

BenchMarks:

I have benchmarked my implementation of Gale-Shapley on each input size (10, 100, 1,000, and 5,000 respectively) 10 times each, and then averaged the 10 runs to obtain a run time for each input size, and then I have plotted those run times onto a graph with a best fit curve and R^2 value, the individual run times are listed in the tables below:

10:

Attempt	Run Time
1	0.0010020732879638672
2	0.000997781753540039
3	0.0010020732879638672
4	0.0010020732879638672
5	0.001001119613647461
6	0.0010013580322265625
7	0.0009999275207519531
8	0.0010006427764892578
9	0.0010008811950683594
10	0.0009999275207519531
Average:	≈ 0.000997

100:

Attempt	Run Time
1	0.009998559951782227
2	0.011001110076904297
3	0.007999897003173828

4	0.010998249053955078
5	0.00799870491027832
6	0.01000070571899414
7	0.009002685546875
8	0.009935855865478516
9	0.009001016616821289
10	0.010087966918945312
Average:	≈ 0.009597

1,000:

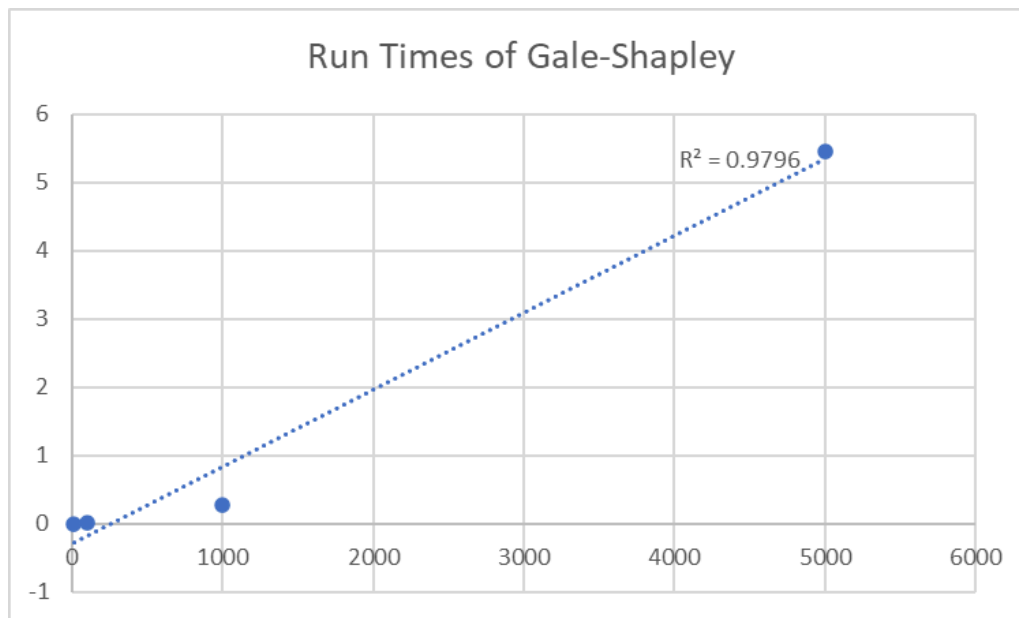
Attempt	Run Time
1	0.28705811500549316
2	0.27486538887023926
3	0.2590346336364746
4	0.27380824089050293
5	0.268237829208374
6	0.2727806568145752
7	0.31100034713745117
8	0.2780435085296631
9	0.27214527130126953
10	0.25400662422180176
Average:	≈ 0.275093

5,000:

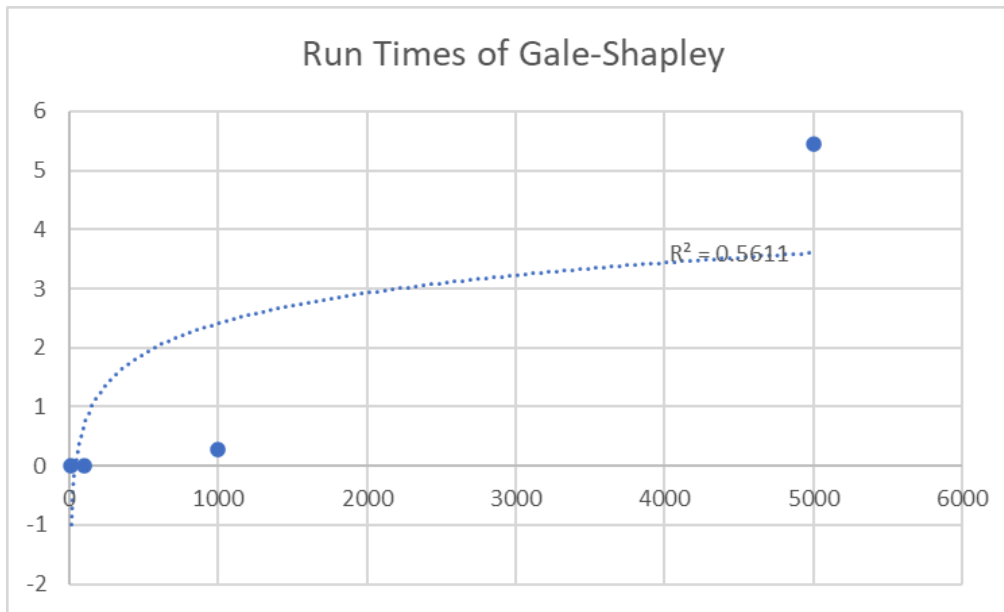
Attempt	Run Time
1	5.691620826721191
2	5.521880626678467
3	5.323196172714233
4	5.494591236114502
5	5.353791952133179
6	5.4991960525512695
7	5.382903337478638
8	5.339593887329102
9	5.481658458709717
10	5.395039319992065
Average:	≈5.448343

Best Fit Curve Graphs:

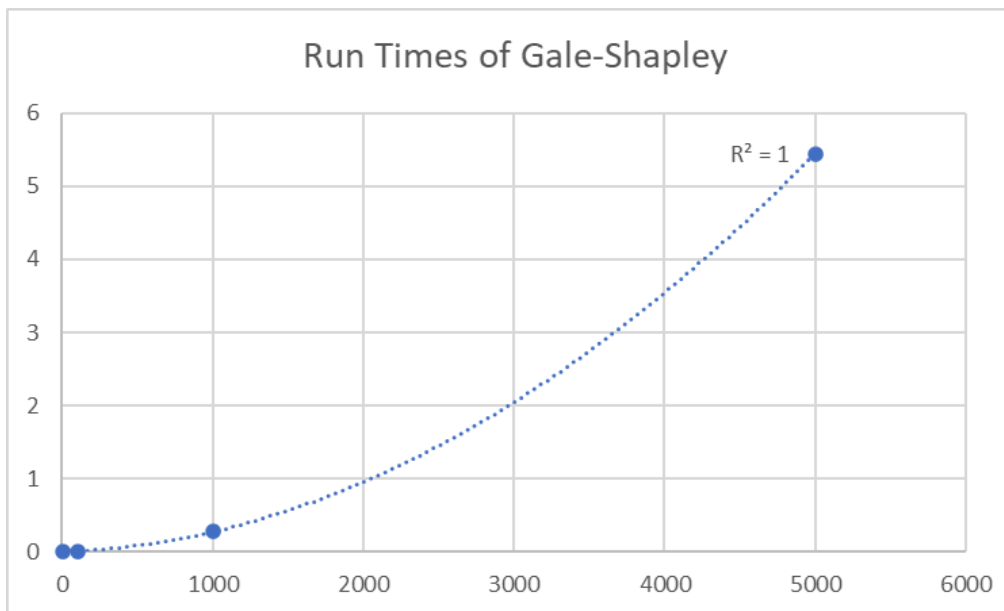
Linear Curve Fit ($O(n)$):



Logarithmic Curve Fit ($O(\log(n))$):

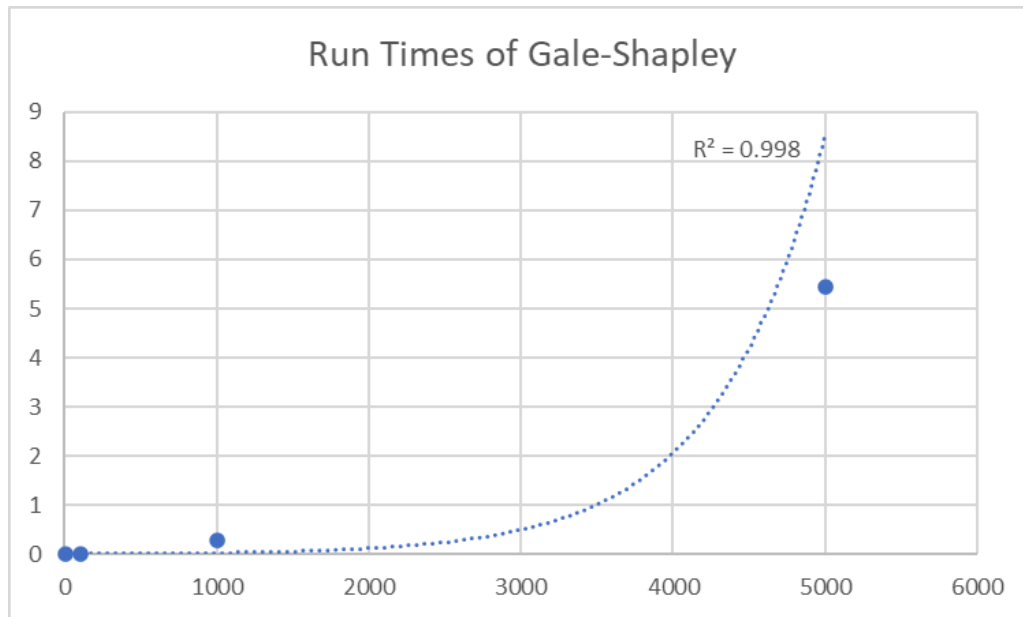


Quadratic Curve Fit ($O(n^2)$):



Cubic Curve Fit ($O(n^3)$):

Exponential Curve Fit ($O(2^n)$):



If we look at these curve fits for the run times on different input sizes, we see a few different R^2 values for a linear fit, we get 0.9796, for logarithmic, we get 0.5611, for exponential, we get 0.998, and for quadratic we get a perfect value of 1.0. Looking at these values, it becomes very clear that the Gale-Shapley algorithm runs in $O(n^2)$ time based on the perfect R^2 value of 1.0.