Platooning Method Using Dynamic Correlation of Destination Vectors in Urban Areas

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Abstract : Economic losses due to delays in traffic congestion regarding urban transportation networks have become a more serious social problem as traffic volume increases. Platooning has recently been attracting attention from many researchers to alleviate traffic jams, especially on the highway. On highways, platooning can have positive effects, such as reducing inter-vehicular distance and reducing air resistance. However, the impacts of platooning on urban roads have not been addressed in detail since traffic lights may break the platoons. In this study, we propose a platooning method using L2 norm and cosine similarity to form a platoon with highly similar routes. Also, we investigate the sorting method within a platoon according to each vehicle's straightness. Our proposed sorting platoon method, which uses two lanes, eliminates Head of Line Blocking at the intersection and improves throughput at intersections. This paper proposes a cyber-physical system (CPS) approach to collaborative urban platoon control. We conduct simulations using the traffic simulator SUMO and the road network, which imitates Manhattan Island. Results from the SUMO confirmed that our method shortens the average travel time by 10-20%. This paper shows the validity of forming a platoon based on destination vectors and sorting vehicles within a platoon.

Keywords : CPS, platooning, connected car, vector correlation

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