Simultaneous object detection and behavior prediction of traffic participants for automated driving

Primary Researcher: Keisuke Yoneda
Assoc. Professor, Kanazawa University

Co-researchers: Haku Shinoda
Master Student, Kanazawa University
Keigo Hariya
Project Assistant Professor, Kanazawa University
Akisuke Kuramoto
Assistant Professor, Institute of Scence Tokyo

Recognition of surrounding objects using in-vehicle sensors (cameras, LiDAR, GPS, etc.) is an important environment recognition technology for automated driving in urban areas with mixed traffic participants (cars, cyclists, pedestrians). In addition to the current state of the objects, predicting the state of the objects a few seconds ahead makes it possible to design safe vehicle trafjectory. In this study, we develop a deep learning model that can simultaneously recognize surrounding traffic participants and predict their behavior. We design a recognition model that can output the future state of surrounding objects by extending the real-time object recognition model developed as an existing result. We aim to reduce false positives of surrounding objects by constructing a model with multiple frames of point cloud information as input. This enables state prediction that takes into account the different characteristics of objects in the prediction. The effectiveness of the proposed model was evaluated using actual driving data in urban areas. The main contribution of this research is that our model can suppress false detections because it is based on a time-series LiDAR point clouds and is possible to obtain object features for objects with sparse points.