IT LAB - M.TECH CS
Lab - 3

August 21, 2017

Understanding and implementing Dynamic Programming (DP) Strategy: The elements of the DP to be noted are: how to index the subproblems; need to store the solutions of the subproblems in a table; also store the intermediate information from which the final solution can be built.

1. First, write the algorithm of DP strategy for solving parenthesization of Matrices that uses optimal number of scalar multiplications and trace it on an example of 4 matrices. This needs to be shown to the TA's before going ahead with implementation.

2. Write a program to implement DP strategy taking input from command line arguments with the first argument as the input file name and the second argument as the output file name.
   For example: ./DP input.txt output.txt

   input.txt is a file containing the number of matrices n in the first line and in the next line a list of integers d_0, d_1, d_2, d_n, with the understanding that matrices A_1 is of dimension $d_0 \times d_1$, A_2 of dimension $d_1 \times d_2$, ... A_n is of dimension $d_{n-1} \times d_n$. For example:
   4
   50 10 40 30 5

   The output file should show (i) the minimum number of multiplications to compute the product $A_1 A_2 \ldots A_n$ as well as (ii) the actual parenthesization of the matrices.

3. Apply the following greedy strategy to this problem and obtain a solution: First multiply A_i and A_{i+1} whose common dimension d_i is smallest and continue in the same way.

4. Run the two algorithms (DP and greedy) on 10 different inputs and tabulate the results, writing the output to a file.

Submission Instructions: (i) A written document carrying the algorithm and tracing of the DP algorithm to be shown in the lab itself. (ii) : Please submit Rollno_DP.tar containing the directory named by your rollno having all the program files to sdbcs@dcis.uohyd.ernet.in and mtechalgo2017@gmail.com by 24 August 2017.