

A safe overtaking control scheme for autonomous Vehicles using rapid-exploration random tree

ABSTRACT

In order to enhance the commuting ability of autonomous vehicles on the road and ensure the comfort and safety of passengers, the Rapid-exploration Random Tree (RRT) algorithm is applied to the research of safe overtaking control of autonomous vehicles. Firstly, the kinematics and dynamic model of the vehicle are implemented. Secondly, the RRT algorithm and the A-star algorithm are expounded, and the idea of the A-star algorithm is applied to the RRT algorithm for improvement. The improved algorithm is used to obtain the rough obstacle avoidance of the vehicle. The rough path is optimized by applying the cubic spline interpolation method to solve the problem that the path cannot be applied to the actual vehicle driving task. Finally, the simulation of the overtaking scheme is carried out. The results reveal that the safe overtaking scheme based on RRT algorithm achieves the predetermined requirements in the two actual cases under the premise of ensuring safety, controlling the swing of the sideslip angle of the vehicle's center of mass within a reasonable range. It has certain practical significance for ensuring the road safety of autonomous vehicles.