CS 2223 B17 - Project 2 Report - 11/21/17
Nikolas Gamarra

Executive summary:

Intro:

I conducted my experiment by creating a modifying my last project as a into a skeleton framework for testing various algorithms. Functionality was added to interpret .txt files and check for invalid input. The program defaults to read from input.txt but can be set to read any .txt file with an array of numbers in it by specifying a filename at runtime after the python file name.

Time efficiency:

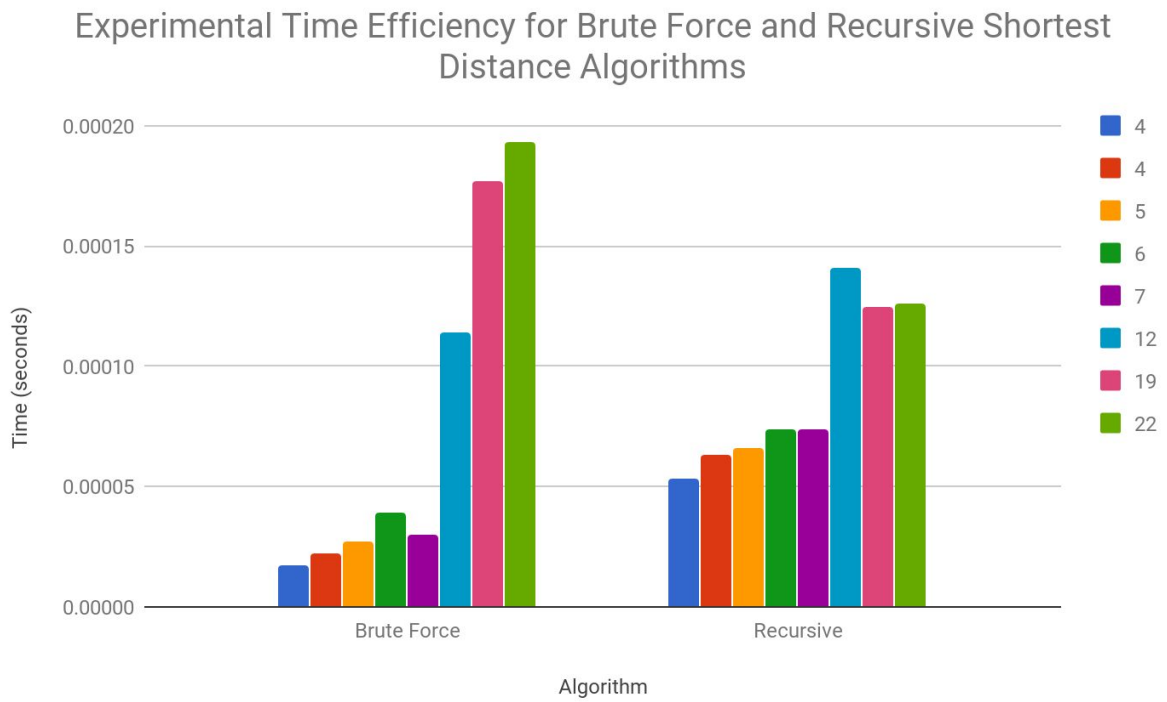
The time efficiency for the Brute Force Algorithm would be $O(n^2)$ because it has two nested for loops that loop through all data. Time efficiency for the Recursive Algorithm would be O(n log n) because the number of steps required can be expressed by T(n) = 2 T(n/2) + O(n) solving using the master method we get O(n log n).

Conclusion:

In conclusion while the Brute Force Algorithm performed faster experimentally at first, with larger values of n the Recursive Algorithm eventually performed faster. As described the the mathematical theoretical time efficiency the Recursive Algorithm can be expected to perform much better for very large values of n.

Data:

Note: the numbers in the legend represent the number of points in the list.



Run	Algorithm:	Alg 1 - Brute Force	Alg 2 - Recursive
1	File:	**input.txt**	**input.txt**
	Number of inputs (n):	**4**	**4**
	Distance	**45.12205669**	**45.12205669**

	Time (seconds):	**2.19E-05**	**6.29E-05**
2	File:	**input1.txt**	**input1.txt**
	Number of inputs (n):	**4**	**4**
	Distance	**32.24903099**	**32.24903099**
	Time (seconds):	**1.72E-05**	**5.29E-05**
3	File:	**input2.txt**	**input2.txt**
	Number of inputs (n):	**12**	**12**
	Distance	**2.828427125**	**2.828427125**
	Time (seconds):	**0.0001139640808**	**0.0001411437988**
4	File:	**input3.txt**	**input3.txt**
	Number of inputs (n):	**5**	**5**
	Distance	**1**	**1**
	Time (seconds):	**2.69E-05**	**6.60E-05**
5	File:	**input4.txt**	**input4.txt**
	Number of inputs (n):	**7**	**7**
	Distance	**22**	**22**
	Time (seconds):	**3.00E-05**	**7.39E-05**
6	File:	**input5.txt**	**input5.txt**
	Number of inputs (n):	**6**	**6**
	Distance	**2002.344626**	**2002.344626**
	Time (seconds):	**3.91E-05**	**7.39E-05**
7	File:	**input6.txt**	**input6.txt**
	Number of inputs (n):	**19**	**19**
	Distance	**1**	**1**
	Time (seconds):	**1.77E-04**	**1.25E-04**
8	File:	**input7.txt**	**input7.txt**
	Number of inputs (n):	**22**	**22**
	Distance	**3**	**3**
	Time (seconds):	**1.93E-04**	**1.26E-04**