## 

Department of Computer Science and Engineering

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CSE 246: Algorithm

Project: String Matching using LCS

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**Problem Statement**: Annie went to an amusement park with her one-year-old daughter. Somehow Annie lost her daughter and after announcing in the “lost and found” center of the park, the authority got to see there are seven other girls of the similar age to Annie’s daughter. There were even other guardians demanding their children but without any strong proof they won’t let her take away her daughter. DNA testing or biometric anything can be an option. Build a program with necessary algorithms so that Annie can find her daughter.

**Source Code** :

#include <bits/stdc++.h>

using namespace std;

#define DNA\_size 700

string daughter\_DNA = "";

string girl\_DNA[7];

int LCS(string &test\_DNA)

{

int lcs\_table[DNA\_size + 1][DNA\_size + 1];

for (int i = 0; i <= DNA\_size; i++)

{

for (int j = 0; j <= DNA\_size; j++)

{

if (i == 0 || j == 0)

lcs\_table[i][j] = 0;

else if (daughter\_DNA[i - 1] == test\_DNA[j - 1])

lcs\_table[i][j] = lcs\_table[i - 1][j - 1] + 1;

else

lcs\_table[i][j] = max(lcs\_table[i - 1][j], lcs\_table[i][j - 1]);

}

}

int index = lcs\_table[DNA\_size][DNA\_size];

return index;

}

int main()

{

string string\_sequence[4] = {"AT", "TA", "CG", "GC"};

srand(time(NULL));

for (int i = 0; i < DNA\_size / 2; i++)

{

int randNum = rand() % 4;

daughter\_DNA = daughter\_DNA + string\_sequence[randNum];

}

cout << "Annie's daughter's DNA :" << endl << daughter\_DNA << endl;

for (int j = 0; j < 7; j++)

{

for (int i = 0; i < DNA\_size / 2; i++)

{

int randNum = rand() % 4;

girl\_DNA[j] = girl\_DNA[j] + string\_sequence[randNum];

}

}

vector<int> lcs\_size;

int match = 0;

double maxi = 0;

for (int i = 0; i < 7; i++)

{

lcs\_size.push\_back(LCS(girl\_DNA[i]));

double accuracy = ((double)lcs\_size[i] / daughter\_DNA.size()) \* 100;

if (accuracy >= maxi)

{

maxi = accuracy;

match = i;

}

cout << "Accuracy of girl " << i + 1 << " with Annie's daughter is " << accuracy << "%" << endl;

}

cout << endl;

cout << "The highest accuracy is " << maxi << "%" << endl;

cout << "Girl " << match + 1 << " is the most likely match to be Annie's daughter." << endl;

}

**Output:**

