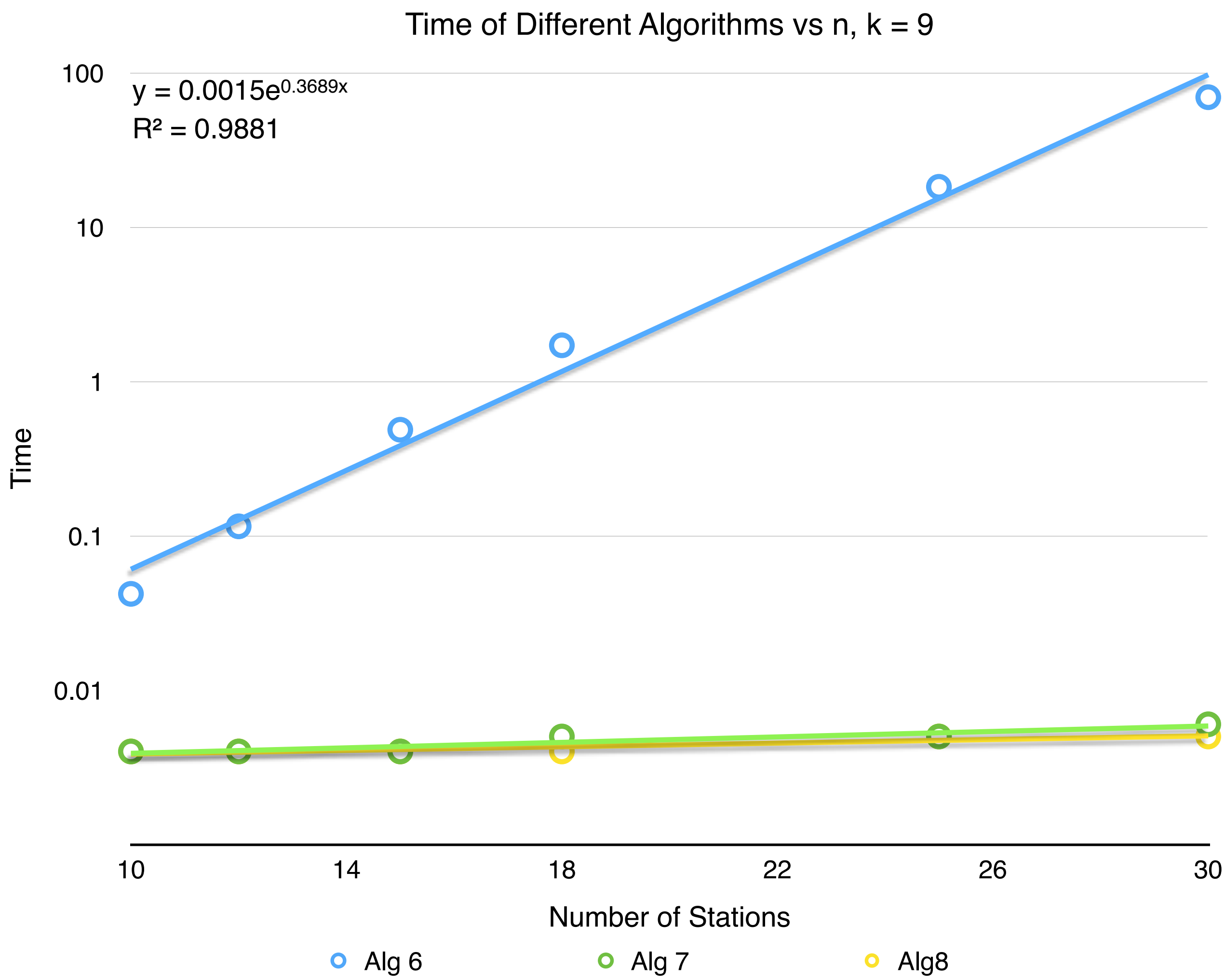
Report

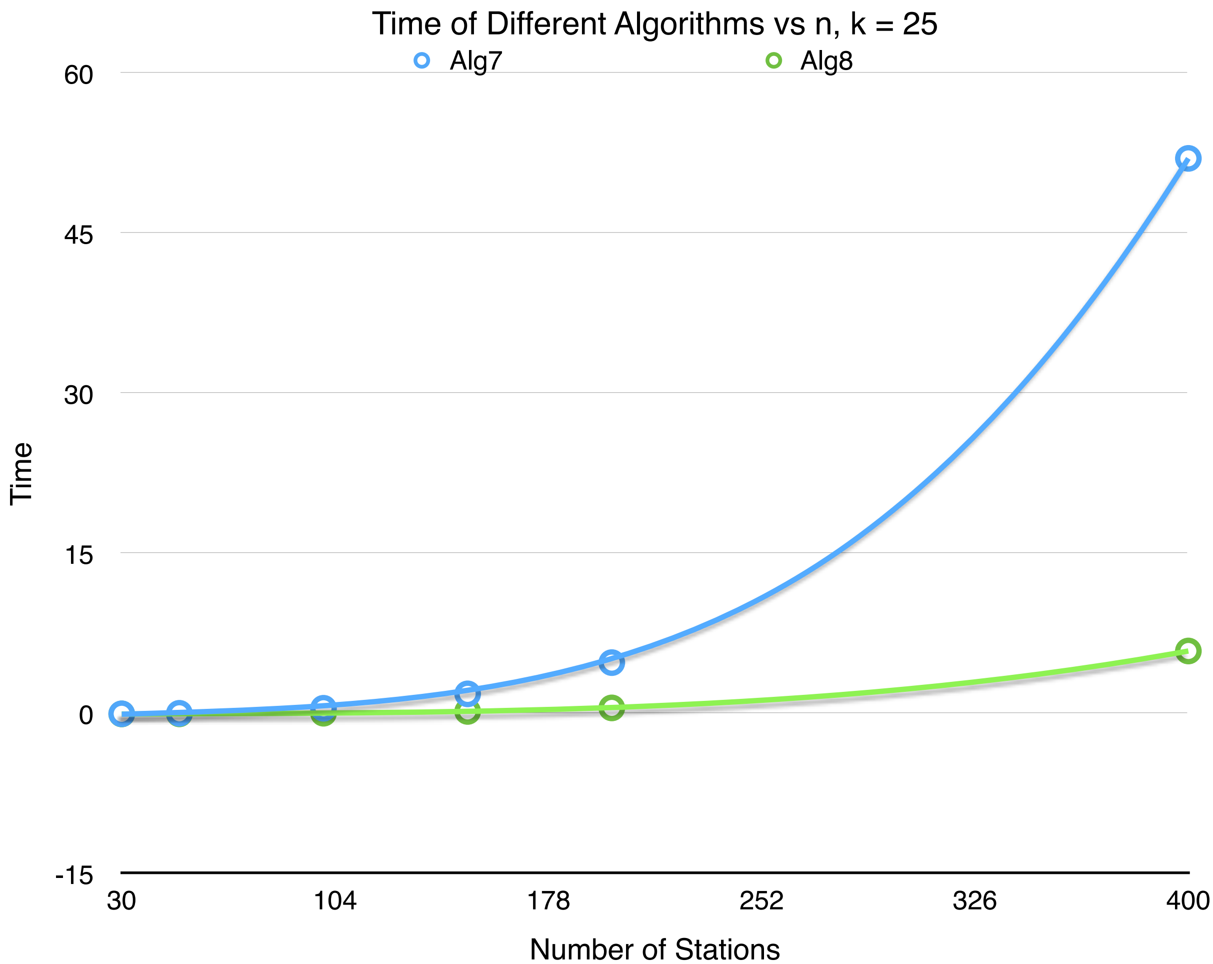
1. Performance comparison between Alg6, Alg7, and Alg8 on small input sizes.



n	Alg 6	Alg 7	Alg8
10	0.042	0.004	0.004
12	0.115	0.004	0.004
15	0.486	0.004	0.004
18	1.713	0.005	0.004
25	18.228	0.004	0.005

The points indicating the time needed by Alg6 or different number of stations nearly form a straight line. Therefore the algorithm 6 takes exponential time.

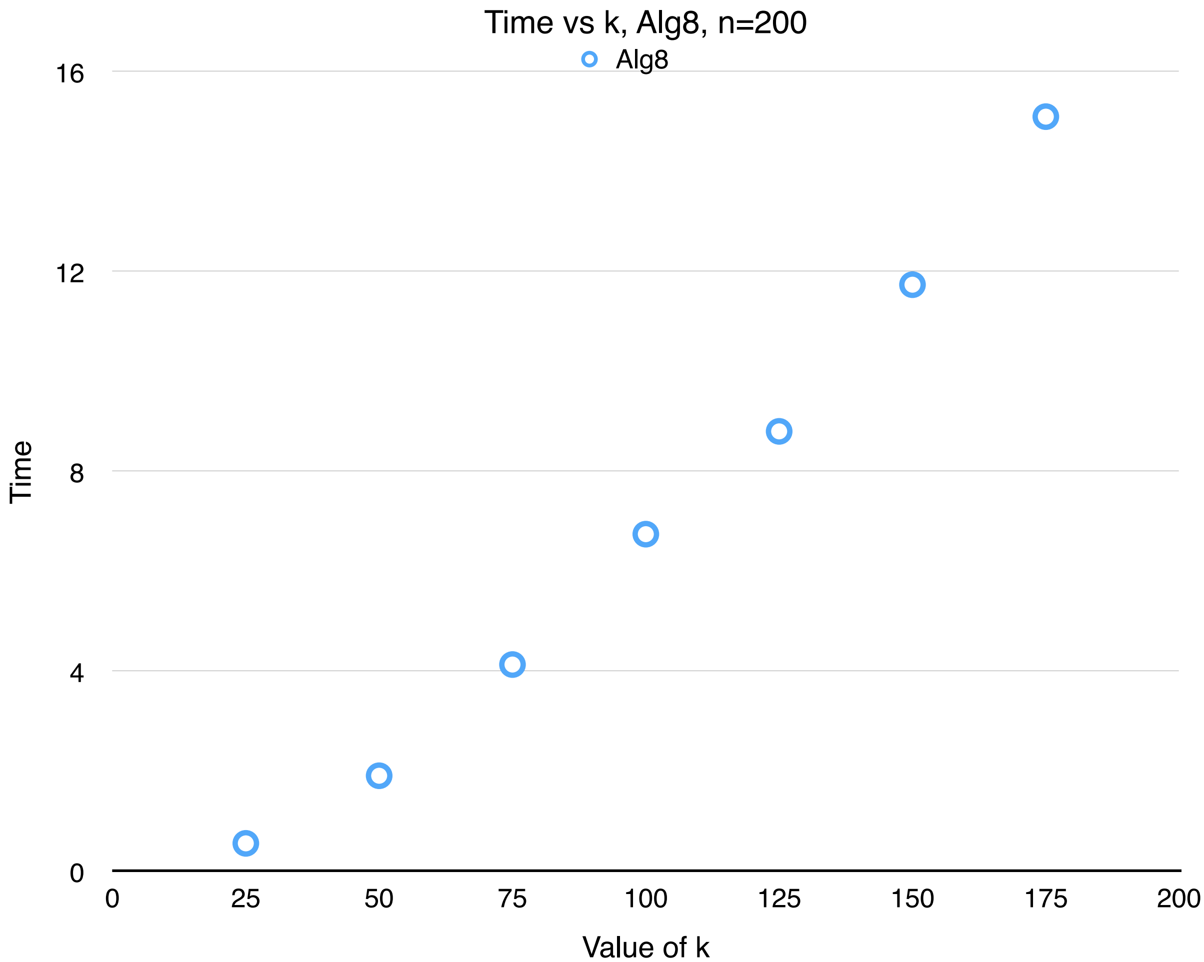
2. Performance comparison between Alg7 and Alg8 on large input sizes.



n	Alg7	Alg8
30	0.023	0.008
50	0.069	0.015
100	0.541	0.076
150	1.89	0.243
200	4.818	0.574
400	52.065	5.907

Clearly both Alg7 and Alg8 run polynomial time. However, Alg8 is much faster than Alg7, about 8 times faster. The time complexity of Alg8 is $O(n^5)$

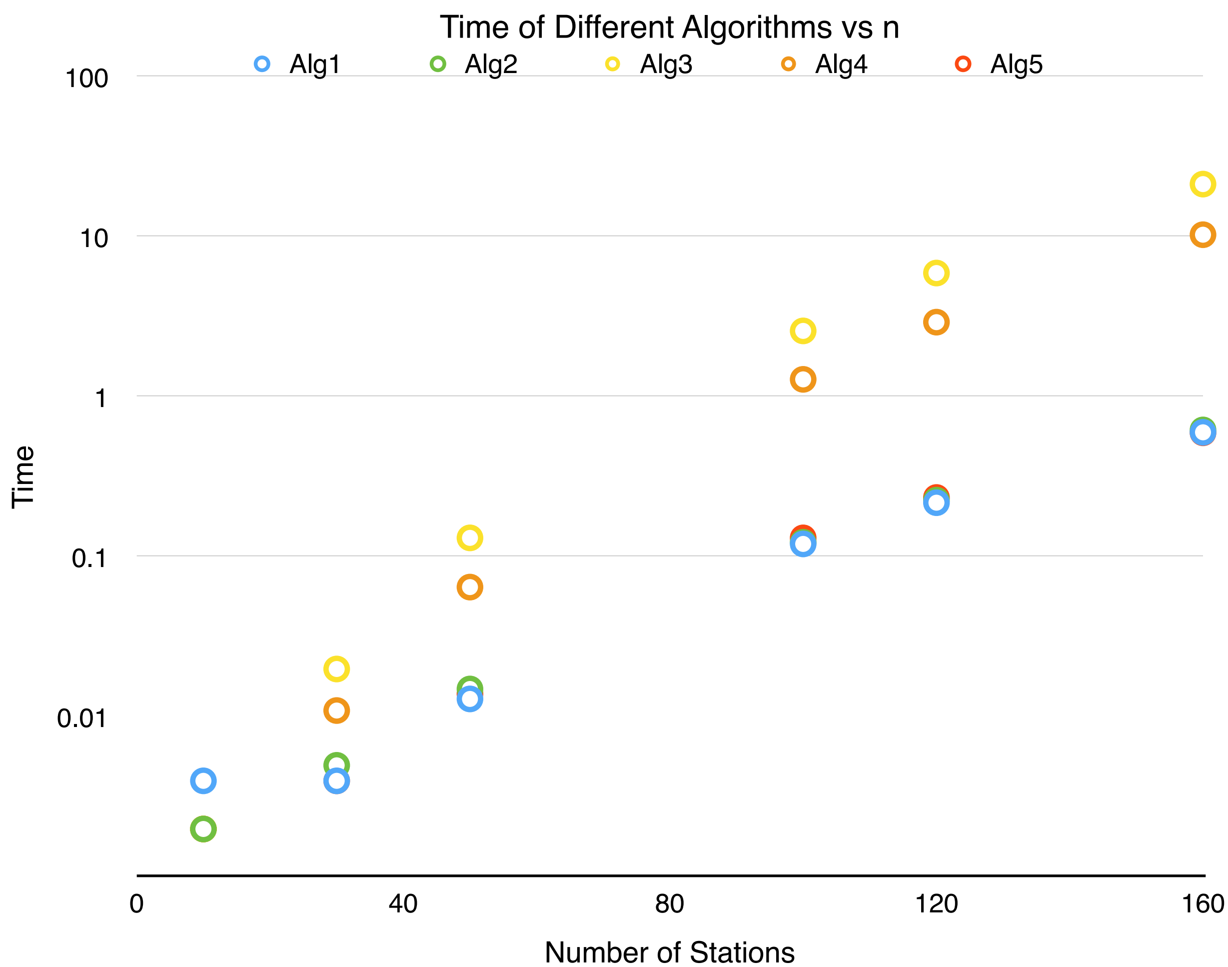
2. Time vs k



n	Alg8
25	0.574
50	1.927
75	4.152
100	6.761
125	8.818
150	11.753
175	15.116

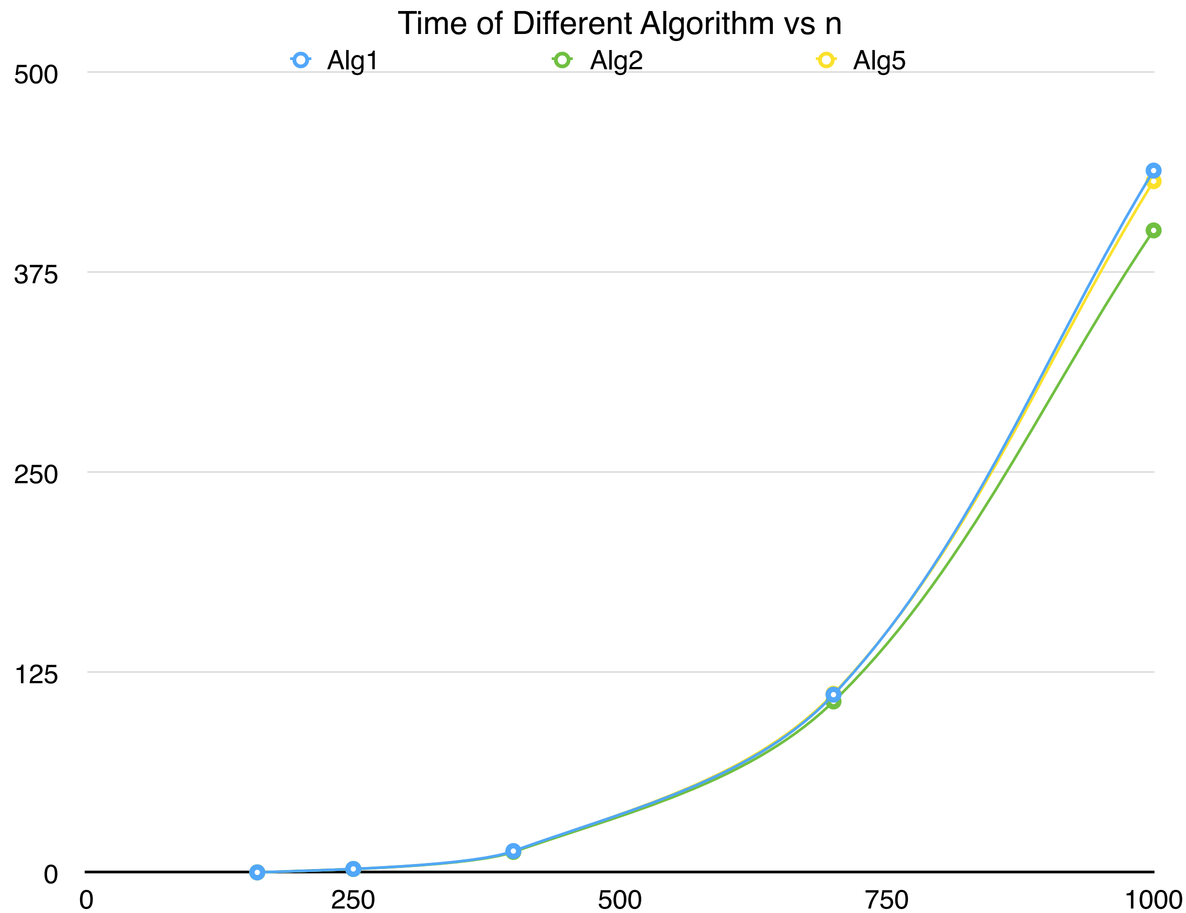
It is obvious that larger value of k result in longer running time. By analyzing my code, I can narrow down the time complexity of Alg8 to $O(n^3k^2)$

3. Comparison between Alg1, Alg2, Alg3, Alg4 and Alg5



	10	Rank	30	Rank	50	Rank	100	Rank	120	Rank	160	Rank	To. Rank
Alg1	0.004	3	0.004	5	0.013	4	0.121	5	0.219	5	0.603	5	22
Alg2	0.002	1	0.005	1	0.015	2	0.124	3	0.227	2	0.624	3	9
Alg3	0.002	1	0.02	2	0.132	1	2.595	2	5.967	1	21.459	1	7
Alg4	0.002	3	0.011	4	0.065	3	1.292	1	2.943	3	10.359	2	14
Alg5	0.002	3	0.004	3	0.014	5	0.132	4	0.236	4	0.599	4	19

Rank is the rank of total power found by the algorithm. The highest rank means the lowest power. Total ranks is the sum of rank of each number of stations. For these five sizes of input, Alg3 has the best result. My algorithm, Alg5, is not good, but is still better than Alg1.



	160	Power	250	Power	400	Power	700	Power	1000	Power
Alg1	0.59	2.031E+08	2.751	1.965E+08	13.93	1.931E+08	111.67	2.875E+08	439.219	2.825E+08
Alg2	0.594	1.744E+08	2.692	1.665E+08	13.359	1.662E+08	107.412	2.875E+08	401.828	2.477E+08
Alg5	0.598	1.829E+08	2.737	1.759E+08	13.679	1.697E+08	112.26	2.516E+08	432.569	2.493E+08

Again, Alg2 has the least average power. I don't recommend my algorithm, because it often does not generate the minimum power, nor runs the fastest. According to the trend, the running time difference between Alg2 and other algorithms will be bigger.