AUTOMATED ROAD CENTERLINES EXTRACTION FOR HIGH-DEFINITION MAP USING MOBILE LIDAR SYSTEM

Shao-Wei Huang[a], Tee-Ann Teo[b,]

[a] M.S. Student, Dept. of Civil Engineering, National Chiao Tung University, Hsinchu, Taiwan 30010.
[b] Professor, Dept. of Civil Engineering, National Chiao Tung University, Hsinchu, Taiwan 30010.
E-mail: dnxniti2007@gmail.com; tateo@mail.nctu.edu.tw

ABSTRACT:

High-Definition map (HD map) is developed for autonomous vehicles with high precision and detailed road information. The linear features such as road boundaries, road centerlines, and stop lines are the critical information for autonomous vehicles. Several studies showed the extraction of road centerline from the airborne and ground-based system. For example, the radius-rotating intersection method can be applied to obtain road segments and then employed a total least square to generate linear road centerline. Besides, the condition Euclidean clustering and nonlinear least square can also be utilized to generate horizontally curved road centerlines. Nowadays, the road marks can be extracted using deep learning technique automatically. After extracting road marks, it is important to generate road centerline from these road marks in producing a HD map for autonomous vehicles. The research aims to extract road centerline automatically and from deep learning derived road marks. The road marks were extracted from mobile lidar point using deep learning frameworks. The road marks were used to generate road centerlines by the following steps. The first step transforms the irregular road mark points into a 2D grid data. The noises can be isolated and removed after transformation. The second step utilizes the Hough transform method to extract the initial road lines. The third step generates buffer region and applies a least square adjustment to refine the initial road lines into Most Probable Lines. The fourth step connects the road lines into road lanes and estimates centerlines from road lanes. Finally, accuracy analysis between the results of automatic extraction and manual editing. The experimental area is Jianguo Expressway in Taipei City. The road marks were extracted from Rigel VMX 250 mobile lidar system using deep learning method. The experimental results demonstrated that the Hough transform method was capable of extracting straight road lines from rasterized road marks. These extracted straight road lines were classified into different clusters and were converted into lanes and centerlines.

KEY WORDS: road lane, road centerline, Hough transform, mobile lidar.