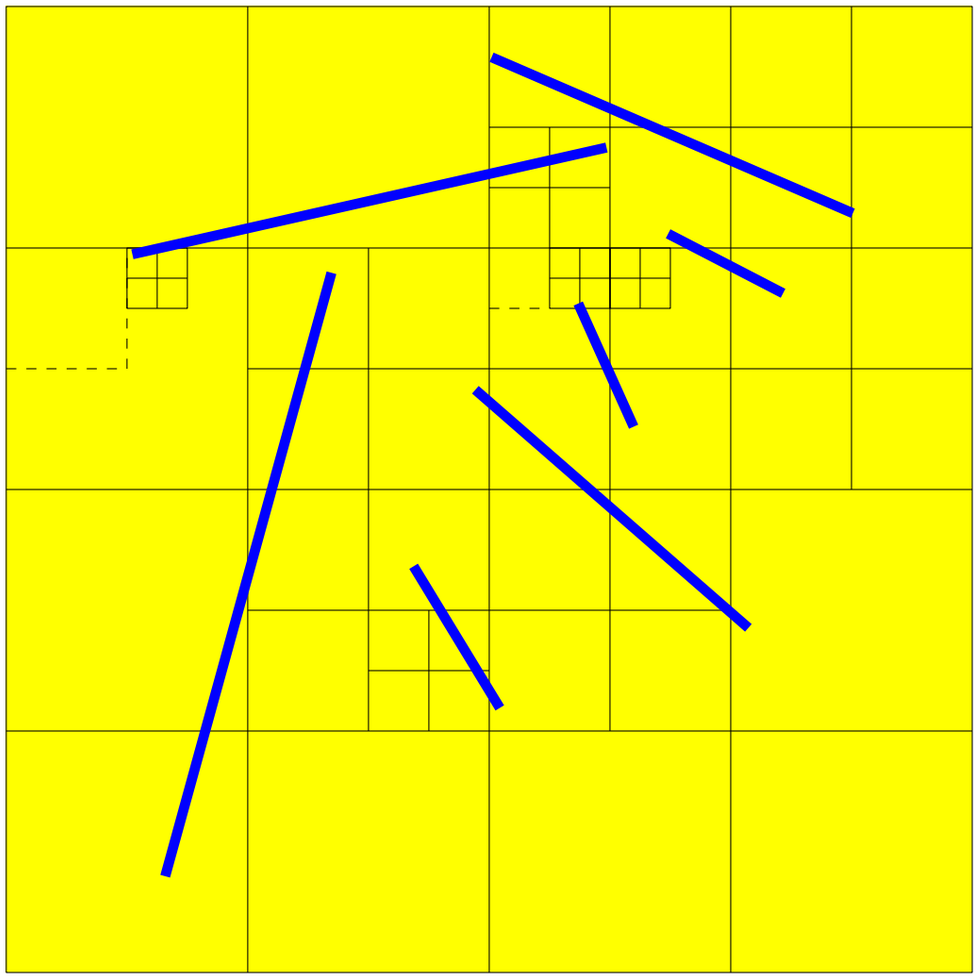
# How to get that quadtree in Z-order (for line segments in unit square)

Input: file with for each line segment its endpoints.



Algorithm:

1. Sort bounding box vertices of line segments into list $L = \{L_1, ..., L_m\}$ in Z-order
2. For $i \leftarrow 1$ to $m$:
   - find smallest cell $Q$ that contains $L_i$ and $L_{i+1}$;
   - output cell boundaries of $Q$ and its subquadrants
3. Sort cell boundaries in Z-order (removing duplicates)
4. Put line segments in cells

To prove for input of $n$ line segments:

(compressed)

- together cell boundaries form quadtree subdivision of unit square;
- $O(1)$ line segments per cell;
- $O(n)$ cells in total;
- algorithm runs in $O(sort(n))$ I/O's