

Press Release

Driving lessons for artificial intelligence

Artificial intelligence (AI) is an integral element of highly and fully automated vehicles. However, the complexity of constantly changing and new traffic situations is a great challenge to further develop AI for serial production of autonomous vehicles. The project KI Delta Learning investigates new methods of machine learning, which allow for the transfer of existing knowledge from known domains to new traffic scenarios, so-called target domains, with minimal effort. Only through new methods for the efficient and unrestricted extension of AI, autonomous driving can become reality in the complex "open world". It is this scalability of AI, also known as autonomy at scale, which enables the development of highly automated vehicles to react more dynamically to new requirements and provides fast access to new markets.

Developed by the VDA Leitinitiative autonomous and connected driving and funded by the Federal Ministry of Economic Affairs and Energy, the KI Delta Learning project has been working for a year now with leading partners from science and industry to deepen expertise in the successful implementation of AI in autonomous driving. The focus is on the development of methods for the efficient transfer of already existing knowledge from known domains to new target domains. With the help of these methods, AI should in future only have to learn the gaps - the deltas - to unknown target domains by building on existing knowledge. These deltas can be divided into six use cases. They comprise, for example, dealing with further developments in the field of vehicle sensors or with long-term changes in the world of mobility. The consideration of short-term changes, such as different day times or weather conditions, as well as the extended use of AI methods in other countries are also included in the scope, just to name a few aspects.

"Typical examples of a change in domains are changes in time or place," explains Mohsen Sefati (Mercedes-Benz AG), head of the KI Delta Learning project. "In a traditional training process of algorithms, a neural network has learned, for example, how to drive autonomously under favourable weather conditions. However, if it rains or snows, previously the AI had to be completely retrained in order to be able to drive autonomously. However, this does not only apply to weather-related changes, but also to countless other scenarios. The AI of an autonomous vehicle must be flexibly expandable and must be able to master any situation. This is the only way to make an optimum use of the existing knowledge when situations change. Regardless of whether the vehicle is driving in Germany or China, in winter or summer, in metropolises or rural areas. AI modules must be scalable, especially for level4/5 of automation, and must also react reliably outside specified scenarios. What has already been learned should not be discarded when bridging the delta, but should be used as a basis. This is the only way how autonomous systems can reliably cover the entire complexity of the world of transport in the long term and keep pace with ever shorter innovation cycles and constantly changing mobility".

To meet these deltas, the project focuses on three main areas: transfer learning, didactics and automotive suitability. The state of the art in all three areas will be advanced to such an extent that the next generation of AI algorithms will be ready for unlimited use in autonomous vehicles.

About the project KI Delta Learning



Project runtime: 01/01/2020 – 31/12/2022 (36 months)

Project budget: €26.96 M

Funding budget: €16.22 M

Funding body: Federal Ministry of Economic Affairs and Energy

19 partners:

Mercedes-Benz AG, BMW Group, Volkswagen AG, Robert Bosch GmbH, Hella Aglaia Mobile Vision GmbH, Valeo Schalter und Sensoren GmbH, ZF Friedrichshafen AG, CMORE Automotive GmbH, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), FZI Forschungszentrum Informatik, OFFIS e.V., Albert-Ludwigs-Universität Freiburg, Bergische Universität Wuppertal, Hochschule Reutlingen, Technische Universität München, Universität Stuttgart, Eberhard Karls Universität Tübingen, InnoSenT GmbH, Porsche Engineering Group GmbH

Project management:

European Center for Information and Communication Technologies – EICT GmbH

The research project KI Delta Learning has been initiated and developed as part of the KI Familie by the VDA Leitinitiative autonomous and connected driving.

By means of a networked project cluster, the KI Familie builds up comprehensive AI expertise for automotive applications. Project results are exchanged, key experts are brought together and technical innovations are implemented more quickly. The programme of the VDA Leitinitiative aims to secure the leading position of German industry in the field of autonomous and connected driving and is involved in pre-competitive cooperation projects for a broad-based development of expertise in Germany. In doing so, it focuses on coherent and convergent technology development in conjunction with the demand for a rapid industrialisation. The goal was jointly formulated: "The 'operating system' for autonomous driving comes from Germany".

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