Borah Routing

Implementing Borah, Owens and Irwin routing algorithm

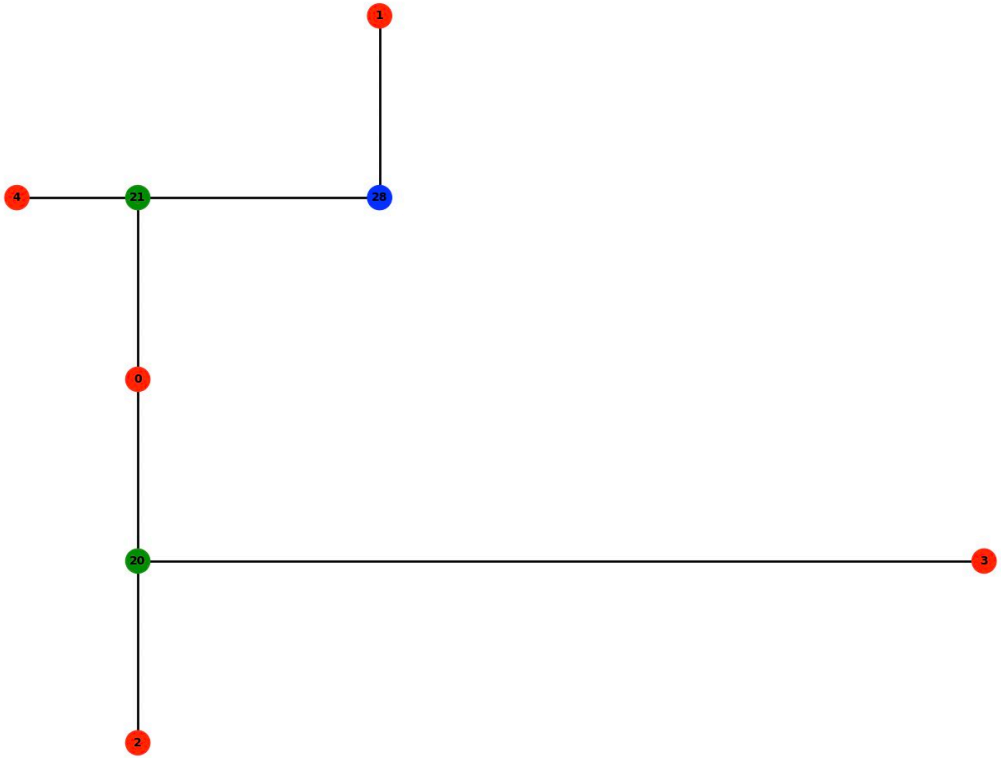
Guillaume Guérin

Anthony Prudhomme

Results

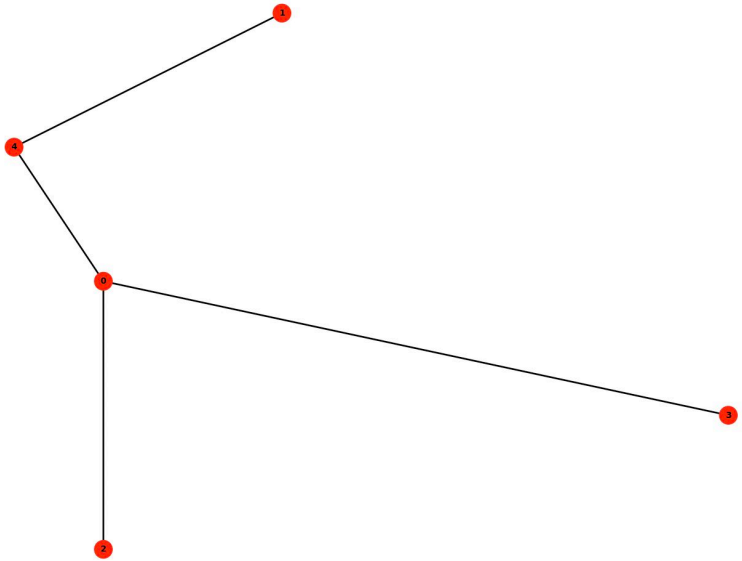
- Rednodes are the original nodes from the file.
- Greenmodes are the added Steiner points.
- Bluenodes are nodes that were added for rectilinearization.

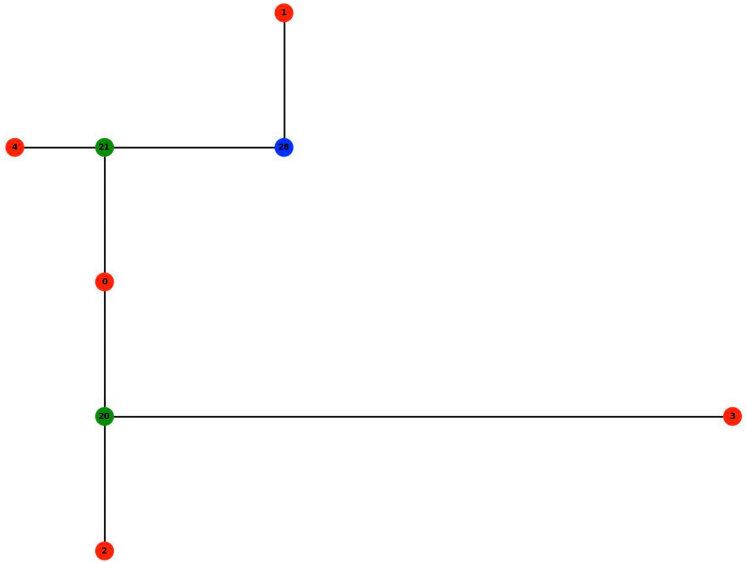
5 points



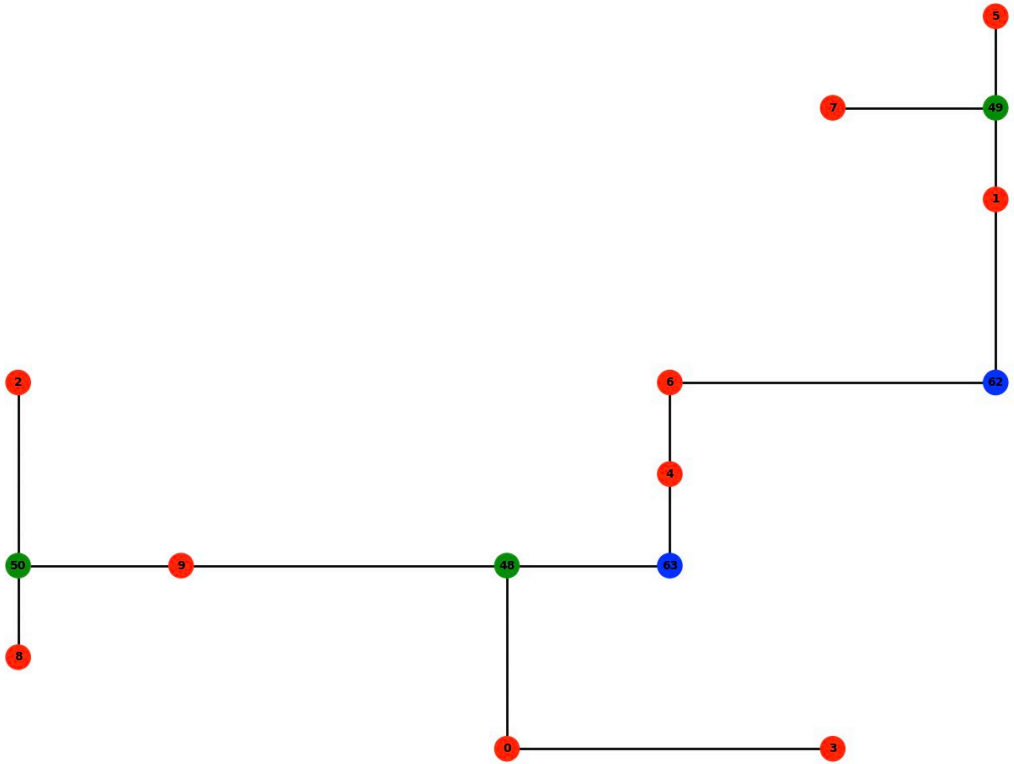
- 5 points
- 2 Steiner points
- MST WL – 21
- BorahWL – 18
- 1 pass
- Prim Runtime – 1ms
- KruskalRuntime – 1ms
- BorahRuntime – 1ms

5 points



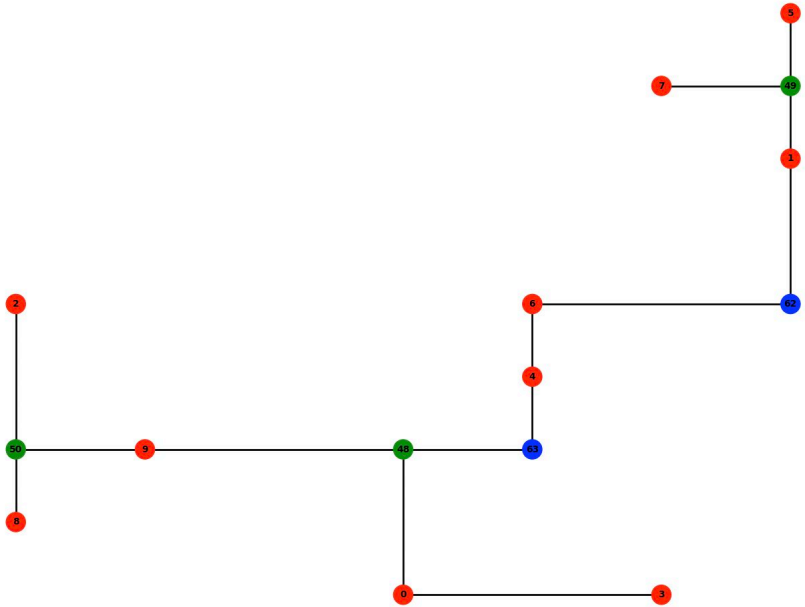


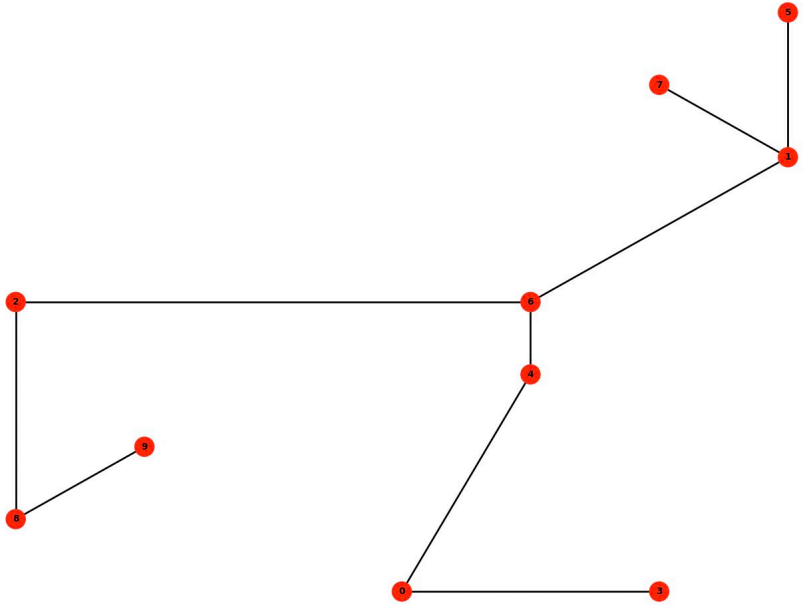
10 points



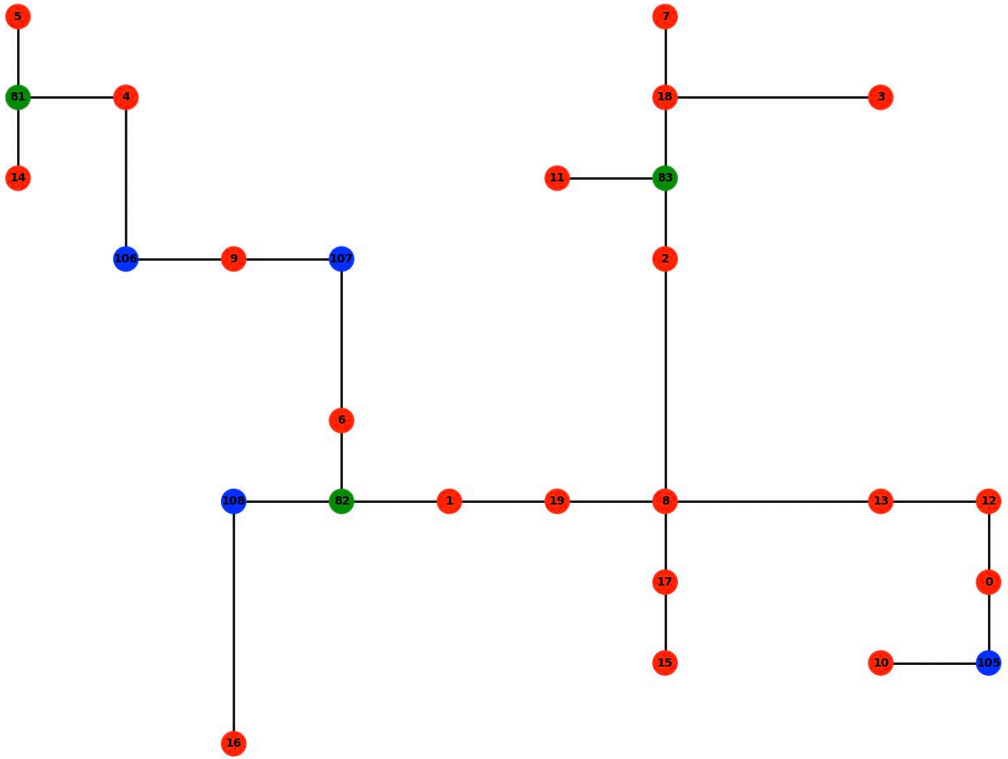
- 10 points
- 3 Steiner points
- MST WL – 24
- BorahWL – 20
- 1 pass
- Prim Runtime – 1ms
- KruskalRuntime – 1ms
- BorahRuntime – 1ms

10 points



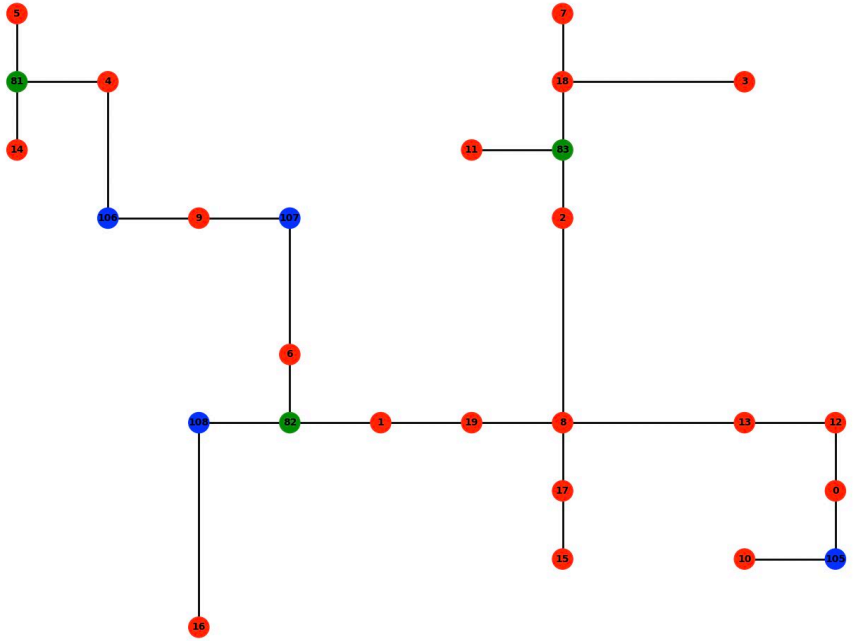


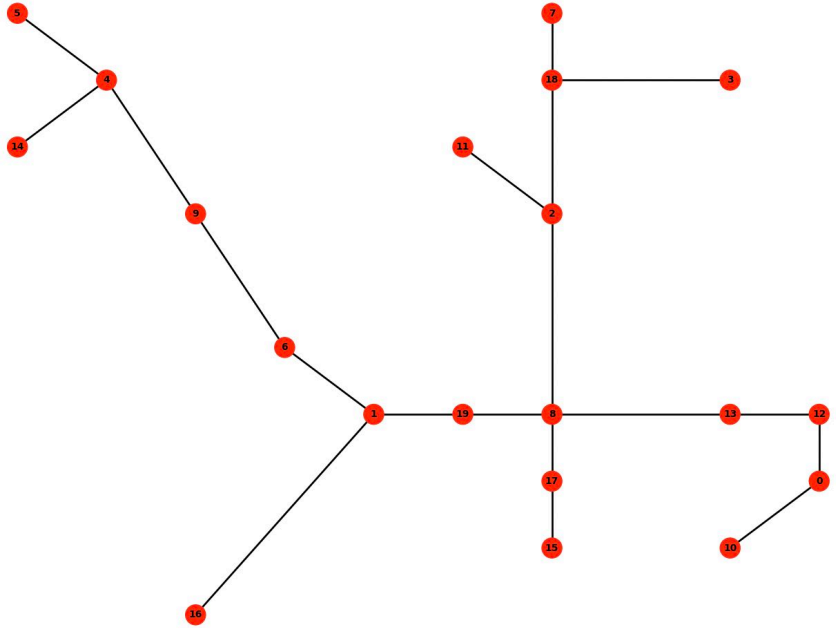
20 points



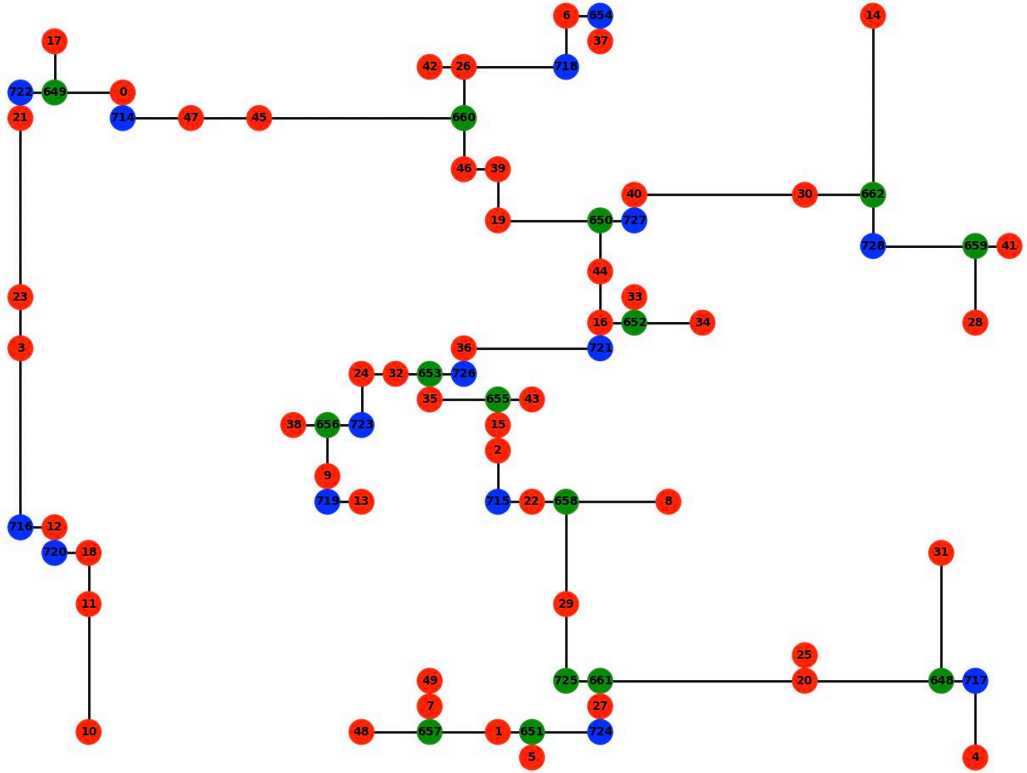
- 20 points
- 3 Steiner points
- MST WL – 37
- BorahWL – 34
- 1 pass
- PrimRuntime – 2ms
- KruskalRuntime – 2ms
- BorahRuntime – 6ms

20 points


5
81
4
14
104
9
107
6
108
82
1
19
7
18
3
11
83
2
8
13
12
17
0
15
10
105
16

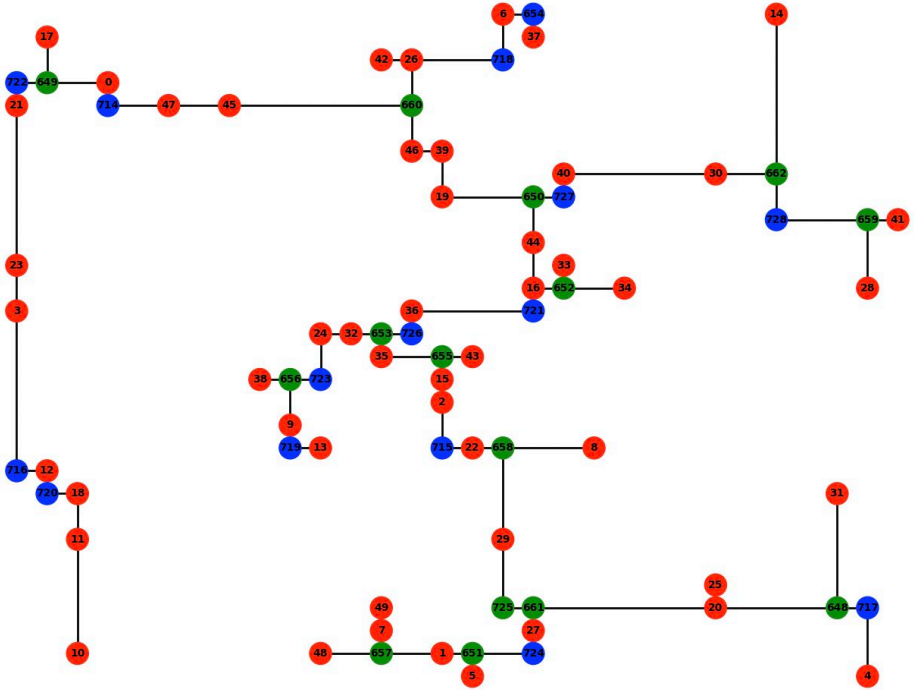

5
4
14
9
6
1
19
7
18
3
11
2
8
13
12
17
0
15
10
16

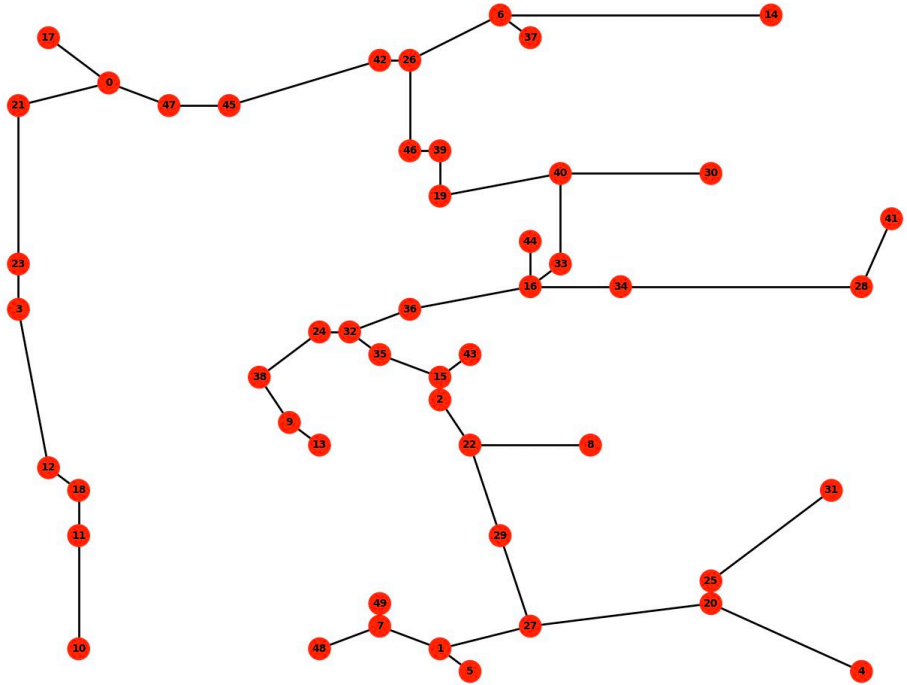
50 points



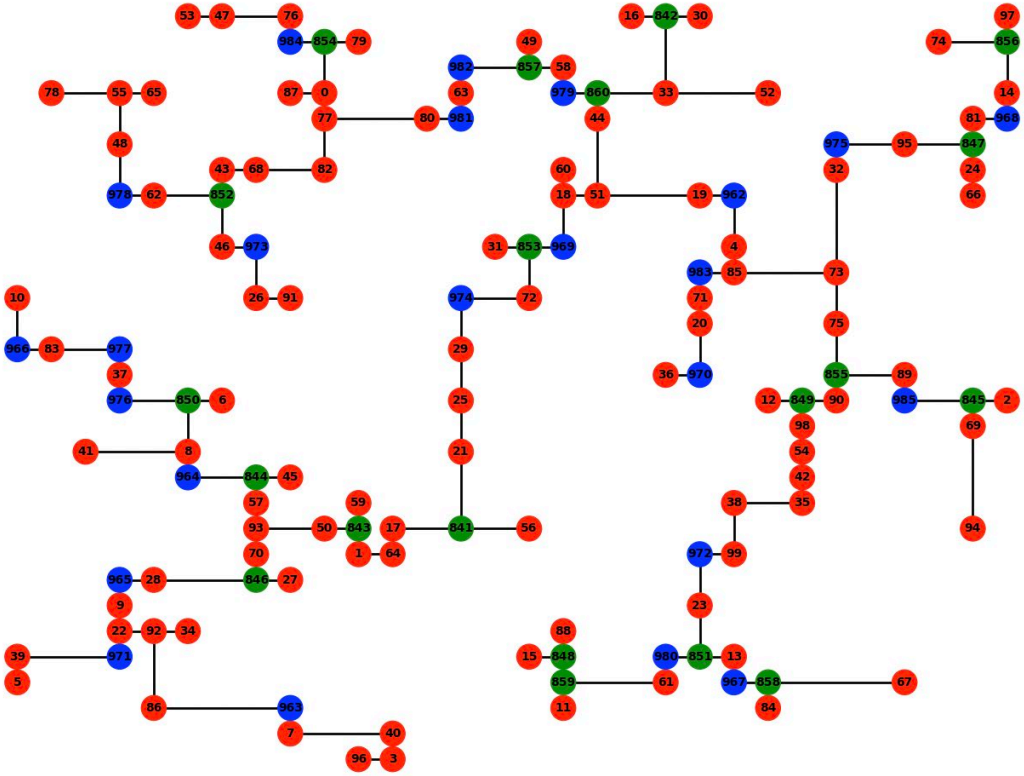
- 50 points
- 16 Steiner points
- MST WL – 183
- BorahWL – 163
- 2 pass
- PrimRuntime – 15ms
- KruskalRuntime – 11ms
- BorahRuntime – 236ms

50 points



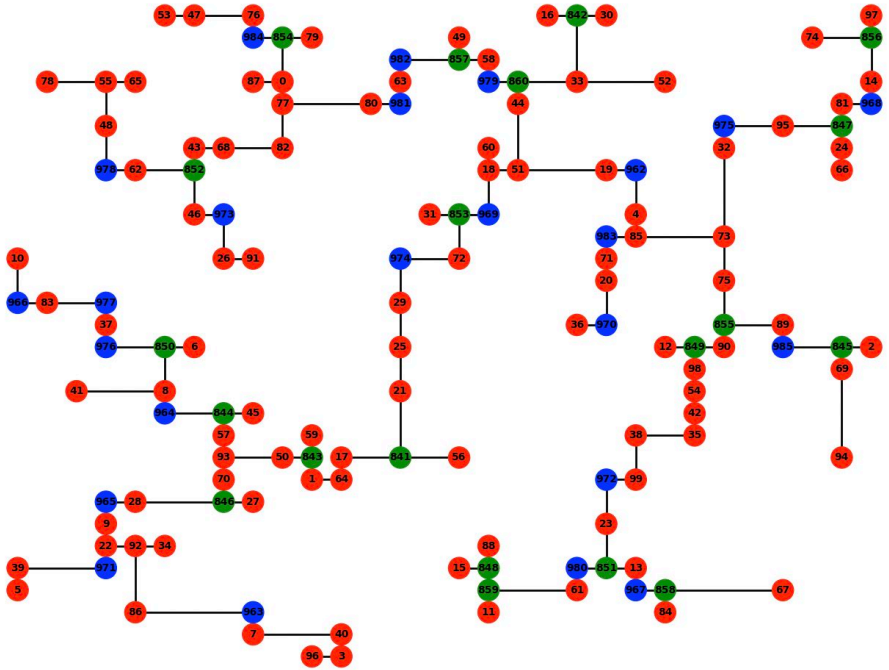


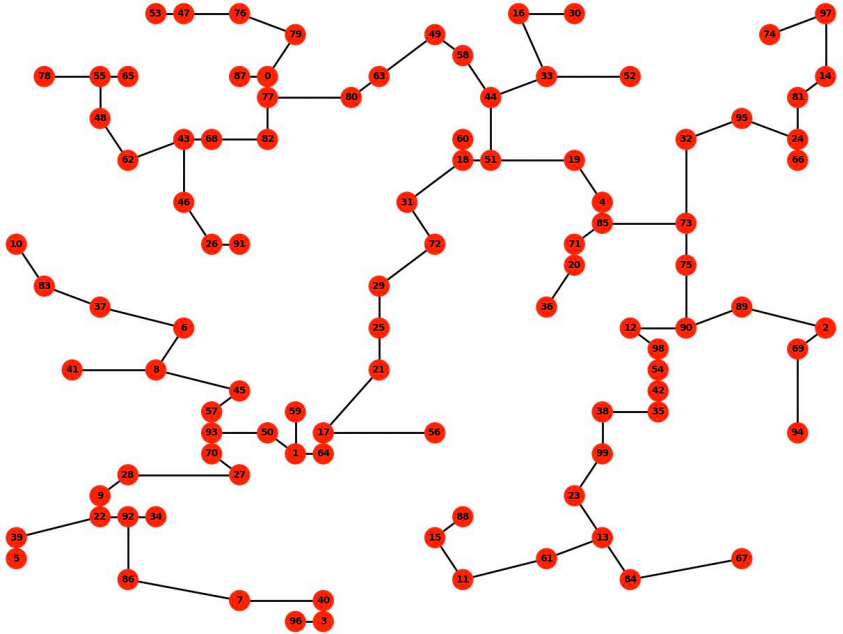
100 points



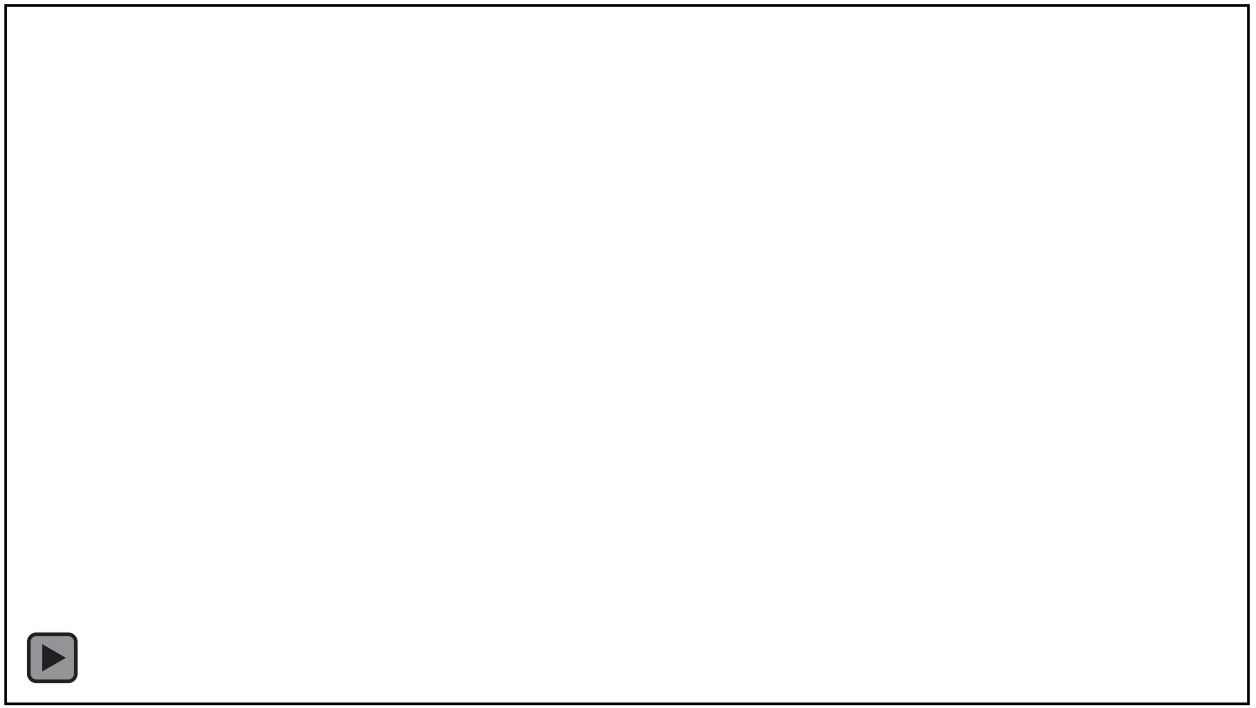
- 100 points
- 20 Steiner points
- MST WL – 242
- BorahWL – 221
- 2 pass
- PrimRuntime – 106ms
- KruskalRuntime – 49ms
- BorahRuntime – 1264ms

100 points





50 pointsprogressvideo



Comparisontable

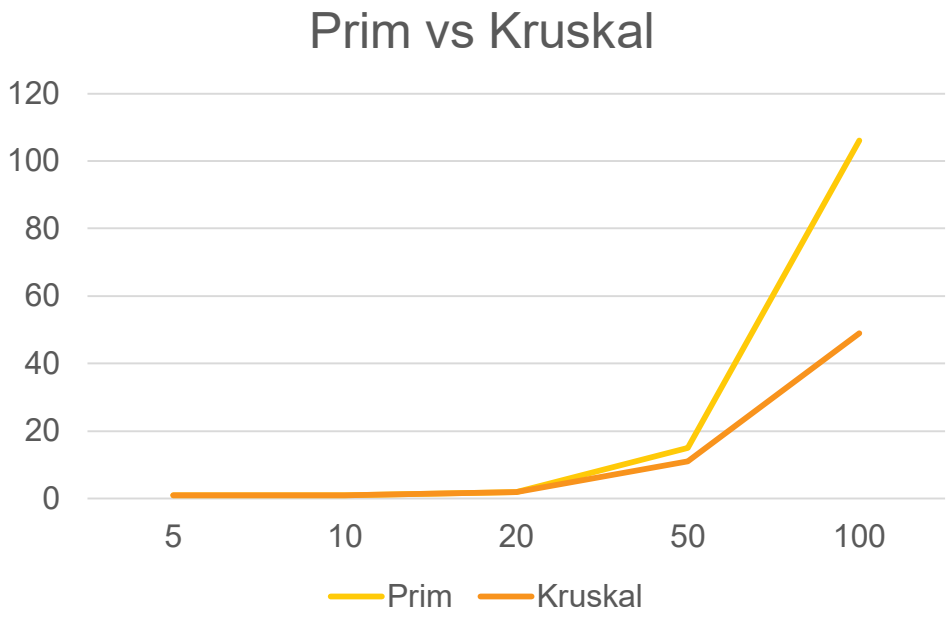
Benchmark	Wirelength MST	Wirelength final tree	# Steiner points	# pass	Runtime Prim	Runtime Kruskal	Runtime Borah
5	21	18	2	1	1ms	1ms	1ms
10	24	20	3	1	1ms	1ms	2ms
20	37	34	3	1	2ms	2ms	6ms
50	183	163	16	2	15ms	11ms	236ms
100	242	221	20	2	106ms	49ms	1264ms

More informations

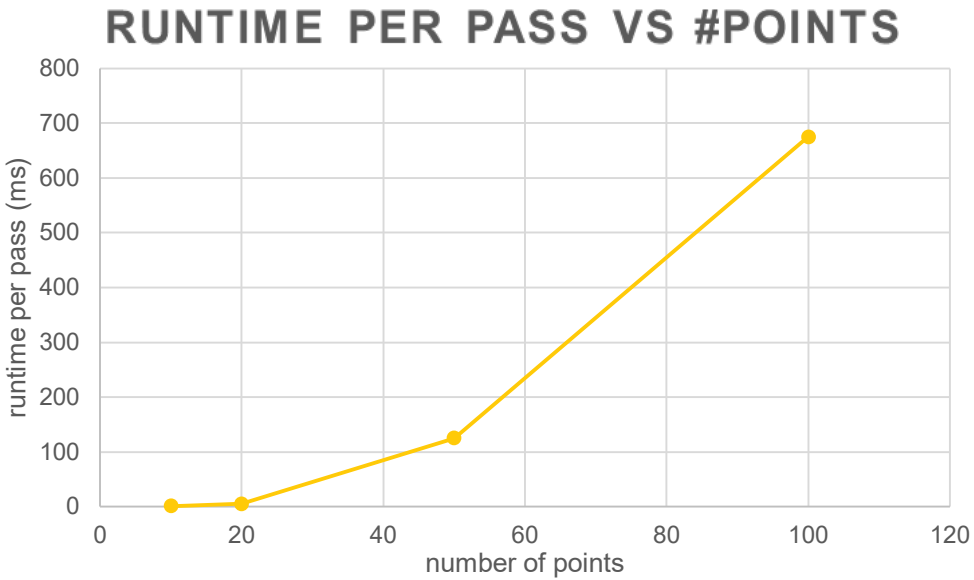
Benchmark	Wirelength reduction	Average Wirelength reduction/pass	Average wirelength reduction/steiner point	Time spent per point	Percentage of wirelength reduction over total wirelength	# of Steiner per #of points
5	3	3	1,5	0,2	14%	0.4
10	4	4	1,334	0,2	17%	0.3
20	3	3	1	0,3	8%	0.15
50	20	10	1,25	4,72	11%	0.32
100	21	10,5	1,05	12,64	9%	0.2

Prim vs Kruskal

# points	Runtime Prim	Runtime Kruskal
5	1ms	1ms
10	1ms	1ms
20	2ms	2ms
50	15ms	11ms
100	106ms	49ms



Runtime per Pass VS. # of points



- Shape of this graph should be close to $n \log(n)$

Contact us

- If you need to contact us, here are our informations:
  - Anthony Prudhomme anthony.prudhomme84@gmail.com
  - Guillaume Guérin guillaume.guerin123@gmail.com