

Motivation

Ensuring the utmost level of autonomous driving necessitates prioritizing safety for the ego vehicle. In the intricate dynamics of a traffic scene, numerous entities interact continually. The ego vehicle, in its pursuit of collision avoidance, undergoes meticulous navigation within this dynamic surroundings. This work involves the estimation of attributes for all traffic participants within each traffic scene. Subsequently, these attributes are leveraged to gauge and estimate potential risks, constituting a proactive approach towards enhancing the safety protocols in autonomous driving.

crafted rules derived from safety separation constraints outlined in the STVO, the German Road Traffic Regulations. Leveraging the ingested data, the reasoner scrutinizes its adherence to the pre-established rules. The evaluation process is geared towards identifying potential risks within the traffic scenario. The reasoner assigns a risk level to each identified situation, quantified on a scale from 0 to 3. This systematic analysis aids in gauging the safety implications associated with the observed traffic conditions, facilitating proactive decision-making in autonomous vehicle systems based on the identified risk levels.

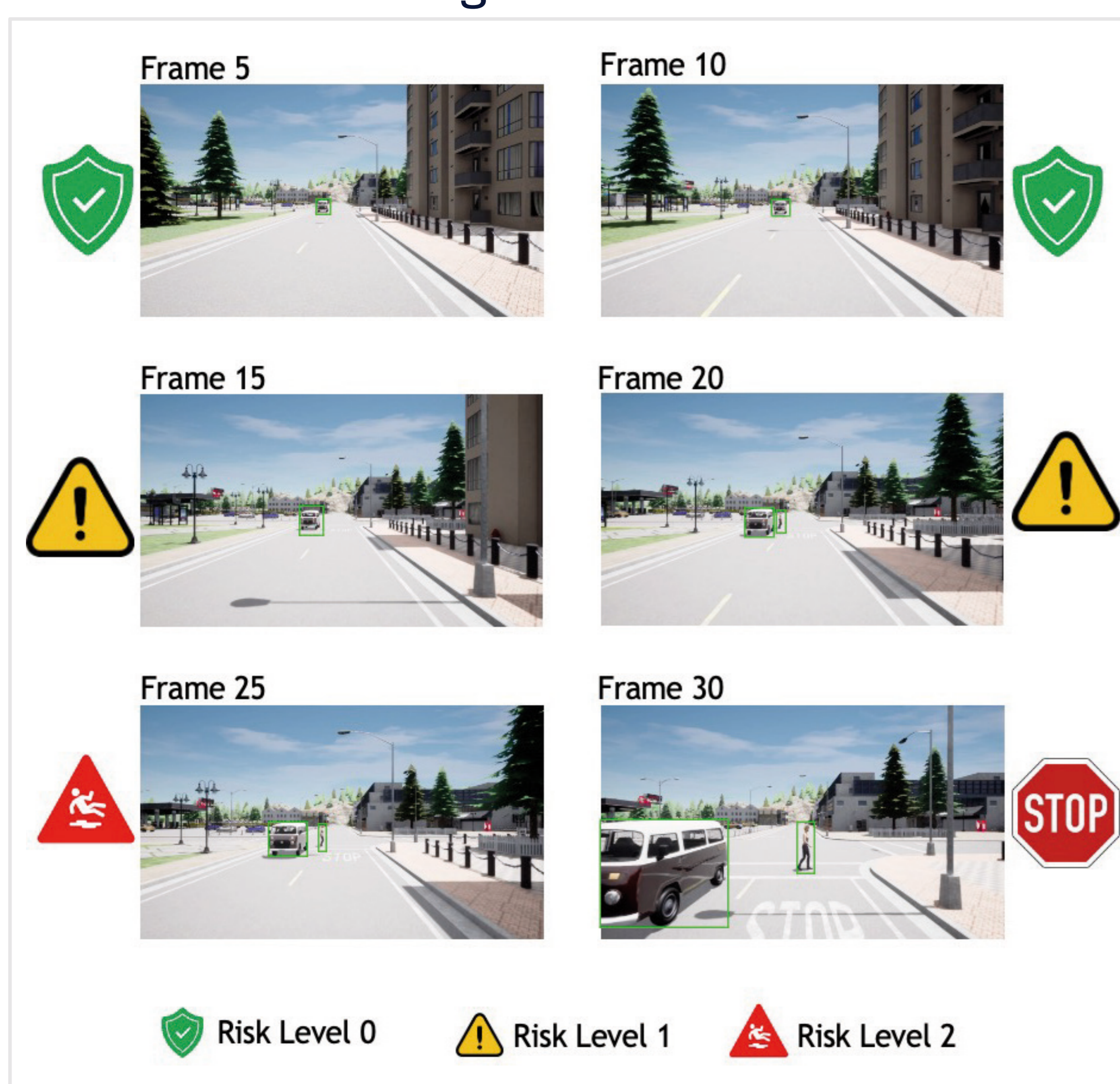


Figure 1: A set of examples for various risk levels (© DFKI GmbH)

Risk Levels

- Risk Level 0: all traffic participants are far apart and do not pose a threat of an interaction.
- Risk Level 1: one or more traffic participants are violating safety distance and are in range of reference.
- Risk Level 2: one or more traffic participants are approaching the ego vehicle and are in medium range of reference.
- Risk Level 3: one or more traffic participants are critically close to the ego vehicle and are about to imminently interact with the ego vehicle.

Technical Solution

The workflow begins with the initial step where environmental and ego vehicle data, encompassing diverse traffic participants and their attributes within the simulated traffic scenario generated by Carla, are collected. This data is then transmitted to the reasoner. The reasoner is equipped with an ASAM OpenXOntology^[1] and a collection of carefully

Key Highlights

- STVO-based Reasoning
- Compliance Check
- Risk Identification
- Risk Quantification
- Proactive Decision-making

References

[1] OpenXOntology, Association for Standardization of Automation and Measuring Systems, 2022

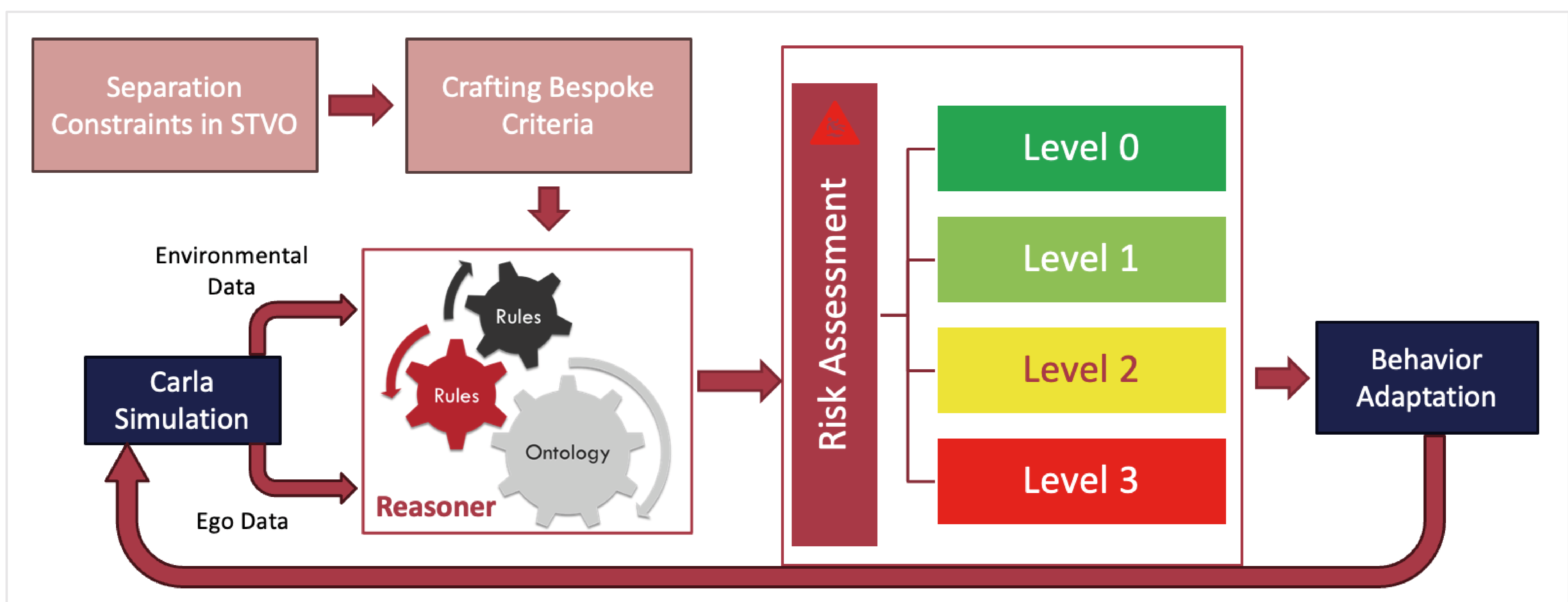


Figure 2: Detailed overview of the pipeline for the Traffic Scene Safety Analysis (© DFKI GmbH)

Partners



External partners



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