Requirement Specification

CDIO-project
Version 1.0

Status

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Project Identities

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1 Introduction

This document states the requirements of the automatic 2D map classification project. The project is part of the course TSBB11, Images and Graphics Autumn 2015 at Linköpings university. The goal of the project is to classify geographic structures like roads and water in Vricon maps by utilizing machine learning techniques. Vricon is an international company that developes photo realistic 3D maps of the globe based on satellite images. OpenStreetMap (osm) is an open-source project that allows private users from all over the world to add geographic information. The project will be developed using the SCRUM model.

The requirements are presented in tables as seen below:

Requirement	**Description**	**Priority**
Requirement number	Requirement description	Requirement priority

- Prio 1 - Basic functionality that is required to fulfil the agreement
- Prio 2 - Extra functionality which will be implemented after all Prio 1 requirements are fulfilled if time are available

2 Overview of the system

The system should use machine learning to classify different areas in a Vricon satellite image using osm as control label data. The result should be a 2D map where classified areas are marked. The variables of the classification algorithm are different features, and a statistical analysis of the result using different features will be performed in order to see what features resulted in most accurate output classification.

2.1 Flowchart

Figure 1 displays a flowchart of the system. The main task is to construct a training module for classification of the Vricon maps. The classification will take a Vricon map and verify the resulting classification with an osm map. If the classification is not good enough, the features of the classification will be changed and the new result will be sent for verification. When the result is satisfactory, the classification algorithm will be applied to another Vricon map. This will result in a 2D classified map, as can be seen in figure 1.

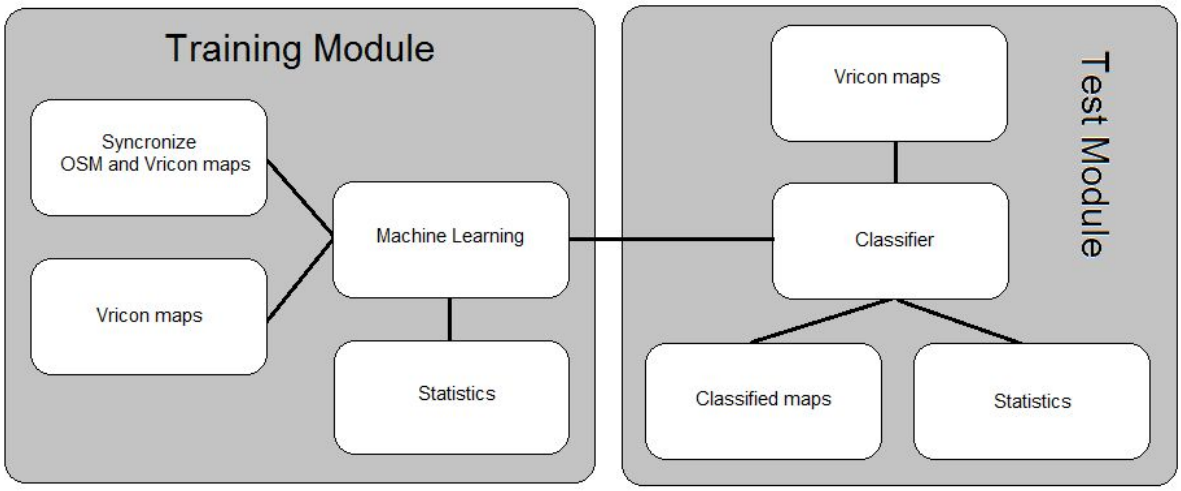

Figure 1: System flowchart. The Training Module uses machine learning algorithms, with OSM maps as reference, to create a classifier for the Vricon maps. Statistics about classification features and training progress is delivered. The Test Module uses the final classifier to classify Vricon maps and also deliver statistics about the quality of the result.

3 System

The following is the general requirements on the system.

3.1 Quality

The software should be implemented with well written code that can be understood by an external part, with comments and descriptive names on functions, variables, classes etc.

3.2 Requirements

Below follows general requirements of the system.

Requirement	**Description**	**Priority (1 is highest)**
3.1	The system should be able to create a classifier using machine learning and osm training data	1
3.2	The system should be able to classify roads	1
3.3	The system should be able to classify water	1
3.4	The system should be able to classify vegetation	2
3.5	The system should be able to classify buildings	2
3.6	The system should have a user interface (UI)	2

	for changing input maps	

4 Software components

The following is the requirements on the technical details of the system.

4.1 Input and output data

Below follows requirements for the input and output of the system.

Requirement	**Description**	**Priority (1 is highest)**
4.1	The system should have osm and Vricon maps as input data	1
4.2	The system should be able to handle osm data as reference label data in the classifier	1
4.3	The system should be able to handle geotiff data as input to the classifier	1
4.4	The system output should be a classified 2D map	1

4.2 Training and classification

Below follows the requirements for the training algorithm and the classifier of the system.

Requirement	**Description**	**Priority (1 is highest)**
4.5	The training algorithm should improve the classifier	1
4.6	The classifier should perform significantly better than a random classifier	1

4.3 Analytics

Below follows the requirements for the analytics of the system.

Requirement	**Description**	**Priority (1 is highest)**
4.7	The system should deliver statistics of the training performance	1
4.8	The system should deliver statistics of the resulting	1

	classification performance	

5 Deliverables

Below follows a list of all the deliveries and what dates they should be delivered.

Description	**Date of delivery**
Project specification	2015-09-21
Requirement specification	2015-09-21
Project plan	2015-09-21
User manual	2015-12-11
Technical documentation	2015-12-11
Website	2015-12-11
Poster	2015-12-11
Source code and written documentation on USB to Vricon	2015-12-11
Final presentation at Vricon	2015-12-11
Final presentation	2015-12-21

6 Documentation

The following is a list of all the written documents that will be produced.

Requirement	**Description**	**Priority (1 is highest)**
6.1	At the end of the project, a technical report is delivered to the customer and the course examiner	1
6.2	A poster is delivered to the course examiner	1
6.3	A project plan is delivered to the customer and the course examiner	1
6.4	A requirement specification is delivered to the customer	1