

## Assignment: A real Map Routing problem

Write a program that uses the A\* algorithm to find optimum paths *for walking* (i.e. no one way streets; that is we are in an undirected graph) between different places in the small city of Berga. To this end, an “ad-hoc” heuristic function should be developed. Of course this function must satisfy the good properties described in the theoretical lectures and to be as close to the optimal heuristic function as possible.

The data of the city of Berga is contained in the accompanying file `Berga-graph.txt`. The first task that the program should perform is to read the data contained in this file and store in memory in a structure convenient for later manipulation. Moreover, a list of nodes that are in a street (“way”) should be produced.

The program has to allow the user to choose the code (number) of a *starting node* among all nodes given by the data file and the code of an *end node* (from the same list), and compute an optimal path from the *starting node* to the *end node*.

To compute distances, a *Mercator* transformation from latitude-longitude coordinates to map position should be done. Again you can look for it in internet or ask me to give it to you.

The format of the file is:

- Line 1: Name of graph
- Line 2: Numer of nodes  $n$  and number of edges  $e$
- Lines 3 to  $n+2$ : Node specification as follows:
  - Columns 1-5: Node code
  - Columns 7-15: Latitude
  - Columns 17-25: Longitude
  - Columns 27- : Description
- Lines  $n+3$  to  $n+e+2$ : Edge specification as follows:
  - Columns 1-5: Edge code
  - Columns 7-11: Initial node of edge
  - Columns 13-17: Final node of edge
  - Columns 19- : Description