Jaguar and the Charité.

All around the Ernst-Reuther-Place in Berlin, the future of inner-city road traffic is being reshaped. Several companies have come together to contribute to the "Smart City Berlin" project and it's subsequent activities. Amongst them we find T-Systems, Cisco, TÜV Nord, along with the Technische Universität Berlin (TU Berlin). The group aims to research the digitization of road environments, the opportunities for autonomous driving, traffic flow management, and the environmental protection of Berlin's metropolitan regions. But right at the start of the project, a challenge arose: On the one hand, the precise

recording and categorization of all road users is an indispensable basis for meaningful data models; on the other hand, the German Data Protection Act and the European General Data Protection Regulation (GDPR) demands privacy protection, especially in public spaces. By employing KiwiVision technology, these opposing hurdles could be overcome.

"To attain the objectives of Level 5 autonomous driving, there is more to be done, especially making the roads more intelligent," says Prof. Dr. Sahin Albayrak, Chief Executive of the Distributed Artificial Intelligence Laboratory (DAI) at the TU Berlin and the brain behind the flagship project, DigiNet-PS (www.diginet-ps.de). For making the roads more intelligent the roads should be digitized by deploying different types of sensors and actuators.

"Most autonomous driving projects focus on vehicle-based solutions," explains Dr. Ing. Habil Manzoor Ahmed Khan, Director of Network & Mobility and one of the lead researchers at the DAI Laboratory. With such approaches, the capabilities of the vehicles may be improved, however, to extend the vision (from a few meters to a few kilometers) and improve

the perception of the vehicles, additional information should be provided through external sources, especially through the digitized environment. It goes without saying that capabilities of L-5 autonomous driving may be achieved by improving the perception, making the roads talk to the autonomous vehicles, and applying AI approaches in a distributed manner.

Berlin goes digital

For research purposes, numerous cameras and other sensors were installed at Ernst-Reuther-Place and along Straße des 17. Juni to provide information about road users and traffic density, road conditions, parking space occupancy, traffic light synchronization, and weather. The immense amounts of data are then analyzed using various machine learning and other AI-based methods developed at the DAI laboratory. The application possibilities of the knowledge gained are almost limitless: "In the future, we will be able to inform vehicles that the road is icy or muddy for six meters in one kilometer. Our data models also allow precise statements to be made about which parking spaces are likely to be free on Friday mornings and which traffic light switching is optimal for the flow of traffic on Tuesdays at noon."

The basis for such concrete statements is the correct recording of every single car, truck, and bus as well as every pedestrian and cyclist. "We have the actual data on all road users, so we can simulate Ernst-Reuther-Place at any given time," says Manzoor Ahmed Khan. "This is only possible because from the outset we have paid attention to the rights of road users, whose consent we cannot obtain. We had to come up with a viable approach to privacy that was rigorously tested. Otherwise, we would not have received approval for the project."

KiwiVision delivers accurate and anonymized data

If faces or license plates of uninvolved road users are recorded by a camera and subsequently stored, this is personal data. The collection and processing of such data are limited and regulated by GDPR. Failure to comply with the regulations may result in substantial penalties. However, if persons are only represented as blocks, the personal reference is missing in the data. Computer-generated representations that replace people and vehicles with symbols, therefore, fall outside the scope of GDPR.

The Berlin research team took advantage of this fact. The cameras use KiwiVision video analysis, which recognizes objects in the traffic flow, categorizes them, and anonymizes the data obtained. The algorithms cannot be fooled by different weather conditions such as snow or rain and can identify moving objects just as reliably as static ones. Only after anonymization is the data collected by a self-developed IoT middleware of the DAI laboratory and forwarded to processing systems. Trucks, cars, and, pedestrians appear as circles,

squares, or triangles in the analyses and simulations. The researchers do not need more information. Subsequent de-anonymization is impossible because the video streams are not recorded. "Because capture and identification are so central to our project, we have looked at several technologies and conducted comparative studies," says Manzoor Ahmed Khan. "KiwiVision definitely fits our requirements the best, so we decided to use it and this turned out to be the right decision."

The same algorithms are also used in Genetec KiwiVision Privacy Protector™. With this pixelation and masking solution, companies can ensure that employees and visitors are made unrecognizable despite comprehensive video surveillance. Privacy Protector fully integrates with Security Center, the unified security platform from Genetec. By supporting open industry standards, Security Center enables the management of non-proprietary IP-based cameras, door locks, sensors, and more. through a single interface.

For corporate use, the original video stream is recorded, encrypted, and available for the investigation of incidents. Access is secured by an authentication procedure in which two employees have to enter special chip cards and PINs or login information. Privacy Protector is one of few solutions that has received the European Privacy Seal. This seal of approval is only awarded after extensive technical and legal examination of the compatibility of IT products with European data protection directives. The seal is valid for two years, so certified products always meet the latest requirements.

Future projects and KiwiVision

More intelligent traffic management is one of the great challenges of our time, which is why the work of the Berlin researchers is far from complete. Another large-scale project on 5G mobile communication and autonomous driving is already being planned, in which Ernst-Reuther-Place and Straße des 17. Juni will form one of six European test tracks. KiwiVision video analytics will again provide the necessary information for this project. "KiwiVision is our solution for anonymous traffic data," says Manzoor Ahmed Khan. "The support was very cooperative at all times. Based on our experience to date, we look forward to working together on future projects."