Algorithms Programming Assignment 2 Report

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In my PA2, I use the bottom-up method on my DP algorithm, I have tried the top-down method, but in the assignment, it will be hard to run in 5 minutes for the 100000.in test file since it will have $O(2^n)$ time complexity, and if I use the bottom-up method, it's time complexity will done to $O(n^2)$. I use a table to record the max number of chords in each interval, so I can use the optimized numbers of each interval to get the optimized solution of the whole problem. Then, when I need to find the chords of the solution, I only need to observe the table and then I can get the chords of the solution. Interestingly, when I use different method to find paths. First, I use the top-down method to find the chords, and it would run for a very long time. Secondly, I change a method to find chords. I establish a new table differ from the table which records the numbers, it records the chord index of the solution in each interval, but the method is still too slow to run in 5 minutes. Since I have learned computer architecture, I guess that two tables will generate too much "store" instructions, and the "store" instruction will need about 1.5 times of time more than other kinds of instructions. Also, it may have too much load-use hazard when it runs, so there may appear a lot of "nop" instructions in my obj files even I used the "-O3" flag to optimize my code. For another thing, I think if we can write some assembly languages in the .cpp file by ourselves to optimize the code, such as the "vector" operation in assembly languages, I think the loop could be faster about 3 to 4 times.