شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

IMPROVEMENT OF MOBILE LIDAR DATA CLASSIFICATION OF URBAN ROAD ENVIRONMENT USING MACHINE LEARNING ALGORITHMS

By

Mahmoud Abdeltawwab Abdelhamid Mohamed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
In
CIVIL ENGINEERING - PUBLIC WORKS

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:
"Improvement of Mobile LiDAR Data Classification of Urban Road Environment Using Machine Learning Algorithms"

Key Words:
Mobile LiDAR data; Classification; Neighborhood selection; Subsampling; Machine Learning.

Summary:

3D road mapping is essential for intelligent transportation system in smart cities. Road features can be utilized for road maintenance, autonomous driving vehicles, and providing regulations to drivers. Currently, 3D road environment receives its data from Mobile LIDAR Scanning (MLS) systems. MLS systems are capable of rapidly acquiring dense and accurate 3D point clouds, which allow for effective surveying of long road corridors. They produce huge amount of point clouds, which require automatic features classification algorithms with acceptable processing time. Machine learning (ML) algorithms are widely used for predicting the future or classifying information to help policymakers in making necessary decisions. This prediction comes from a pre-trained model on a given data consisting of inputs and their corresponding outputs of the same characteristics. In this research, an attempt to extract some road features from MLS point cloud using proper ML classifier, and evaluation of different steps entire the method.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mahmoud Abdeltawwab Abdelhamid Mohamed Date: / /2021

Signature:

Dedication

To Allah

My dear parents

My lovely wife

My dear and missed friend Mohamed Elmasry

To Mahmoud

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Nomenclature

2D	Two-dimensional
3D	Three-dimensional
ALS	Airborne LiDAR Scanning
DEM	Digital Elevation Model
DMI	Distance Measurement Unit
FOV	Field of View
GNSS	Global Navigation Satellite System
GNB	Gaussian Naïve Bayes
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
kNN	K nearest neighbors
LiDAR	Light Detection and Ranging
ML	Machine Learning
MLS	Mobile LiDAR Scanning
MTLS	Mobile Terrestrial LiDAR Scanning
OA	Overall accuracy
QDA	Quadratic Discriminate Analysis
RF	Random Forest
SVM	Support Vector Machine
TLS	Terrestrial LiDAR Scanning