Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 8

A subsequence is a sequence that can be derived from another sequence by deleting some elements without changing the order of the remaining elements. Longest common subsequence (LCS) of 2 sequences is a subsequence, with maximal length, which is common to both the sequences.

Given two sequences of integers, P = <M, N, O, M> and Q = <M, L, N, O, M>, find any one longest common subsequence.

In case multiple solutions exist, print any of them. It is guaranteed that at least one non-empty common subsequence will exist.

App.py

```
from flask import Flask, render_template, request

app = Flask(__name__)



def lcs(X, Y):
    m = len(X)
    n = len(Y)



    L = [[0 for i in range(n+1)] for j in range(m+1)]

    for i in range(m+1):
        for j in range(n+1):
            if i == 0 or j == 0:
                L[i][j] = 0
            elif X[i-1] == Y[j-1]:
                L[i][j] = L[i-1][j-1] + 1
```

Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

```
            else:
                L[i][j] = max(L[i-1][j], L[i][j-1])

    lcs_str = ""
    i = m
    j = n
    while i > 0 and j > 0:
        if X[i-1] == Y[j-1]:
            lcs_str += X[i-1]
            i -= 1
            j -= 1
        elif L[i-1][j] > L[i][j-1]:
            i -= 1
        else:
            j -= 1

    lcs_str = lcs_str[::-1]

    return L, lcs_str
@app.route('/', methods=['GET', 'POST'])
def index():
    if request.method == 'POST':
        X = request.form['string1'].upper()
        Y = request.form['string2'].upper()


        L, lcs_str = lcs(X, Y)
        lcs_length = len(lcs_str)

                return  render_template('index.html',  X=X,  Y=Y,  table=L,
lcs=lcs_str, length=lcs_length)

    return render_template('index.html')

if __name__ == '__main__':
    app.run(debug=True)
```

Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

Index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>LCS Finder</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-color: #f4f4f9;
            margin: 0;
            padding: 0;
            display: flex;
            justify-content: center;
            align-items: center;
            min-height: 100vh;
        }
        .container {
            background-color: #fff;
            padding: 20px;
            border-radius: 8px;
            box-shadow: 0 4px 8px rgba(0, 0, 0, 0.1);
            max-width: 600px;
            width: 100%;
        }
        h1 {
            color: #333;
            text-align: center;
        }
        form {
            display: flex;
            flex-direction: column;
            margin-bottom: 20px;
        }
        label {
            margin-bottom: 5px;
            color: #555;
        }
        input[type="text"] {
```

```
            padding: 8px;
            margin-bottom: 15px;
            border: 1px solid #ccc;
            border-radius: 4px;
            font-size: 16px;
        }
        input[type="submit"] {
            padding: 10px;
            background-color: #28a745;
            color: white;
            border: none;
            border-radius: 4px;
            font-size: 16px;
            cursor: pointer;
        }
        input[type="submit"]:hover {
            background-color: #218838;
        }
        .result-section {
            background-color: #f9f9f9;
            padding: 15px;
            border-radius: 8px;
            border: 1px solid #ddd;
        }
        .result-section p {
            margin: 8px 0;
        }
        table {
            width: 100%;
            border-collapse: collapse;
            margin-top: 10px;
        }
        table, th, td {
            border: 1px solid #ccc;
        }
        th, td {
            padding: 8px;
            text-align: center;
        }
        th {
```

Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

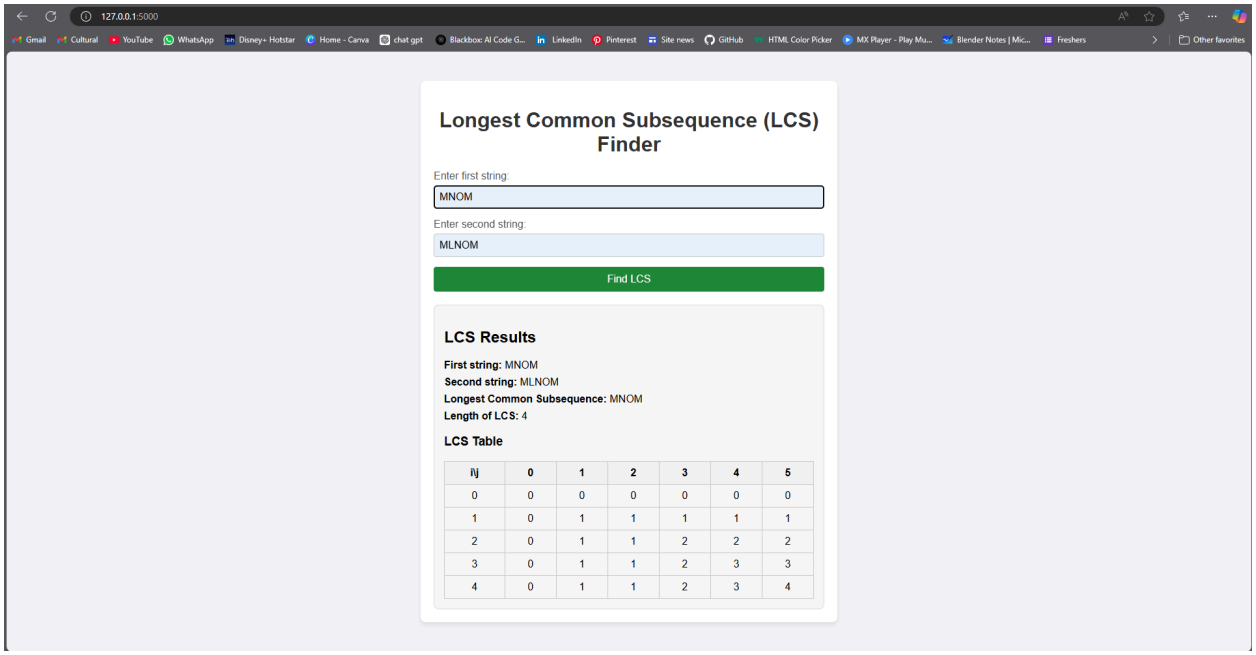
```
            background-color: #f2f2f2;
        }
        a {
            display: block;
            margin-top: 15px;
            text-align: center;
            text-decoration: none;
            color: #007bff;
        }
        a:hover {
            text-decoration: underline;
        }
    </style>
</head>
<body>
    <div class="container">
        <h1>Longest Common Subsequence (LCS) Finder</h1>

        <form action="/" method="POST">
            <label for="string1">Enter first string:</label>
            <input type="text" id="string1" name="string1" required>

            <label for="string2">Enter second string:</label>
            <input type="text" id="string2" name="string2" required>

            <input type="submit" value="Find LCS">
        </form>

        {% if lcs %}
        <div class="result-section">
            <h2>LCS Results</h2>
            <p><strong>First string:</strong> {{ X }}</p>
            <p><strong>Second string:</strong> {{ Y }}</p>
            <p><strong>Longest Common Subsequence:</strong> {{ lcs }}</p>
            <p><strong>Length of LCS:</strong> {{ length }}</p>

            <h3>LCS Table</h3>
            <table>
                <thead>
                    <tr>
```

Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

```
                        <th>i\j</th>
                        {% for j in range(table[0]|length) %}
                        <th>{{ j }}</th>
                        {% endfor %}
                    </tr>
                </thead>
                <tbody>
                    {% for i in range(table|length) %}
                    <tr>
                        <td>{{ i }}</td>
                        {% for cell in table[i] %}
                        <td>{{ cell }}</td>
                        {% endfor %}
                    </tr>
                    {% endfor %}
                </tbody>
            </table>
        </div>
        {% endif %}
    </div>
</body>
</html>
```

Name: Ayush Patel Enrolment: 22162171038 Class B Batch 55

Output:



i\j	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	1	1	1	1
2	0	1	1	2	2	2
3	0	1	1	2	3	3
4	0	1	1	2	3	4