Abstract:

A hybrid planning approach is presented in this paper with the focus of integrating task planning and motion planning for highly automated driving. In the context of task planning, the vehicle and environment states are transformed from the continuous configuration space to a discrete state space. A planning problem is solved by a search algorithm for an optimal task sequence to reach the goal conditions in the symbolic space, regarding constraints such as space topology, place occupation, and traffic rules. Each task can be mapped to a specific driving maneuver and solved with a dedicated motion planning method in the continuous configuration space. The task planning approach not only bridges the gap between high-level navigation and low-level motion planning, but also provides a modular domain description that can be developed and verified individually. Our task planner for automated driving is evaluated in several scenarios with prior knowledge about the road-map and sensing range of the vehicle. Behavior that is otherwise complex to achieve is planned according to traffic rules and re-planned regarding the on-line perception.