Exercise Set 7

Exercise 7.1. Let N be a finite set of pins, and let S_p be a set of axis-parallel rectangles for each $p \in N$. We want to compute the *bounding box netlength* of N, i.e. an axis-parallel rectangle R with minimum perimeter s.t. for every $p \in N$ there is an $S \in S_p$ with $R \cap S \neq \emptyset$.

Show how to compute such a rectangle in $O(n^3)$ time where $n := \sum_{p \in N} |S_p|$.
(4 points)

Exercise 7.2. Consider quadratic netlength minimization in x-dimension based on the (quadratic) CLIQUE netmodel i.e.

$$\text{CLIQUESQ}(N) := \sum_{\{p,q\} \subseteq N} \frac{w(N)}{|N| - 1} \Big(x(p) + x(\gamma(p)) - x(q) - x(\gamma(q)) \Big)^2$$

Show that CLIQUESQ can be replaced equivalently by the quadratic STARSQ netmodel

$$\text{STARSQ}(N) := w'(N) \cdot \min \left\{ \sum_{p \in N} \big(x(p) + x(\gamma(p)) - c \big)^2 \ \middle| \ c \in \mathbb{R} \right\}$$

for an appropriate weight function w'.

(4 points)

Deadline: May 23, before the lecture. The websites for lecture and exercises can be found at:

`http://www.or.uni-bonn.de/lectures/ss23/chipss23_ex.html`

In case of any questions feel free to contact me at drees@or.uni-bonn.de.