**Overview on 3D LIDAR Point Cloud based Intersection Recognition for Autonomous Driving**

* This paper proposes a real-time intersection detection of roads for navigation of autonomous vehicles, especially when there is no position or geographic auxiliary information like GPS is available.
* The 3D point clouds are acquired by a dense 64-beam scanning LIDAR (Light detection and ranging) mounted on the roof of the vehicle.
* The method not only recognizes intersections in front of autonomous vehicle but also distinguishes between + -shaped and T-shaped intersections as we considering intersection detection as a classification problem.

**Methodology:**

* Firstly, a square grid map is built for each frame of the point cloud; then the cells belonging to other vehicle will be removed from grid map.
* A Beam based model is proposed for feature construction:
* The beam model is a sequence of beams with same launching point which is within the adaptive distance in front of the autonomous vehicle, the distance is related to the speed of the autonomous vehicle with the unit in meter per second.
* 360 number of beams are emitted from the adaptive launching point, each beam has a width information which is little wider than the autonomous vehicle.
* Normalized lengths of all the 360 beams are in one frame as a feature, so the feature is just a 360-D vector.
* D =5+ v ∗ t; Where t = 1s and v=speed of autonomous vehicle.
* Length of each beam is combined as the feature vector for classification.
* Support Vector Machine (SVM) is used for the classifier to classify + shaped and T shaped intersection.

**Testing and Training Data used:**

A set of manually labeled examples used for training SVM classifier is made of 1300 frames of point clouds 150 frames of +-shaped intersections, 150 frames of T-shaped intersections and 1000 frames of road segments, all the intersections are labeled as positive examples.

**Result:**

* After detecting the intersections, we recognize the type of this intersection as T-shaped or +-shaped.
* For test data, the accuracy is below 90% but above 80%.
* It is noted that the accuracy of T- and +-shaped classification is lower than the accuracy of the classification of intersection and road segment.

**Suggestions and Improvement:**

* As stated in the paper enhanced classifiers can be used to improve the accuracy of the proposed model.
* The paper also does not state the performance and efficiency of the lidar to acquire 3D point cloud data in case of adverse weather conditions.