Comment: Transformation from MAXIMUM INDEPENDENT SET. The bad news is valid even if a small gap is allowed between corresponding points.

SR10 ► MINIMUM RECTANGLE COVER

INSTANCE: An arbitrary polygon P.

SOLUTION: A collection of m rectangles whose union is exactly equal to the polygon P.

MEASURE: Size, i.e. number m of elements, of the collection.

Good News: Approximable within $O(\sqrt{n}\log n)$, where n denotes the number of vertices of the polygon [Levcopoulos, 1997].

Comment: If the vertices are given as polynomially bounded integer coordinates, then the problem is $O(\log n)$-approximable [Gudmundsson and Levcopoulos, 1999]. If the polygon is hole-free then it is approximable within $O(\alpha(n))$, where $\alpha(n)$ is the extremely slowly growing inverse of Ackermanns' function [Gudmundsson and Levcopoulos, 1997]. In the case of rectilinear polygons with holes, the rectangular covering is APX-hard [Berman and DasGupta, 1997]. If the solution can contain only squares, then the problem is 14-approximable [Levcopoulos and Gudmundsson, 1997].

Garey and Johnson: SR25

Miscellaneous

SR11 ► MINIMUM TREE COMPACT PACKING

INSTANCE: A tree $T = (V,E)$, a node-weight function $w : V \to Q^+$ such that $\sum_{v \in V} w(v) = 1$, and a page-capacity p.

SOLUTION: A compact packing of T into pages of capacity p, i.e., a function $\tau : V \to Z^+$ such that $|\tau^{-1}(i)| = p$.

MEASURE: The number of page faults of the packing, i.e., $\sum_{v \in V} c_\tau(v) w(v)$ where

$$c_\tau(v) = \sum_{i=0}^{l(v)-1} \Delta_\tau(v_i),$$

$l(v)$ denotes the number of edges in the path from the root to v, v_i denotes the ith node in this path, and $\Delta_\tau(v)$ is equal to 0 if the parent of v is assigned the same page of u, it is equal to 1 otherwise.

Good News: Approximable with an absolute error guarantee of 1 [Gil and Itai, 1995].

Comment: If all $w(v)$ are equal then it is approximable with an absolute error guarantee of 1/2.