

Sensor fusion and multimodal VRU detection and tracking in the NextPerception project

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Abstract: One of the most important challenges regarding road safety set by the European Commission, is reaching the goal of zero traffic deaths on EU roads by 2050. Intelligent infrastructure will certainly have an important role in reaching this goal.

Within NextPerception project, sensor fusion algorithms are being developed in order to improve the accuracy of detection of vulnerable road users (VRU). Furthermore, we utilize this fused information to perform detection, tracking and behaviour prediction of VRU. Besides information from multiple sensors at one location, we introduce data and intermediate results from other, complementary sensor locations. Finally, one of the most important aspects in this project is distributed data processing close to sensors. The first algorithm developed within this project was semi-supervised vulnerable road users detection (VRU) based on radar-video fusion. Thanks to the use of temporal information and prediction, the proposed method reduced the amount of training data needed for achieving the required detection accuracy. We reach 90% recall and 63% pixel accuracy by using only 30% of labelled training data compared to our previous work on radar-video fusion. Next, we have proposed a novel method for depth map estimation and object detection based on semantic-guided radar-video fusion. The proposed method reaches average precision of 65.77% at nuScenes dataset. Currently we are working on a thermal-RGB fusion method for VRU detection.

Finally, we will exchange detections and features from VRU detection sensor units located at complementary locations in the intersection in order to fully cover the situation. Information fusion and VRU detection at sensor box level will be based on Quasar platform, while the exchange of information will rely on distributed computation platforms like fog05.