Project Plan

CDIO-project
Version 1.0

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CARTOMATIC

Project Identities

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Keywords

Classification, machine learning, coordinate transformation, geographical structure detection, neural networks, CDIO, Vricon, OpenStreetMap.

1 Introduction

This document describes how the project of automatic 2D map classification will be carried out. 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.

1.1 About this document

This document describes the project outline and the initial Product Backlog.

2 Method

This section describes how the project group will work and how the system will be developed.

2.1 Documents

The Project Backlog will be a spreadsheet containing a list of tasks that have been done and that are left to do. The tasks are listed depending on priority and chronological order. After the project is completed a user guide and a technical documentation will be written.

2.2 Definition of responsibilities

Karin Stacke is the *Project leader*, and will make sure that all the group members do their jobs.
Victoria Härd is the *Document Manager,* and are responsible for all the documents.
Hannes Järrendahl is the *Test Manager*, and are responsible for the testing.
Sara Shimekaw is the *Customer Contact,* and are responsible for keeping the customer satisfied.
Joakim Svensk is the *Quality Assurance*, and are responsible for the quality of the product.
Gustav Tapper is the *Scrum Master*, and are responsible for the workflow.
Patrik Tosteberg is the *Design Manager,* and are responsible for the design of the product but also the website.

2.3 Meetings

Each sprint starts with a *Sprint planning* meeting. During this meeting the group will reprioritize the backlog and decide what stories to complete within the coming sprint period.

During a sprint the entire group will meet at least two times every week for a 15 minute long meeting, *Daily Scrum*. The following questions will be answered by each group member:

- What have you done since the last meeting?
- What will you do until the next meeting?
- Have you encountered any obstacles?

Any obstacles or other technical issues which needs to be discussed must occur after the meeting.

After each sprint a combined *Sprint Review* and *Sprint Retrospective* meeting will be held to evaluate the workflow. During this meeting the following questions are answered:

- Which stories are done?
- Can we improve the way we work?
- Are there any unfinished stories?

3 Flow chart

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 that will then result in a 2D classified map.

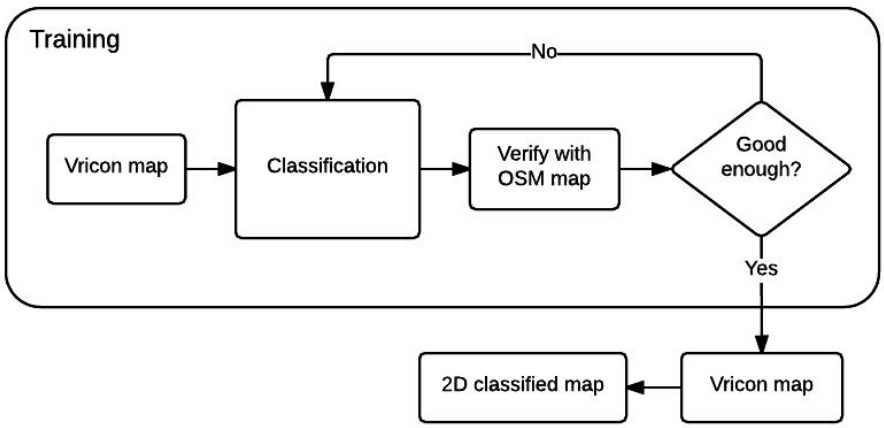

Figure 1: Flowchart of the system. The classifier trains on Vricon maps and uses OSM for verification, if the result is good enough the classifier is tested on testing data.

3.1 System approach

The problem will be approached with machine learning. State of the art methods uses different approaches to classify images, and an investigation of which method that is most suitable for this problem will be conducted. The system will be trained and tested on separate data to avoid overtraining. The data which should be classified is represented in several color frequency images, which can provide different features. Different features should be specified for vegetation and roads etc.

4 Sprint planning

Each sprint will be two weeks long, where items (stories) from the backlog will be solved. The backlog stories are sorted after priority, with high priority stories at the top. Knowledge about stories high up in the backlog is generally much better than the knowledge about stories further down. Therefore, the backlog items high up can more easily be divided into smaller segments while stories further down tend to be larger. At the *sprint planning* meeting, the stories to be solved for the coming sprint are chosen. These stories are divided into small segments and assigned to different project members. There may also be changes to some backlog items if they are found to be unsuitable when new knowledge is gained.

4.1 Initial Backlog

Table 1 contains the initial backlog as of the beginning of Sprint 1.

Table 1: List of the backlog stories.

Story	**Description**
Import maps and images	Importing OSM/Geotiff in MATLAB/Python as a suitable data structure variable
Overlay OSM and Geotiff	Transforming the OSM/Geotiff images into the same coordinate system
Approach research	Evaluation of machine learning methods and image processing
Machine learning implementation	Implementing the machine learning algorithm in MATLAB/Python
Training module implementation	Implementation of the training module in MATLAB/Python
Subsystem merging	Merging modules into one complete system

System testing and evaluation	Overall control, test and evaluation of the system
Website	Detailed description of the program
Poster	A description of the website