Self Assembly
Self assembly is the process in which simple parts "self-organize" into larger structures.

Performance Measures for the Model
1. Tile Complexity: number of distinct tile types.
2. Bin Complexity: number of distinct contains used to store intermediate structures.
3. Stage Complexity: number of stages.

Quality Measures for the Model
1. Planarity: tiles can be moved into position without intersecting each other.
2. Connectivity: every pair of adjacent tiles should be connected.
3. Scale factor.

Spanning-Tree Technique
Spanning tree method can create any shape.
1. Tile Complexity: $O(1)$.
2. Bin Complexity: $O(\text{number of tiles})$.
3. Stage Complexity: $O(\text{depth of spanning tree})$.
5. Planar: yes.

Jigsaw-Puzzle Technique
Jigsaw-puzzle technique create shapes that are fully connected but right now it can only be used to create $N \times N$ squares.
1. Tile Complexity: $O(1)$.
2. Bin Complexity: $O(1)$.
3. Stage Complexity: $O(\text{logN})$.
5. Planar: yes.
6. Fully connected.

The idea behind jigsaw-puzzle technique is to build structures by combining superficies. But combining superficies while using only constant number of glues results in shifting problem. We use jigsaw-puzzle technique to avoid shifting problem.

Future Work
The next step is to extend jigsaw-puzzle technique to create any general shape. We also plan to investigate methods for creating 3-D structures.

References


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