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Branch - CBA Batch - 51
AAD Practical 8

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Algorithm Analysis and Design

Practical 8

Problem : 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 sequence of characters, 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 :

```
import YSL_io


def LCS(P, Q):

s1, s2 = len(P), len(Q)

dp = [[0] * (s2 + 1) for _ in range(s1 + 1)]


for i in range(1, s1 + 1):

for j in range(1, s2 + 1):

if P[i - 1] == Q[j - 1]:
```

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


i, j = s1, s2
lcs = []


while i > 0 and j > 0:
if P[i - 1] == Q[j - 1]:
lcs.append(P[i - 1])
i -= 1
j -= 1
elif dp[i - 1][j] > dp[i][j - 1]:
i -= 1
else:
j -= 1
def display():
for i in range(s1 + 1):
for j in range(s2 + 1):
print(dp[i][j], end="\t")
print()
return [''.join(str(y) for y in lcs[::-1]), display]


# Demo inputs :
```

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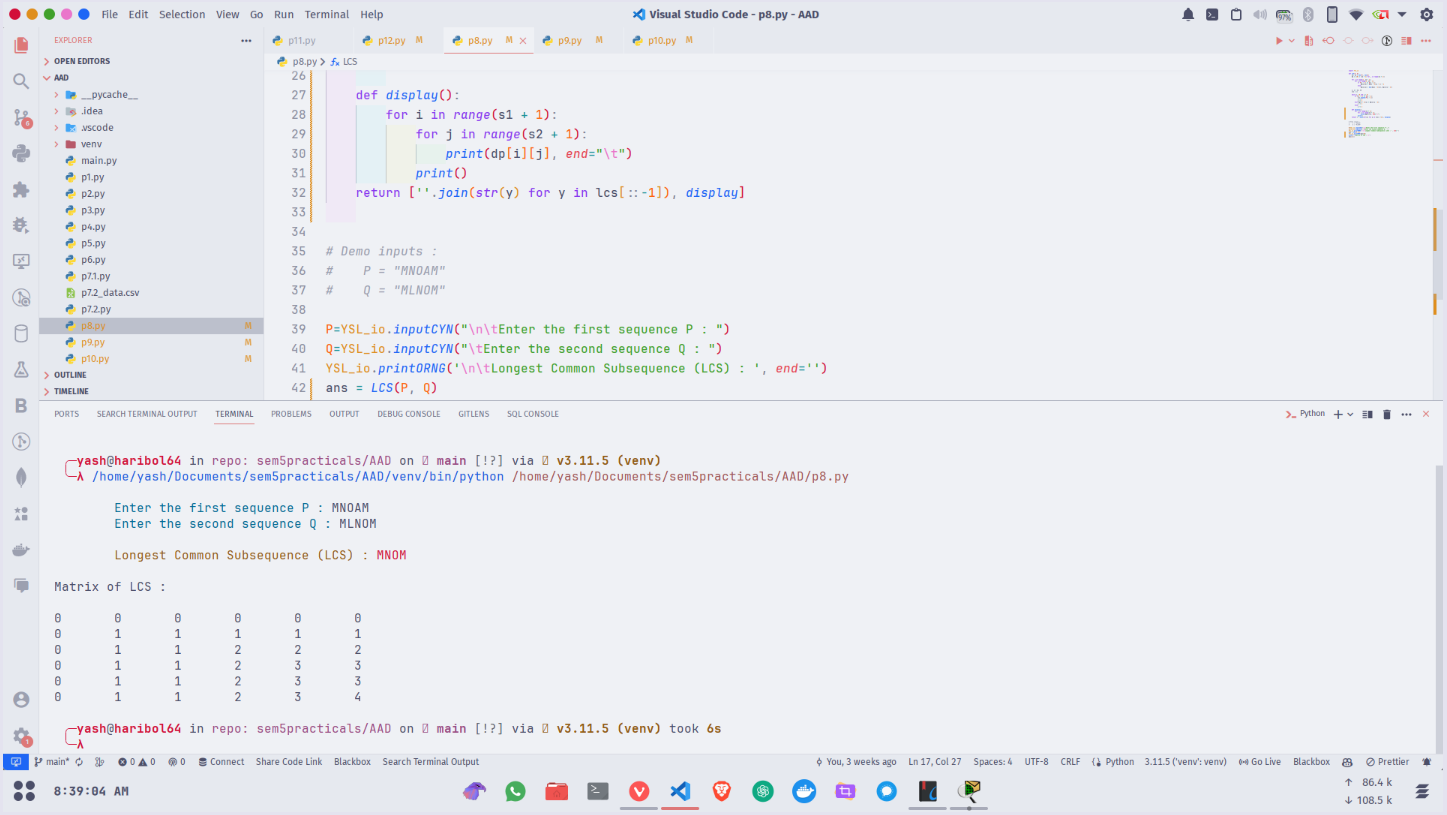
```python
# P = "MNOAM"

# Q = "MLNOM"


P=YSL_io.inputCYN("\n\tEnter the first sequence P : ")

Q=YSL_io.inputCYN("\tEnter the second sequence Q : ")

YSL_io.printORNG('\n\tLongest Common Subsequence (LCS) : ', end='')

ans = LCS(P, Q)

YSL_io.printRED(ans[0])

print('\nMatrix of LCS : \n')

ans[1]()
```

Screenshot :



File Edit Selection View Go Run Terminal Help
Visual Studio Code - p8.py - AAD
p11.py
p12.py M
p8.py M
p9.py M
p10.py M
p8.py > LCS
EXPLORER
OPEN EDITORS
AAD
__pycache__
.idea
.vscode
venv
main.py
p1.py
p2.py
p3.py
p4.py
p5.py
p6.py
p7.1.py
p7.2_data.csv
p7.2.py
p8.py
p9.py
p10.py
OUTLINE
TIMELINE
PORTS SEARCH TERMINAL OUTPUT TERMINAL PROBLEMS OUTPUT DEBUG CONSOLE GITLENS SQL CONSOLE
Python
main* 0 0 0 Connect Share Code Link Blackbox Search Terminal Output
You, 3 weeks ago Ln 17, Col 27 Spaces: 4 UTF-8 CRLF Python 3.11.5 ('venv': venv) Go Live Blackbox Prettier
8:39:04 AM
86.4 k
108.5 k

```python

    def display():
        for i in range(s1 + 1):
            for j in range(s2 + 1):
                print(dp[i][j], end="\t")
            print()
    return [''.join(str(y) for y in lcs[::-1]), display]


# Demo inputs :
#    P = "MNOAM"
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P=YSL_io.inputCYN("\n\tEnter the first sequence P : ")
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YSL_io.printORNG('\n\tLongest Common Subsequence (LCS) : ', end='')
ans = LCS(P, Q)
```

```
╭─yash@haribol64 in repo: sem5practicals/AAD on □ main [!?] via □ v3.11.5 (venv)
╰─λ /home/yash/Documents/sem5practicals/AAD/venv/bin/python /home/yash/Documents/sem5practicals/AAD/p8.py

        Enter the first sequence P : MNOAM
        Enter the second sequence Q : MLNOM

        Longest Common Subsequence (LCS) : MNOM

Matrix of LCS :

0       0       0       0       0       0
0       1       1       1       1       1
0       1       1       2       2       2
0       1       1       2       3       3
0       1       1       2       3       3
0       1       1       2       3       4

╭─yash@haribol64 in repo: sem5practicals/AAD on □ main [!?] via □ v3.11.5 (venv) took 6s
╰─λ
```