Technische Universität München
Lehrstuhl für Informatik V
Univ.-Prof. Dr. M. Bader
Dipl.-Inf. G. Buse, M.Sc. K. Rahnema

SS 2012
Sheet 10
27.6.2012

Algorithms of Scientific Computing

Multidimensional Data – problem definition

Excercise 1: Traveling Salesman

In the map of Germany, figure 1, all of the cities shown are connected to each other by train tracks via the shortest distance rule. Choose the starting point to be Munich and the destination to be Kiel, which tracks would you choose for the journey?

Next, choose Munich as the starting and destination city and make a round trip.

Compare your results with your colleagues.

Excercise 2: Partitioning Bavaria

In figure 2 Bavaria is shown discretized as a triangular grid. Please partition the grid in 3 and 5 parts of almost the same sizes. Try to keep partition boundaries(”Edge-cut”) as short as possible. Think about the different approaches you might choose.

For your information: the triangular grid has 197 cells.

Excercise 3: Triangle strips

Try to divide the Bavarian map, figure 3, into triangle strips(a sequence of triangles that are connected by a common edge). Refine the grid where necessary!

Excercise 4: Enumeration

Enumerate the cells in figure 4 to obtain an order in which the cells could be traversed. Refine the grid only if necessary! Try to minimize the distance(with respect to the enumeration) between adjacent triangles.

What do you consider as an optimal enumeration strategy? Why?

What relations do you see between enumeration, partitioning, and triangle strips?

Figure 1: A traveling salesman in germany – please calculate the route!

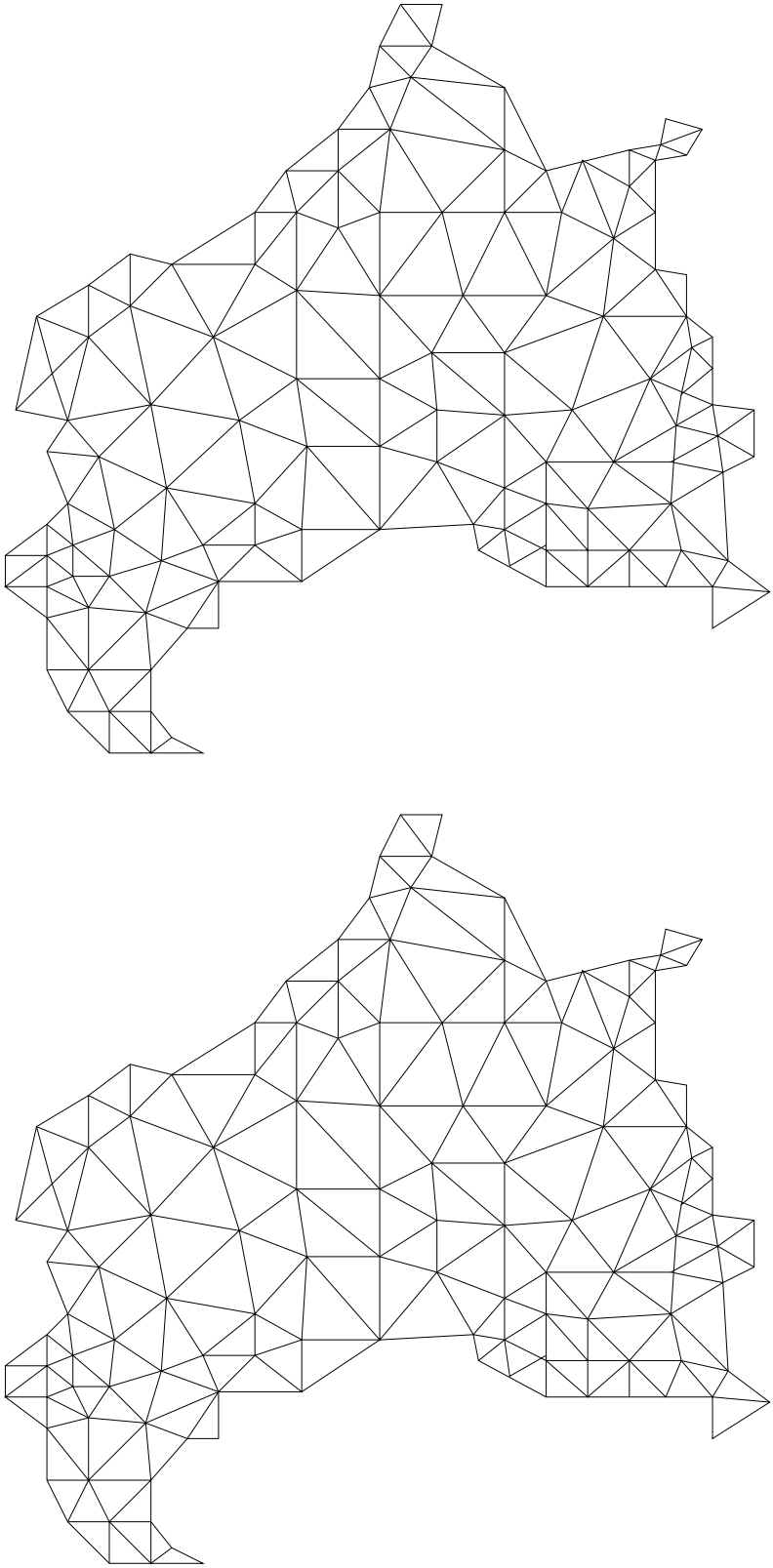

Figure 2: Bavaria – Three and five nearly equal partitions are needed!

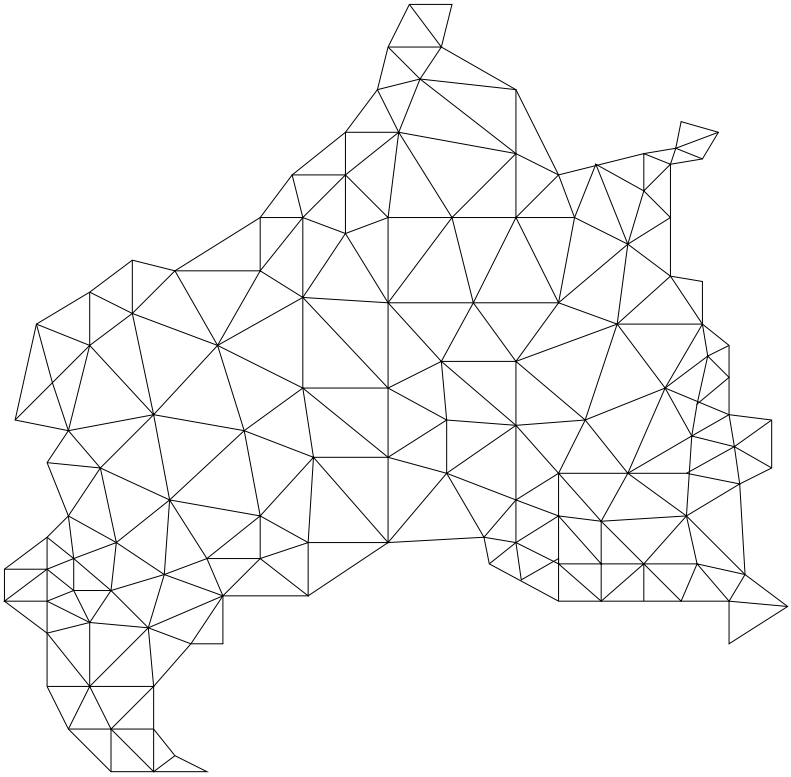

Figure 3: Bavaria – Create triangle strips!

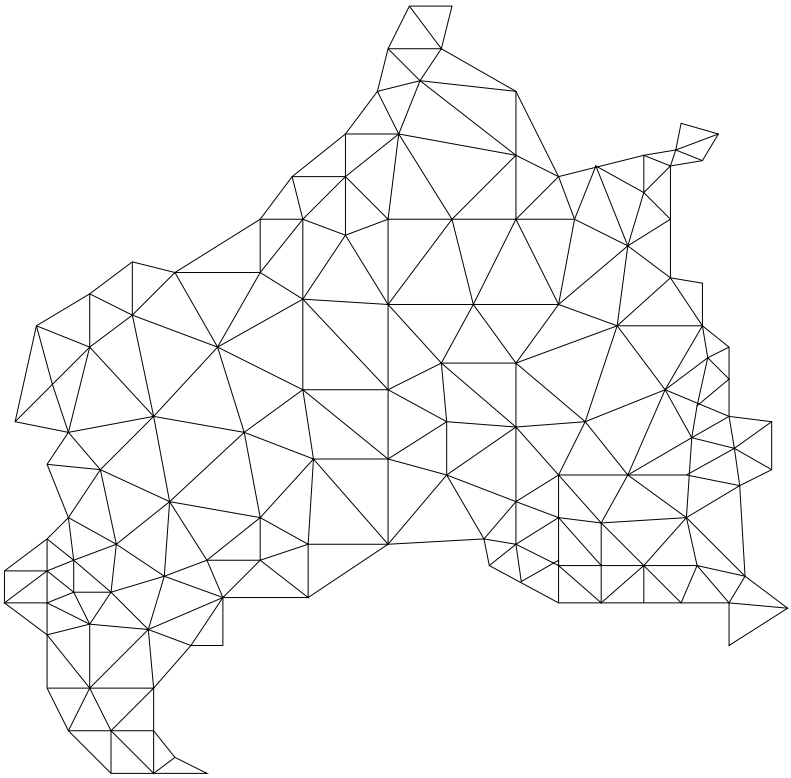

Figure 4: Bavaria – Enumerate the cells!