

(別記様式－博3)

2023年12月12日

Date

学位（博士）論文内容の要旨
Summary of Thesis Contents (Doctor)

1. 論文申請者 地球環境科学 専攻 都市環境システム コース
Thesis Applicant Division Department
(ふりがな) Furigana
2021年4月入学 学生証番号 21WD1301 氏 名 (ご しゅんけつ) 呉 俊傑
Year / Month of Enrollment Student ID Number Name

2. 論文題名（外国語の場合は、その和訳を併記）

Thesis Title (foreign language title must be accompanied by Japanese translation)

Development of Deep Learning-based Road Marking Segmentation Algorithm and Damage Detection System using Street View Images
ストリートビュー画像の深層学習に基づく路面標示のセグメンテーションと損傷検出に関する研究

3. 論文概要（600字程度）Outline of Thesis (about 2,000 letters for English)

Road markings, including road lanes and symbolic road markings, can convey abundant guidance information to autonomous driving cars. However, recent works have paid less attention to the recognition of symbolic road markings compared with road lanes. In this study, a road-marking-segmentation dataset named the RMD (Road Marking Dataset) is introduced to compensate for the lack of datasets and the limitations of the existing datasets. Furthermore, we propose a novel multiscale attention-based dilated convolutional neural network (MSA-DCNN) to tackle the proposed RMD. The proposed method employs multiscale attention to merge the weighting outputs of adjacent multiscale inputs, and dilated convolution to capture spatial context information. The performance analysis shows that the proposed MSA-DCNN yields the best results by combining multiscale attention and dilated convolution. Additionally, the proposed method gains the mIoU of 74.88%, which is a significant improvement over the existing techniques.

Moreover, this study proposes a road marking damage detection system using computer vision and deep learning techniques with street view images captured by a regular digital camera mounted on a vehicle. The damage ratio of road marking is measured according to the undamaged part and region of road marking using semantic segmentation, inverse perspective mapping, and image thresholding approaches. Furthermore, road marking damage detectors using YOLOv8 algorithm are developed based on the damage ratio of road marking. The experimental results show that the proposed system successfully automates the inspection process for road markings.

4. 学位に付記する専攻分野の名称 博士（工学）

Name of Degree

主任研究指導教員氏名 丸山喜久
Name of Main Academic Advisor