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Lab 11

This lab was conducted to find the time performance difference two MST methods, Krukal, and Prim. I used the code I made for the two algorithms from my last lab. I randomly generated graph using different values of n, where n was the number of vertices. After generating the graphs, I used those to time the different methods in how long it took to find a minimum spanning tree and the cost associated with that tree.

I started the lab by creating a for loop that ran 20 times. This was to calculate the five iterations of each of the four sizes: 500, 1000, 2000, and 4000. I used the variable i in the loop to use a different seed for each iteration of the test. I generated an adjacency list to hold all the values that were to be used for the graph. I generated the graph first to make sure that both methods were timed fairly using the same information. To determine if the vertices had an edge, I generated a random variable x. If x was greater than or equal to 0.5, I created an edge by generating a random number between 1 and 4n. Each iteration used a different seed, thus giving different values to be used for each test run.

When I started the timer, I ran the algorithm for the Kruskal method and kept up with the cost associated with the MST. I then stopped the timer, recorded the time and then did the same thing for the Prim algorithm. After 5 iterations, I took the average time associated with the methods and changed the size of n. I did this for all sizes, using a different seed for each run to make sure that each graph was different from the others.

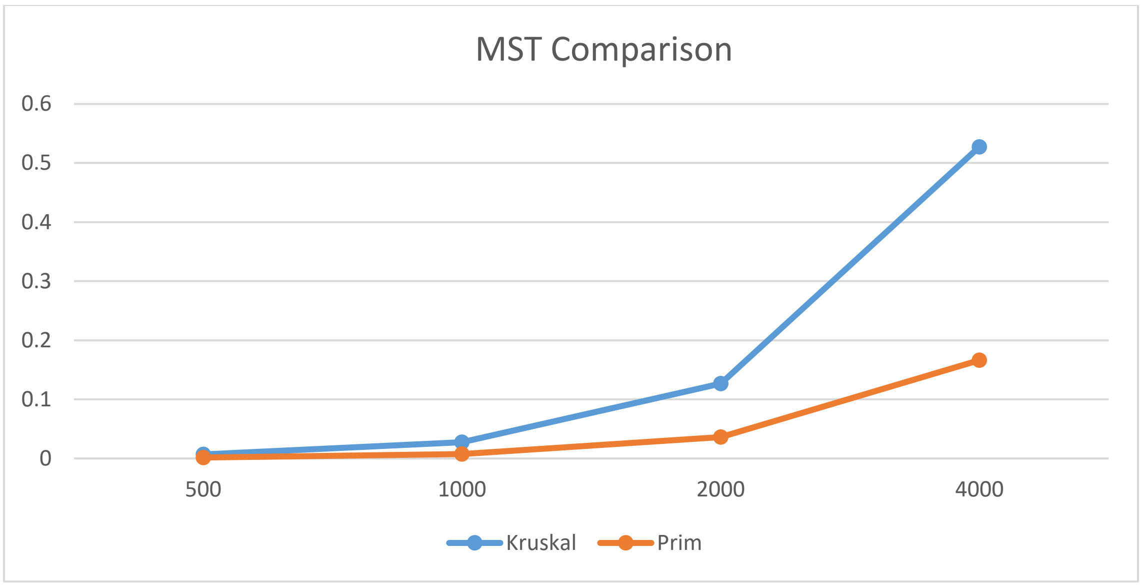
What I observed from this lab is that the Prim algorithm was faster than the Kruskal algorithm with the sizes used. Though it was faster, both performed in under a second, with Kruskal being the slowest at almost half a second for the largest size. Both methods are fast at calculating the MST. Below are graphs representing the data I received from this lab.

MST

n	Kruskal	Prim	Srand	Cost
500	0.007757	0.001908	1	128691
	0.00703	0.001778	2	120200
	0.00879	0.001473	3	122563
	0.005205	0.00145	4	120574
	0.005809	0.00168	5	124918
1000	0.031306	0.007445	6	243478
	0.028775	0.007699	7	253379
	0.023844	0.007308	8	246300
	0.026665	0.007241	9	248824
	0.028133	0.007244	10	230421
2000	0.125151	0.035589	11	478311
	0.126289	0.036242	12	497657
	0.117492	0.035745	13	486991
	0.138786	0.036555	14	504853
	0.12484	0.036013	15	477163
4000	0.551575	0.169825	16	961687
	0.535907	0.166066	17	947764
	0.518579	0.165311	18	947876
	0.534716	0.164053	19	977498
	0.49584	0.166446	20	976830

AVG

n	Kruskal	Prim	Cost
500	0.0069182	0.0016578	123389.2
1000	0.0277446	0.0073874	244480.4
2000	0.126512	0.0360288	488995
4000	0.527323	0.16634	962331


MST Comparison
0.6
0.5
0.4
0.3
0.2
0.1
0
500
1000
2000
4000
Kruskal
Prim