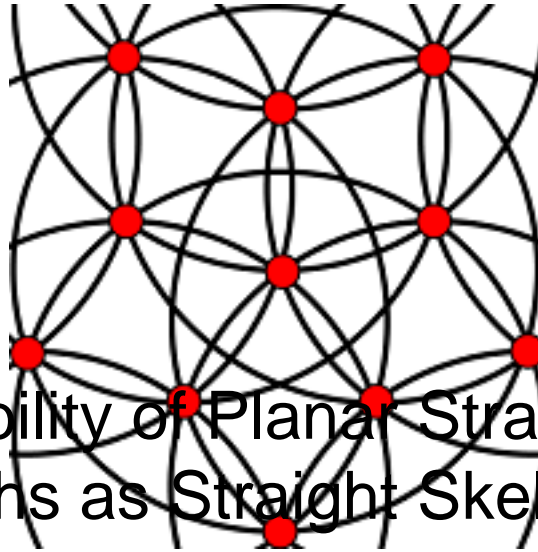


# CSASC 2013



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## Realizability of Planar Straight-Line Graphs as Straight Skeletons

### Content :

The straight skeleton is a skeleton structure similar to the (generalized) Voronoi diagram. Since their introduction to computational geometry by Aichholzer et al. two decades ago, straight skeletons turned out to be a useful tool for a large number of applications in different areas of science and industry. The straight skeleton  $S(H)$  of a planar straight-line graph (PSLG)  $H$  consists of straight-line segments only. Hence,  $S(H)$  can itself be interpreted as a PSLG (with some edges forming rays to infinity). Different algorithms and implementations were presented to compute  $S(H)$  for a PSLG  $H$ . In this talk we will investigate the reverse question of computing  $S(H)$ : Is a given PSLG  $G$  realizable as the straight skeleton  $S(H)$  of a PSLG  $H$ ? In other words, find  $H$  such that  $S(H) = G$ .

In joint work with Therese Biedl and Martin Held, we developed a method that reduces the problem of finding a suitable  $H$  to finding a line that intersects a set of convex polygons. We can find these polygons and all such lines in  $O(n \log n)$  time, where  $n$  denotes the number of edges of  $G$ . It turns out that the same technique can also be used to find a suitable set of points whose Voronoi diagram realizes a given PSLG  $G$ . Thereby, we complete a partial solution for the problem Voronoi-realizability provided by Ash and Brooker in 1985.

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