CSE 101: Design and Analysis of Algorithms **WI 2016**

Programming Assignment #2 Solutions

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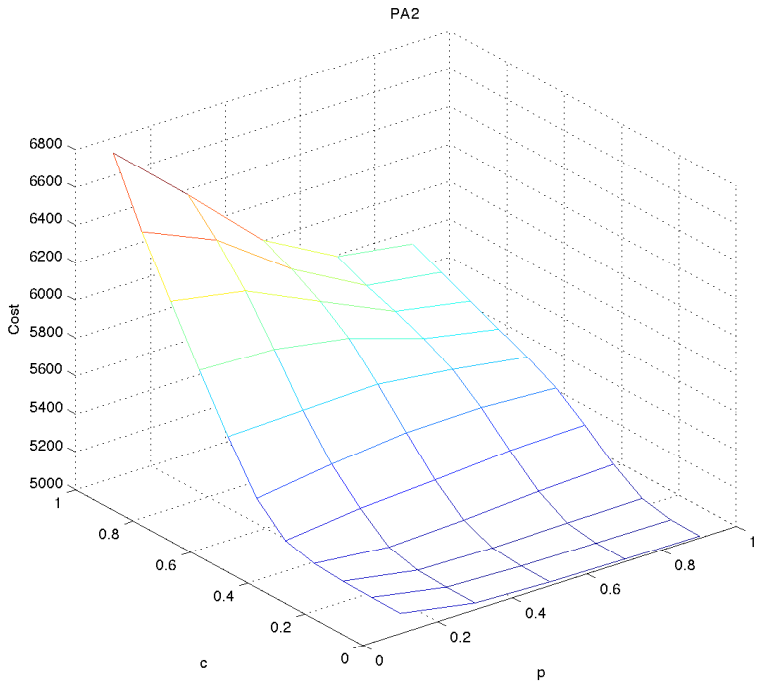
Problem 4

	p=0.1	p=0.3	p=0.5	p=0.7	p=0.9
c = 0	5107.02	5035.05	5020.16	5014.47	5011.05
c = 0.1	5108.86	5036.71	5022.25	5017.69	5014.8
c = 0.2	5112.38	5044.3	5035.72	5041.4	5045.74
c = 0.3	5123.83	5084.12	5101.01	5127.96	5143.7
c = 0.4	5162.92	5207.67	5231.92	5260.54	5268.79
c = 0.5	5304.57	5359.81	5399.04	5403.69	5380.54
c = 0.6	5549.39	5560.13	5570.84	5522.04	5460.36
c = 0.7	5815.18	5798.07	5730.46	5602.39	5525.95
c = 0.8	6097.29	6026.01	5843.72	5664.69	5592.13
c = 0.9	6384.73	6213.86	5933.69	5719.13	5663.19
c = 1.0	6720.84	6371.08	6004.69	5791.08	5731.34



Based on the table as well as the graph, a few conclusions can be drawn:

1. The cost of SPT is larger than the cost of MST.
   Obvious.

2. The cost of Prim-Dijk increase with the increasing of c. The more similar the algorithm is to the Dijkstra's algorithm, the more cost it has.
   This is due to the concern of previous path cost.

3. With the same number of vertex and when c is near extreme value 0 or 1, the denser the graph is, usually the less cost it has.
   Using algorithm highly similar to Dijkstras Algorithm or Prims Algorithm, the denser the graph is, the more likely it can find a shortest path or a shortest distance.

4. With the same number of vertex and when c is near mean value 0.5, the cost with the increasing of density will first increase and then decrease.

5. The differences among costs with bigger c are larger than those with smaller c.
   Dijkstras Algorithm's cost differs more as it will start from a specific vertex and find its SPT. Different choices of starting vertex may differ the result and the density of the graph plays a more important role in looking for a shortest path.