

Map of Denmark

*First-Year Project, Bachelor in Software Development,
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Group 12

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Chapter 1

Preface

Chapter 2

Background

2.1 Problem area

Over the last decade people have switched from traditional roadmaps to using the web-maps. This is a change without any negative side-effects. The online services remove all the problems with determining the quickest route between two points and you spend no time browsing the pages of the map to find what you need. With the popular smartphones the online map is even more useful, since you no longer need to prepare your trip before you leave.

The online maps have now been used for many years and haven't been slow at adopting new features to improve their usability. They have both implemented satellite-maps that allow us to browse the entire planet from above, and lately the feature called Google Street View has upped the stakes when allowing us to look at any direction from a given point of a road. The two maps that we use the most are Google Maps and the Danish map called Krak. These maps both have the mentioned features but slight differences in the way the user navigates and searches for routes.

Because of the widespread knowledge of the online maps, the users have been accustomed to certain features and ways of using the map. It is very important that we, with a new map program, use this knowledge to our advantage and don't try to reinvent the wheel. By using some of the commonly used controls in our map, a user will be able to quickly adapt to our program and use it efficiently.

2.2 Requirements for the map

2.3 Our requirements

2.3.1 Project requirements

2.3.2 Our own requirements

2.4 Data set

We have been provided with a dataset of roads and intersections in Denmark from Krak. Additionally we got some code for loading the data in from the text files. We have only made minor changes to the code for loading the data.

2.4.1 UTM-coordinates

It is important to note that the KrakNodes are in UTM-32 coordinates. When using the UTM standard the origo is placed at the south-west corner. These coordinates need some conversion when using in Java since the origo is placed differently.

2.4.2 Graph

When the data has been loaded it is stored as a Graph containing KrakNodes and KrakEdges. The KrakEdges are the road segments and contains the name of the road, an estimated drive time, a direction of traffic and references to the two KrakNodes that are at either end of the road. The KrakNode itself contains only the coordinates for the point. The Graph itself contains a number of useful methods for searching the data like getting all edges that is connected to a KrakNode. We will be using these methods extensively throughout the project both for drawing the map and for finding the route between two points.

2.5 MVC structure

Chapter 3

User Interface analysis

In this chapter we describe our decisions and present our analysis and arguments regarding some of the features that we find interesting.

3.1 User interface as a whole

3.2 Interesting implemented features

This section presents some of the interesting features we have implemented.

3.2.1 Zoom

We have several options for zooming in and out on the map. As described in section 2.3.1 on page 6, it was required that we made it possible to zoom by dragging a box around the part of the map the user wants to view.

In addition to the option of using the mouse to zoom, we have implemented a zoom-in and out function on the GUI and a hotkey for zooming out to the original view.

We felt that we really needed a zoom out function, so that a user did not need to close the program and start it again, when the user wants to view the map further zoomed out. A combination of the zoom in and out functions helps the user a lot when navigating the map.

3.2.2 Navigation

We have made it possible for the user to navigate the map by scrolling

3.2.3 Hotkeys

3.2.4 Markers

3.2.5 Bike/car

3.3 Not implemented

This section presents some of the features we have chosen not to implement. These features are not in the final program, because we did not feel there were compelling arguments for implementing them.

3.3.1 Choice of roads to be displayed

3.3.2 Smooth scrolling

3.3.3 Dynamic route finding

Chapter 4

Implementation

4.1 Dijkstra vs A-star

4.2 Evaluator

4.3 Quadtree

4.4 Serialization

4.5 UTM-conversion

4.6 Mousezoom

4.7 Floats

Chapter 5

UML-diagrams

5.1 MVC

5.2 Simple Diagram

5.3 Control flow

Chapter 6

Tests

6.1 WhiteBox: closestEdge

6.2 JUnit

6.3 System test

Chapter 7

Manual

7.1 Navigation

7.1.1 GUI

7.1.2 Keyboard

7.2 Zoom

7.2.1 GUI

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Product conclusion

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Group norms

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Diary

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Chapter 12

Process description and reflection