



Data-driven prediction of inland vessel trajectories

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Abstract

Autonomous systems like inland vessels require knowing the behavior of surrounding vessels and moving objects. Predicting the behavior of surrounding inland vehicles operating in a narrow field like rivers, channels, etc. around the Ego-system is challenging due to the required accuracy. Existing approaches for sea navigation cannot be used because the precision requirements are lower than required for inland vessels navigation. Precise behavior prediction is required that allows navigation with high precision during overtaking in upstream and downstream directions.

In this contribution, new approaches have been developed using past trajectories information of different types of inland vessels. Here the concepts of two (pre-filtering) approaches, based on AIS data, are developed that generate the clustered information of the trajectories. The Bayesian approach is applied to find the best trajectory (intention) from the clustered past information. The initial results, from this study, are based on the data of a single ship.

A further extension of the approach will generate safe collision-free navigation.

Keywords: Gaussian Mixture Model (GMM), Hierarchical Clustering, Bayesian Approach, Intent prediction, Automatic Identification System (AIS).