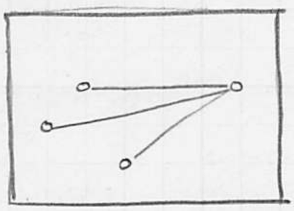
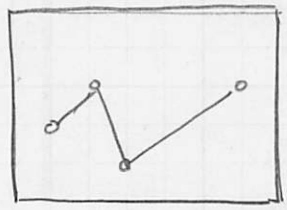
SPANNING TREE

- ROUTE THAT CONNECTS ALL PINS AND IS A TREE
- MINIMUM SPANNING TREE IS A SPANNING TREE W/ MINIMUM LENGTH



SPANNING TREE



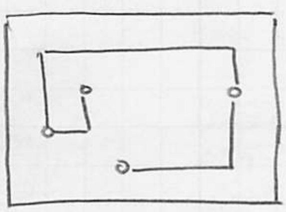
MIN SPANNING TREE

FINDING MIN SPANNING TREE IS $O(p^2)$ USING CLASSIC ALGOS

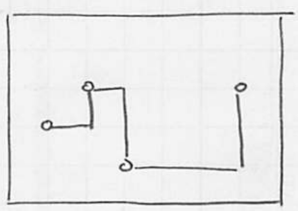
p = # PINS

RECTILINEAR SPANNING TREE

- ROUTE THAT CONNECTS ALL PINS AND IS A TREE
- ONLY USES PIN TO PIN CONNECTIONS
- ONLY USE "RECTILINEAR" (MANHATTAN) ROUTING



RECT SPANNING TREE

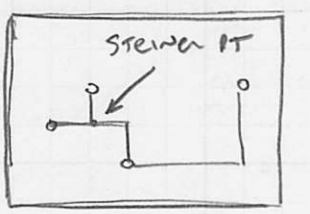


MIN RECT SPANNING TREE

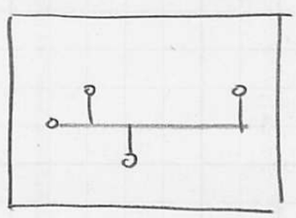
FINDING MIN RECT SPANNING TREE IS $O(p^2)$ USING CLASSIC ALGOS

RECTILINEAR STEINER TREE

- ROUTE THAT CONNECTS ALL PINS AND IS A TREE
- USES PIN-TO-PIN CONNECTIONS AND STEINER POINTS
- INTRODUCTION OF STEINER POINTS CAN REDUCE TOTAL WIRE LENGTH COMPARED TO THE RECTILINEAR MINIMAL SPANNING TREE



RECT STEINER TREE



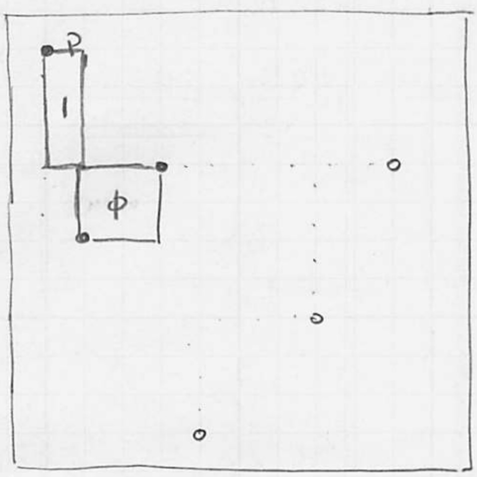
MIN RECT STEINER TREE

FINDING MIN RECT STEINER TREE IS NP-HARD NEED TO USE HEURISTIC ALGORITHMS

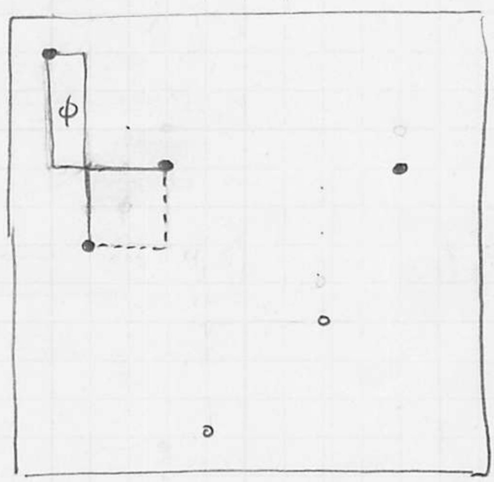
Heuristic Sequential Steiner Tree Algorithm

1. Find closest pin pair (in terms of rectilinear distance)
   Construct MBB_0
2. Find closest pin (not part of the tree) to a point on MBB_0. Call closest pin not in tree P_1 and closest on MBB_0, P_0.
3. Construct MBB_1 from P_0 and P_1
4. Add L-shape in MBB_0 which includes P_0 to the tree (delete other L-shape)
5. Set $MBB_0 = MBB_1$
6. Goto step 2

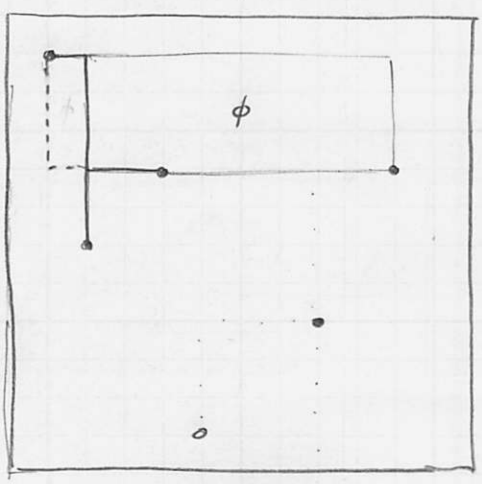
Steps: 1, 2, 3



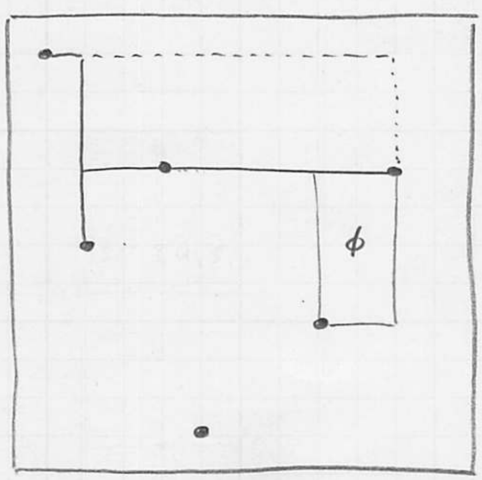
Steps: 4, 5, 6, 2



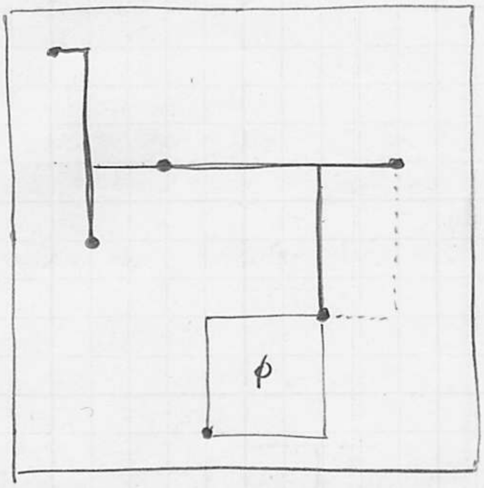
Steps: 3, 4, 5, 6, 2



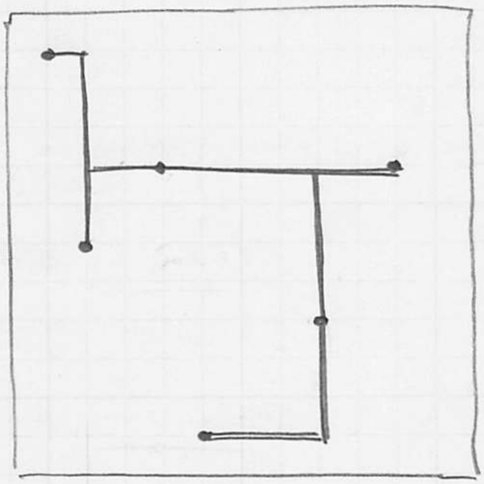
Steps: 3, 4, 5, 6, 2



STEPS: 3, 4, 5, 6.

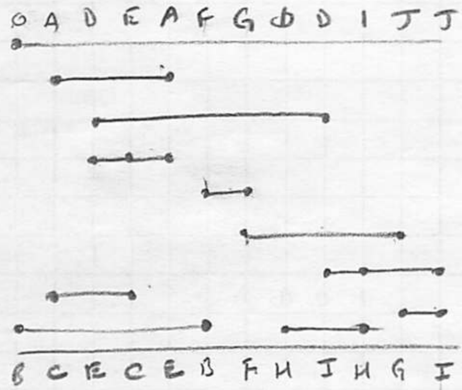


SOLUTION



Horizontal Constraints

①



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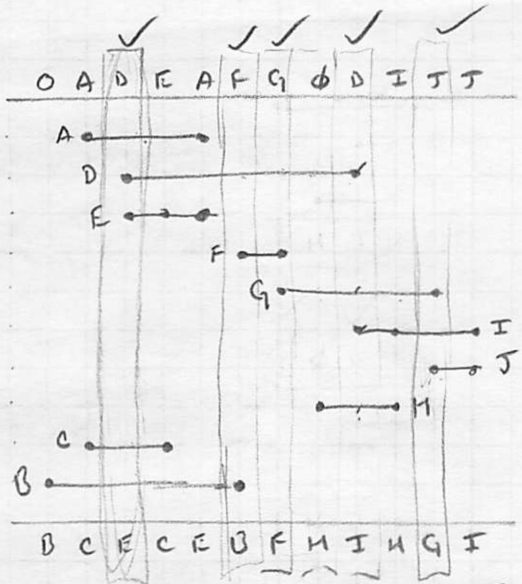

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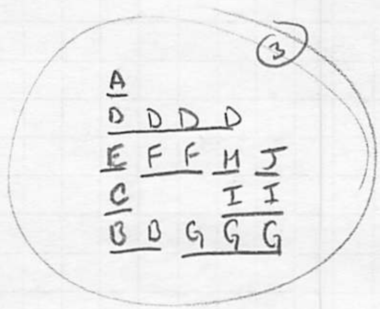
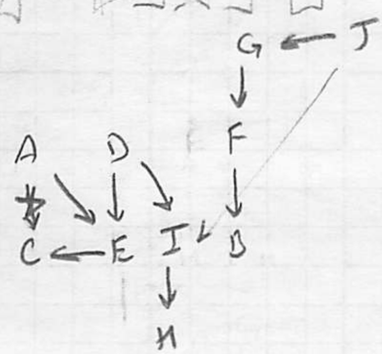


Vertical Constraints

①



②