COMP 3711 Design and Analysis of Algorithms
Spring 2015
Programming Assignment 3

In this programming assignment, you will be comparing the following two different ways for constructing a binary search tree (BST): (1) the standard way to build a perfectly balanced BST (slide 4 in Lecture 9), and (2) the dynamic programming algorithm (Lecture 15) to build the optimal BST given the weights of the keys.

You can find two data files at the following URLs:
http://course.cse.ust.hk/comp3711/homework/pa3a.txt
http://course.cse.ust.hk/comp3711/homework/pa3b.txt

Each file consists of 100 lines, where each line has two integers separated by a comma. The first integer is the key, and the second integer is its weight. Using the data from each file, build two BSTs using the two methods above (i.e., a total of 4 BSTs), and compare their performances as follows. For each key k with weight w, search it w times in the BST (the search algorithm is on slide 3 of Lecture 9), and do so for each of the 100 keys. Measure the total running time of all the searches and compare how the two BSTs perform. Is the optimal BST better than the balanced BST on each of the two data sets? Why and why not?

What to submit:

1. A printout of your dynamic programming code for building the optimal BST.

2. The experimental results (no need to plot figures, just report the measured running time of the BST searches).

3. A brief discussion of what you have observed from the experiments.