HERE Technologies Research Proposal

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1 Introduction

Autonomous vehicles have the potential to revolutionize the transportation industry by drastically improving safety and efficiency of transportation. In order to navigate through complex environments the vehicles rely on wide array of sensors like Light Detection And Ranging (LiDAR), Camera, Inertial Measurement Unit (IMU), Global Navigation Satellite System (GNSS). The level of autonomy in Autonomous Driving Systems is determined by its ability to perceive and navigate in complex environments. Simultaneous Localization And Mapping (SLAM) has been an active area of research in Robotics [1] [2]. To accomplish this task the system needs to sense and generate an accurate map of the environment using different SLAM techniques, find its location in the map using Monte Carlo Localization [3] or Kalman filter based localizations and navigate to the destination. Several approaches have been proposed [4] [1] , however the most successful one [5] was developed by Stanford Artificial Intelligence Lab.

However, most of these researches have been focused on very specific type of environments and the challenge of mapping large-scale environments is still a work in progress.

Talk about how large scale mapping is still untackled

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
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

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