HERE Technologies Research Proposal

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Abstract

Mapping the surrounding environment is of utmost importance for path planning and obstacle avoidance of Autonomous Vehicles. In this paper we would like to propose an innovative system that would create a dense geometric mapping algorithm for identifying and mapping static digital markers like Traffic Signal Posts, Speed Limit Signs. Our system would also be able to classify static and dynamic obstacles, and remove dynamic obstacles from the map.

1 Introduction

Autonomous vehicles have the potential to revolutionize the transportation industry by drastically improving safety and efficiency of transportation.

Primarily Used Sensors: LiDAR, Camera, IMU, GNSS,

The level of autonomy in Autonomous Driving Systems is determined by its ability to perceive and navigate in complex environments. To accomplish this task the system needs to sense and generate an accurate map of the environment, find its location in the map and navigate to the destination. Several approaches have been proposed [1] [2] , however the most successful one [3]

How Self driving requires more data than just the data provided by GNSS

2 Related Work

Different Mapping Techniques have been deployed for generating
1. Visual Mapping - S Thrun Reference [3]
2. Lidar Mapping - A Geiger Reference
Different ways the work load is offloaded:
1. Online Method: Markov Assumption - Forget all prior data
2. Offline Method: GraphSLAM, EKF-SLAM, UKF-SLAM, ISPKF-SLAM

3 Proposed Mapping Technique

We propose a 2-part system which comprises of

Focus on Prior Maps usage

Add references for integrating different dimensions

On-Vehicle: for Data Recording

Online Platform: for putting together the data recorded and generating a map of it

ResNet Style Architecture - Use of Residual Values

4   Conclusion

References

[1] S. Thrun and M. Montemerlo, "The graph slam algorithm with applications to large-scale mapping of urban structures," *The International Journal of Robotics Research*, vol. 25, no. 5–6, p. 403–429, May 2006.

[2] H. Durrant-Whyte and T. Bailey, "Simultaneous localisation and mapping (slam): Part i the essential algorithms," p. 9.

[3] J. Levinson, M. Montemerlo, and S. Thrun, "Map-based precision vehicle localization in urban environments," in *Robotics: Science and Systems III*. Robotics: Science and Systems Foundation, Jun 2007. [Online]. Available: http://www.roboticsproceedings.org/rss03/p16.pdf