

Meeting report (06/21/2019)

Some remarks from meeting with Dr Ahmed Eldawy are:

- The input for the DCEL construction cannot be just a set of nodes and edges as a representation of a planar graph. The information of the faces has to be available in some way.
- The formal input for the DCEL construction should be a set of polygons. The segments of each polygons should be traversed in order to capture the face they belongs.
- An overlay operation will operate over a merged DCEL obtained from the DCEL representations of two sets of polygons.
- Figure 1 illustrates the steps to get a merged DCEL prior to an overlay operation.
- The spatial predicates union, intersection and/or difference will be solved by traversing the merged DCEL and applying boolean operators over the labels of each face.
- The real advantage of a parallel DCEL construction will be the chance of run multiples spatial predicates over the same DCEL in linear time.
- The partition and merge strategy presented last week is viable as a Map-Reduce operation. Actually, it follows a similar concept applied to construct Voronoi diagrams discussed in [1] (Dr Eldawy is co-author of this study).
- According with the literature, the intersection detection and segment generation should not be a cost operation by running the sweep line algorithm as a local step and using the appropriate partitioning.

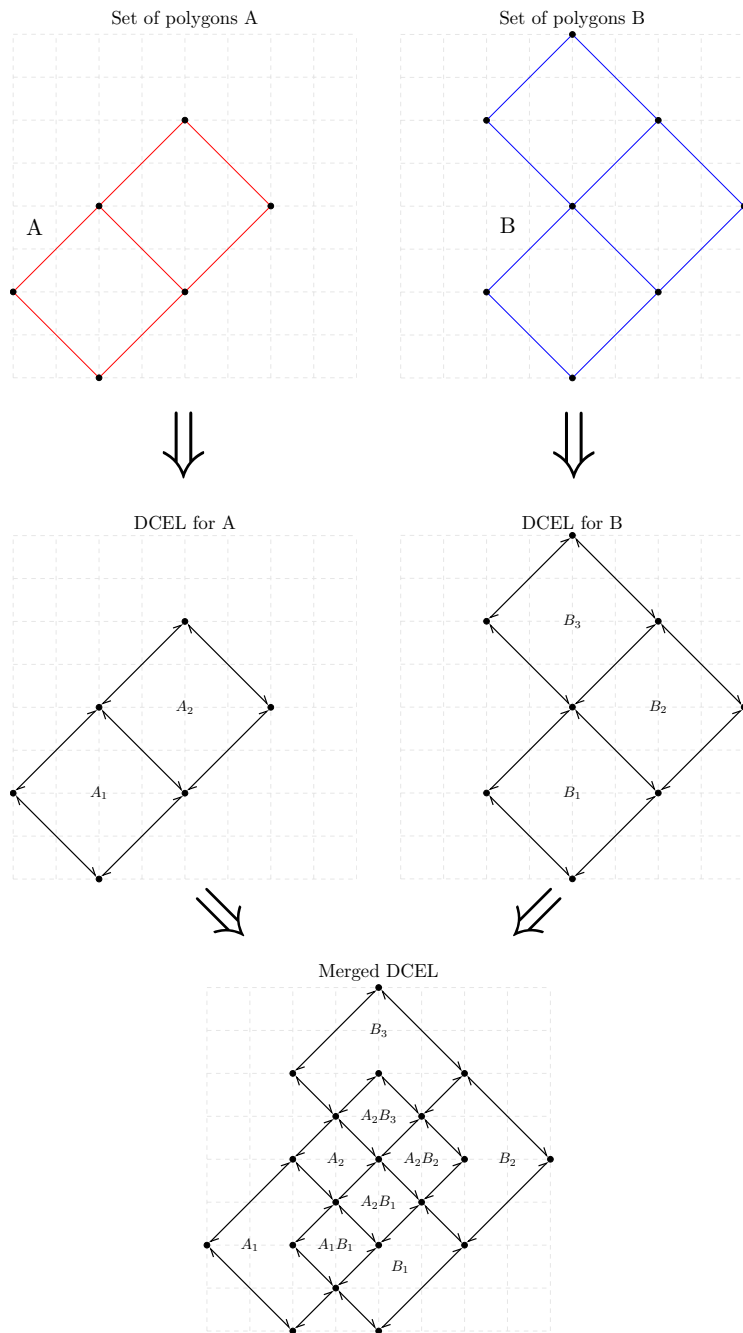


Figure 1: Merged DCEL prior to an overlay operation.

References

- [1] Yuan Li, Ahmed Eldawy, Jie Xue, Nadezda Knorozova, Mohamed F. Mokbel, and Ravi Janardan. Scalable computational geometry in MapReduce. *The VLDB Journal*, January 2019.