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CS 5050

Assignment 8 Discussion

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Because the real-value knapsack problem is an NP-Complete problem it had to be converted into a similar algorithm so as to decrease the runtime. In order to decrease the runtime of the real-value knapsack problem the knapsack has to be converted from a real number to an integer value, by multiplying the real value by 10n, where n corresponds to the number of places the decimal will be moved. In addition to converting the size of the knapsack to an integer value, the same thing must be done with the array of object sizes. Doing these two things creates a problem that is not NP-Complete so it can be solved in a reasonable amount of time.

After running the real-value knapsack as a non-NP-Complete problem the solution must be converted from an integer back to a double. This is done by using a similar process as before, except division replaces multiplication. Because the complete problem was not solved there will be some error involved in the solution, the graph below is intended to illustrate this point. As the precision of the integer values is increased, by moving the decimal over more places, the runtime increases but the error decreases, a prime example of a tradeoff.

Although the graph below is intended to show the tradeoff between runtime and error it is somewhat difficult to see that because the integer value knapsack algorithm ran so quickly. There were many ways I tried to fix this problem, increasing the problem size or running the algorithm 1000 times and dividing the runtime by 1000 at the end, but I could not solve the problem with the speed of the algorithm.

