

# Lab Course Algorithms for OpenStreetMap-Data

FMI, Algorithms Department

## 1 Goal

The goal of this lab course is to get familiar with the data of the OpenStreetMap (OSM) project and implement different algorithms on the data. As the end result, you will implement a routing application for ships which works across the whole globe.

## 2 Possible Approach

- Learn about the OSM data format, especially *nodes*, *ways*, *relations*
- Extract the necessary coastlines from osm.pbf files
- Learn about and implement a spherical grid graph data structure
- Implement a point in polygon test on the sphere to determine if positions are on land or in the ocean
- Implement routing via Dijkstra's algorithm
- Learn about GUI frameworks for OSM data like Leaflet.js and implement such a GUI
- Assemble all the parts to make an interactive routing application
- Implement one or more speed-up techniques for the underlying routing

## 3 Requirements

- Knowledge of a programming language (preferably but not necessarily Go, Rust, C/C++ or Java)
- Interest in geo data and graph algorithms
- Knowledge/Interest in performance optimization