

Design and Analysis of Algorithms (COM336)

Fall Semester 2018/2019

Project # 1 Report

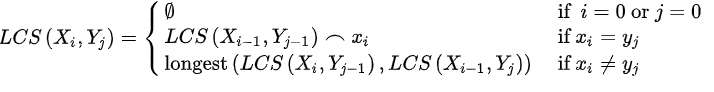
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Section: 1

1. Problem Description:-

The problem is called “The longest common subsequence” also referred as “LCS” in this problem we have arrays of the same data type and we need to find the longest common subsequence between these two arrays.

1. The general form :- 
2. The pseudo code of the designed Algorithm:-

LCS-Length(X, Y)

m <- length[X]

n <- length[Y]

for i <- 1 to m

c[i,0] <- 0

for j <- 1 to n

c[0,j] <- 0

for i <- 1 to m

for j <- 1 to n

if (x\_i == y\_j) {

c[i,j] <- c[i-1,j-1] + 1

b[i,j] <- NW

}

else if (c[i-1,j] >= c[i,j-1]) {

c[i,j] <- c[i-1,j]

b[i,j] <- N

}

else {

c[i,j] <- c[i,j-1]

b[i,j] <- W

}

1. A chart that shows the relation between the execution time and input size:-

Now before drawing the chart we can safely say that the time of the Longest Common Subsequence is O(m\*n) and in this situation we can say that it is O(n²) because the number of LED lights are equal to the number of power supplies.

1. Some produced Solutions
2. Case 5\*5:-

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 5 | 2 | 1 | 3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 1 | 2 |
| 0 | 0 | 1 | 1 | 1 | 2 |
| 0 | 1 | 1 | 1 | 1 | 2 |
| 0 | 1 | 1 | 2 | 2 | 2 |

The Longest Common Subsequence for this array is :- 4,5

1. Case 7\*7:-

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 6 | 7 | 4 | 5 | 1 | 2 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 |
| 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 |
| 0 | 0 | 0 | 1 | 2 | 2 | 2 | 3 |
| 0 | 0 | 0 | 1 | 2 | 3 | 3 | 3 |
| 0 | 1 | 1 | 1 | 2 | 3 | 3 | 3 |
| 0 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |

The Longest Common Subsequence for this array is:- 3,6,7

1. Case 6\*6 :-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | 5 | 4 | 3 | 2 | 6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 2 | 2 |
| 0 | 1 | 1 | 1 | 2 | 2 | 2 |
| 0 | 1 | 1 | 2 | 2 | 2 | 2 |
| 0 | 1 | 2 | 2 | 2 | 2 | 2 |
| 0 | 1 | 2 | 2 | 2 | 2 | 3 |

The Longest Common Subsequence is :- 1, 5,6