

SEMANTICS ON-THE-ROAD

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We think that semantic knowledge is necessary for intelligent vehicles. Present-day driver assistance systems, like automated braking system or automatic cruise control, are quite dumb. They are measuring speed, distances, etc. but they aren't able to act intelligent in the driving environment. They were designed for improving safety or comfort. They are not concerned with the overall driving task. Therefore, they know little about the overall driving environment, except what's absolutely necessary to fulfil their tasks. We do expect more from a modern driver assistance system (DAS), especially more intelligence. We would like to have an assistant (a driver co-pilot), which is able to support us like a driving instructor, or even take over-driving for us completely, if we want it to.

In our opinion, exploiting semantics is the enabling factor for such improved advanced DAS and autonomous vehicles. The analysis and fusion of different sensing technologies, followed by context-sensitive data interpretation on a semantic, descriptive level holds huge potential for safe navigation of intelligent vehicles. The introduction of semantic knowledge to advanced DAS will enable cars to drive nearly autonomous in the next century. User intervention will only be required in exceptional circumstances. Many accidents could be avoided by intelligent driving agents. We see the challenge in teaching semantics to a computer system. What is done intuitively by humans all the time (perceiving environment, assessing necessary actions...) is a difficult task for a computer. Making a machine intelligent enough to recognize and correctly interpret a dynamic environment is a fascinating task.

We will emphasize this statement by giving an example, how semantic influences decisions of intelligent driving agents: The system detects an obstacle on its lane. To act intelligent it must know what the object really is. By recognizing the object type and only its presence, we are able to derive suitable behaviour. For example, we recognize a small obstacle on our lane. If the object is a small human being, then we will brake immediately and try to stop before overrunning him/her, even if this abrupt braking maneuver may provoke a rear-end collision. However, if the recognized obstacle is, for example, a small animal, like a dog or a squirrel, it would be better not to brake, because saving a squirrel's life would not justify provoking an accident with possible personal injury of a human. As one can see from this simple example, semantic knowledge is the only way, to bring more intelligence into driving assistants. Perhaps, in some decades in the future, humans will only drive by themselves to enjoy the fun of it. In case people will not be in the mood to drive by themselves they will just delegate driving to the little semantic-based helper.

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