（別記様式－博３）

2021年5月6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
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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 Automated Extraction Method for Road and Centerline from Aerial Images Using Deep Convolutional Neural Network

空撮画像の深層学習に基づく道路及び中心線の自動抽出に関する研究

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

Road extraction from Remote sensing imagery plays an important role in modern life society. That contributes in a lot of areas, such as urban planning, disaster mitigation, transportation engineering, and so on. Manual updating was the common methodology to keep the road information up to date, however the hectic process to label these images manually requires a lot of time and effort and is also prone to human error. Therefore, this area attracts a lot of researchers' attentions to find a suitable automated process.

This research adapted a deep learning technique as an alternative to solve the problem of road extraction from aerial imagery automatically. The research consisted of two parts. The first one was dedicated to extract road only by a deep convolutional neural network (DCNN). The proposed DCNN was built on the U-Net backbone with a residual block (Res-block) on the encoder part and convolution layers (Conv.layer) on the decoder part. The model shows a good result for extracting road automatically from aerial images, and the research has extended to conduct a comprehensive study covering all the important aspects of this area. The second part of this research was assigned to extract road and centerline simultaneously by extending the previous

model with multi task learning scheme (MTL). The proposed model is a complete MTL scheme without any further utilization of thinning algorithms or post processing.

The proposed model showed a promising results for the single task learning (STL) to extract road only. In addition, the MTL for extracting road and centerline simultaneously also succeeded in extracting the roads and centerlines simultaneously. In order to evaluate the applicability of the proposed model for another dataset, a case study for Baghdad City, Iraq was performed and the accuracy was examined.

４．学位に付記する専攻分野の名称　　博士（　工学　）
Name of Degree

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