

Name : Prathamsinh

Enrolment. No. : 23162172004

Batch : 54

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.

Code :

app.py :

```
from flask import Flask, render_template, request

app = Flask(__name__)

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

    L = [[0] * (n+1) for i 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
            else:
                L[i][j] = max(L[i-1][j], L[i][j-1])
```

```

index = L[m][n]
lcs_seq = [''] * (index+1)
lcs_seq[index] = ''

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

return lcs_seq, L
@app.route('/', methods=['GET', 'POST'])
def index():
    if request.method == 'POST':
        seq1 = request.form['seq1']
        seq2 = request.form['seq2']

        seq1 = [x.strip() for x in seq1.split(',')]
        seq2 = [x.strip() for x in seq2.split(',')]

        result, matrix = lcs(seq1, seq2)

        return render_template('index.html', result=result, seq1=seq1,
seq2=seq2, matrix=matrix)

    return render_template('index.html', result=None)

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

```

index.html:

```

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Longest Common Subsequence</title>
    <style>
        body {
            font-family: Arial, sans-serif;

```

```
        background-color: #f8f9fa;
        padding: 20px;
    }
    .container {
        max-width: 800px;
        margin: 0 auto;
        background: white;
        padding: 20px;
        border-radius: 8px;
        box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
    }
    h1 {
        text-align: center;
        color: #007bff;
    }
    label, button {
        display: block;
        width: 100%;
        margin: 10px 0;
    }
    input[type="text"] {
        width: 100%;
        padding: 10px;
        margin: 10px 0;
        border: 1px solid #ccc;
        border-radius: 4px;
    }
    button {
        padding: 10px;
        background-color: #007bff;
        color: white;
        border: none;
        border-radius: 4px;
        cursor: pointer;
    }
    button:hover {
        background-color: #0056b3;
    }
    p {
        font-size: 18px;
    }
    h2, h3 {
        color: #007bff;
    }
    table {
        width: 100%;
        border-collapse: collapse;
        margin-top: 20px;
    }
```

```

    }
    table, th, td {
        border: 1px solid #ccc;
    }
    th, td {
        padding: 10px;
        text-align: center;
    }
</style>
</head>
<body>
    <div class="container">
        <h1>Find Longest Common Subsequence</h1>
        <form method="POST">
            <label for="seq1">Enter Sequence 1 </label>
            <input type="text" id="seq1" name="seq1" required>

            <label for="seq2">Enter Sequence 2 </label>
            <input type="text" id="seq2" name="seq2" required>

            <button type="submit">Find LCS</button>
        </form>

        {% if result %}
        <h2>Longest Common Subsequence:</h2>
        <p>{{ result }}</p>

        <h3>Input Sequences:</h3>
        <p>Sequence 1: {{ seq1 }}</p>
        <p>Sequence 2: {{ seq2 }}</p>

        <h3>Dynamic Programming Matrix:</h3>
        <table>
            <thead>
                <tr>
                    <th></th>
                    <th></th>
                    {% for e1 in seq2 %}
                    <th>{{ e1 }}</th>
                    {% endfor %}
                </tr>
            </thead>
            <tbody>
                <tr>
                    <th></th>
                    <td>0</td>
                    {% for _ in seq2 %}
                    <td>0</td>

```

```

        {% endfor %}
    </tr>
    {% for i in range(seq1|length) %}
    <tr>
        <th>{{ seq1[i] }}</th>
        <td>0</td>
        {% for j in range(seq2|length) %}
        <td>{{ matrix[i+1][j+1] }}</td>
        {% endfor %}
    </tr>
    {% endfor %}
</tbody>
</table>
{% endif %}
</div>
</body>
</html>

```

Output :

Find Longest Common Subsequence

Enter Sequence 1

Enter Sequence 2

Find LCS

Longest Common Subsequence:

['M', 'N', 'O', 'M', '']

Input Sequences:

Sequence 1: ['M', 'N', 'O', 'M']

Sequence 2: ['M', 'L', 'N', 'O', 'M']

Dynamic Programming Matrix:

		M	L	N	O	M
	0	0	0	0	0	0
M	0	1	1	1	1	1
N	0	1	1	2	2	2
O	0	1	1	2	3	3
M	0	1	1	2	3	4