

CSC 323 Algorithm Design and Analysis
Instructor: Dr. Natarajan Meghanathan
Fall 2017

Project # 5: Binary Search Algorithm to Search for a Value with a Certain Precision

Due: November 2, 2017, 11.30 AM

Consider a function $foo(x)$ that takes a parameter x and returns false if x is less than a threshold and returns true if x is greater than or equal to the threshold. The value of the threshold ($0 < \text{threshold} \leq 1$) is input by the user (each student is assigned a threshold). The objective of this project is to develop a binary search algorithm that repeatedly calls the function $foo(x)$ with various candidate values of x until it finds an x value (called the matching x) whose first p digits match exactly to the value of the threshold input by the user. For example, if the threshold assigned for the user is 0.8123712 (of precision $p = 7$ digits), the matching x value would be something like this 0.812371201813221, whose first $p = 7$ digits match exactly with that of the above threshold. As part of the outputs, you are also required to keep track of the number of iterations of binary search it took to determine the matching x value for the threshold value assigned to you.

Your code should comprise of the following:

- (a) the function $foo(x)$ as defined above
- (b) the main function with the implementation of the binary search algorithm to compute the matching x value for a threshold and the number of iterations

The input to your code should be the threshold value assigned to you. You could also input another value that you want to use to control the precision of the matching x value.

The output of your code should be the matching x value (in its entirety) and the number of iterations it took to determine the matching x value.

What to submit:

A comprehensive report explaining your design of the binary search algorithm for the above problem as well as the code with (a) and (b) as mentioned above, and a screenshot of the execution of the code for the threshold assigned to you along with the output. E-mail me the entire report at natarajan.meghanathan@jsums.edu

Threshold Value assigned for each student

Student Name	Threshold	Student Name	Threshold
Armon Clark	0.74987	Taj Nelson	0.654785
Daniel Epps	0.198564	Paricia Perry	0.27844
Allee Gammons	0.2874561	Daniel Powell	0.8874512
Menlik Getachew	0.1345	Aiyanna Price	0.258456
Taylor Hasty	0.97458	Allaysia Roberts	0.47856
Derrick Jackson	0.333125	Dreshon Sanders	0.012458
Devario Lewis	0.4578966	Miracle Williams	0.5473621
Jai-Michael McMillian	0.784512	Michael Wilson	0.20125789
Nahu Merawi	0.89563214		