

C.W
15/09/2024

CSE246

Dynamic programming

01 Knapsack :-

obj:	1	2	3	4
w:	2	3	4	5
P:	1	2	5	6
	0	1	0	1

F =	(F, P, w) x m =	0 0
	$\frac{P}{w}$	1 1 2 3 4
w:	3 2 5 4	
P:	4 3 5 5	

M = 5

w →	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	0	1	1	1	1
2	0	0	1	2	2	3
3	0	0	1	2	5	6
4	0	1	2	5	6	8

w →	0	1	2	3	4	5
i ↓	0	0 0	0 0	0 0	0 0	0 0
F ←	1	0 0	0 0	0 0	0 0	4 4
	2	0 0	0 1	3 4	4 7	4 7
	3	0 0	0 0	3 4	4 7	7
	4	0 0	0 0	3 4	5 7	7

Algorithm :-

$$\text{int } P[5] = \{0, 1, 2, 5, 6\}$$

$$\text{int } w[5] = \{0, 2, 3, 4, 5\}$$

$$\text{int } m = 8$$

$$\text{int } K[5][5]$$

for(i=0; i<8; i++) {

 for(j=0; j<5; j++) {

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

 K[i][j]=0;

 }

$$P[0, 1, 2, 5, 6] = M$$

w	0	2	3	4	5
	0	2	3	4	5

else if ($w[i] < w$) {

$$K[i][j] =$$

$$\max(P[i] + K[i-1][w])$$

$$K[i-1][w])$$

else {

$$K[i][j] = K[i-1][j];$$

$$B[i, w] = \max(B[i-1, w], B[i-1, w-w[i]] + v[i])$$

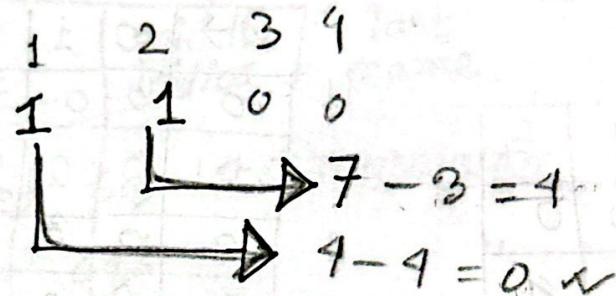
$$\therefore B[2, 5] = \max(B[2-1, 5], B[2-1, 5-2] + 3)$$

$$= \max(4, 7) = 7$$

$$B[4, 4] = \max(B[3, 4], B[3, 0] + 5)$$

$$= \max(4, 5) = 5$$

Backward System



Sum of Subset

→ sum

$$S = \{2, 1, 4, 3\}$$

$$M = 5$$

Ans: [Yes]

Back track: {4, 1}

		0	1	2	3	4	5	
		0	1	0	0	0	0	
value	2	1	1	0	1	0	0	
	1	2	1	1	1	0	0	
	4	3	1	1	1	1	1*	
	3	4	1	1	1	1	1	YES

Sum/Weight - selected value

$$5 - 4 = 1 \text{ (column)}$$

(sum-selected value)

= pprev row এর column number

□ Sort কৃত {2, 3} ৩ পাওয়া যাবে, $M=7$
H.W

HomeWork — {5, 2, 1, 3, 9}, $M=9$

Algorithm :-

Result = Excluding new selected value
or, including " " "

If ($r > c$) $T[r][c] = T[r-1][c]$

```

for (i=0; i<s.length; i++) {
    for (j=0; j<=sum; j++)
        if (i=0 && j=0)
            T[i][j] = 1
        else {
            if (c[i] > j)
                T[i][j] = T[i-1][j];
            else
                T[i][j] = T[i-1][j] || T[i-1][j-c[i]];
}
}

```

$$\therefore T[4][4] = T[0][4] \parallel T[0][4-2]$$

$$= 0 \parallel 0 = 0$$

$$T[2][3] = T[1][3] \parallel T[1][3-1]$$

$$= 0 \parallel 1 = 1$$

Coin Problem :-

Coins = {1, 3, 5}
Am = 8

11111111
111113
3311
53
51110

Same Algorithm

'11' এর গাফুল
+ ইবে

	0	1	2	3	4	5	6	7	8
0	0	1	0	0	0	0	0	0	0
1	1	1	$\frac{0+1}{=1}$	$\frac{0+1}{=1}$	1	1	1	1	1
2	2	1	1	1	$\frac{1+1}{=2}$	$\frac{1+1}{=2}$	$\frac{1+1}{=2}$	$\frac{3+1}{=3}$	3
3	3	1	1	1	1	$\frac{2+1}{=3}$	$\frac{3+1}{=4}$	$\frac{3+1}{=4}$	$\frac{3+2}{=5}$
4									

(same row same column) Amount - coin

$\{ (i+j) \text{ if } i+j > i \text{ else } 0 = 1 \}$ if

$\{ (i+j) \text{ if } i+j > i \text{ else } 0 = 0 \}$ if

$\{ 0 = 0 \text{ if } i+j > i \text{ else } 1 = 1 \}$ if

$i = [i][j]$

$i = [i][j] \text{ if } i+j < 200 \text{ else } 0$

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$i = [i][j] \text{ if } i+j < 200 \text{ else } 0$

$0 = 0 \text{ if } i+j < 200 \text{ else } 1 = 1$

$i = [i][j] \text{ if } i+j < 200 \text{ else } 0$

CSE246

Longest common subsequence (LCS)

$$X = E A B \underline{C D}$$

$$Y = B A C D E$$

(C D subsequence ✓)

E C D

" X (Not a subsequence)

y तथा x match stand क्या हैं / x तथा y के बीच क्या हैं,

(B) $x = E A B \underline{C D}$

B C D

(A) $x = E A B \overset{C}{\cancel{D}}$

A C D

(C) $x = E A B \overset{C}{\cancel{D}}$

C D

(P) $x = P R E S I D E N T$

P R I D E N

$y = P R O V I D E N C E$

(R) $x = P R E S I D E N T$

R I D E N

	O	P
O	O	O
P	O	O + 1

.	O	R
O	O	O
P	O	O + 1 (any) max

	O	P	R	O	V	I	D	E	N	C	E
O	0	0	0	0	0	0	0	0	0	0	0
P	0	1	1	1	1	1	1	1	1	1	1
R	0	1	2	2	2	2	2	2	2	2	2
E	0	1	2	2	2	2	2	3	3	3	3
S	0	1	2	2	2	2	2	3	3	3	3
I	0	1	1	2	2	2	3	3	3	3	3
D	0	1	2	2	2	3	3	4	4	4	4
E	0	1	2	2	2	3	3	4	5	5	5
N	0	1	2	2	2	3	4	5	6	6	6
T	0	1	2	2	2	3	3	4	5	6	6

Algorithm:

if ($x[i] == y[j]$)

$c[i][j] = c[i-1][j-1] + 1;$

else,

$c[i][j] = \max$

($c[i][j-1]$, $c[i-1][j]$)

29/04/21
CSE 246

Longest Increasing Subsequence

10	9	2	5	3	7	10	18
----	---	---	---	---	---	----	----

$\{ (i, j) : F[i] > F[j], i = j \}$ not
 $\{ (i, j) : F[i] > F[j], i < j \}$ not
 $\{ (i, j) : F[i] < F[j], i < j \}$ ok
 $\{ (i, j) : F[i] < F[j], i = j \}$ ok
 $i = j \Rightarrow I = J$

N	3	4	-1	6	2	3
j=0	3	4	-1	6	2	3
i=1	2	3	4	5	6	7

Highest length
subsequence
পাওয়া

if ($N[j] < N[i]$)

if ($DN[j] + 1 > DN[i]$)

j++ করব, $DN[i] = DN[j] + 1$;

যখন $i = j$ সমান হবে তখন $i++$ করবো,

যখন $i = j$ " তখন j আগের জায়গায় নিম্ন মাঝে,

1	2	4	3	2	3	x
---	---	---	---	---	---	---

	0	1	2	2	1
			1		

Highest sequence $\rightarrow 1, 2, 3$

208-2

5	2	8	6	3	6	9	7
---	---	---	---	---	---	---	---

Algorithm

$N[7] = \{3, 4, -1, 0, 6, 2, 3\}$

```
for(i=1, i<7, i++) {
    for(j=0; j<i; j++) {
        if(N[j]+1 > N[i])
            T[i] = T[j+1];
    }
}
```

```
int max = T[0];
for(i=0; i< 7; i++) {
    if(T[i] > max)
        max = T[i];
}
return max;
}
```

9	1	2	3	4	5	6	7
N:	5	2	8	6	3	6	9

DN	1	2	1/2	1/2	1/2	1/3	1/3	1/3
								④

Index		0	0	1	0	0	0
	E=1	D=0	C=0	B=1	A=0		

Sequence : 2 3 6 7

i = 1 o = 5

i = 1 E = 5

i = 1 o = 5

i = 1 o = 5

i = 1 E = 5

i = 1 o = 5

i = 1 E = 5

i = 1 o = 5

i = 1 E = 5

i = 1 o = 5

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i = 1 E = 5

i = 1 o = 5

i = 1 E = 5

i = 1 o = 5

i = 1 E = 5

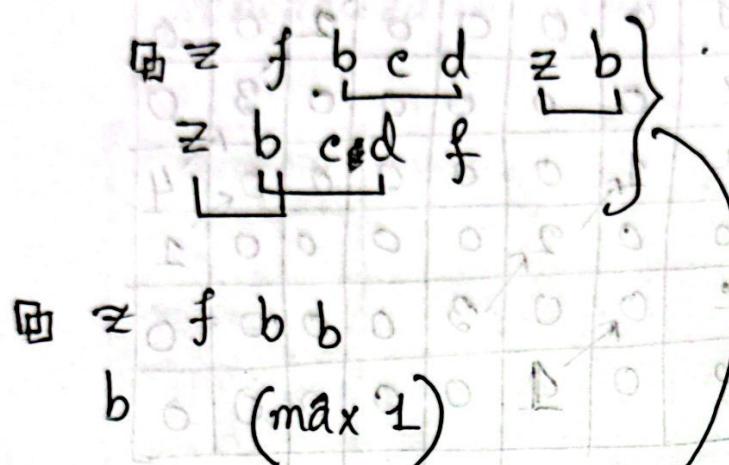
CSE 302 (Lab)

7/5/21 - All SQL Lab exam

M	C	O	R	S	I	L
---	---	---	---	---	---	---

P	S	R	T	O	L
---	---	---	---	---	---

上

Longest common substring

Lab Test - 21 May 21

Presentation - 28 May

	\boxed{z}	f	b	c	d	\boxed{z}	b
\boxed{z}	1	0	0	0	0	1	0
b	0	0	1	0	0	0	2
c	0	0	0	2	0	0	0
d	0	0	0	0	3	0	0
f	0	1	0	0	0	0	0

 \boxed{bed}

✓ * Matlab

~ RAGEGAR ~

Algorithm:

```
LcSub(String m, String n) {
    int dp[m.size()][n.size()];
    " max=0;
```

```
for(i=0; i<m.size(); i++) { (row)
    for(j=0; j<n.size(); j++) { (column)
        if(m[i] == n[j]) {
```

```
            dp[i][j] = dp[i-1][j-1] + 1
        }
    }
}
```

Scanned with CamScanner

abcxyz
 xyzabcb

(9.3) 202423

	a	b	c	x	y	z	a
x	0	0	0	1	0	0	0
y	0	0	0	0	2	0	0
z	0	0	0	0	0	3	0
a	1	0	0	0	0	0	4
b	0	2	0	0	0	0	1
c	0	0	3	0	0	0	0
b	0	1	0	0	0	0	0

zyza
1 2 3 4

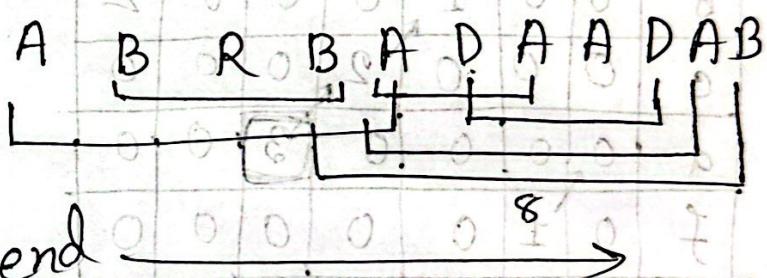
longest common Palindromic Substring/Subsequence

Study X

Madam ✗ ✓

RACECAR ✓

a g b d b a
 LCPS: a b d b a



s	start	0	1	2	3	4	5
0	0	1	1	1	1	3	2+3 5
1	1	1	1	1	1	3	3
2	1	1	1	1	1	3	3
3	0	1	1	1	1	1	1
4	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1

start = end

মিমোরি রেজ

aaaabbaa (7) H.W

a	b	d	b	a
0	2	3	9	5

C.W
06-05-24

CSE 246

208425

Lab Test → 21/05/2024 - Greedy Technique

Quiz → Dynamic Programming - 13/05/2024

Project → Full Algorithm - 3 group member

Final → 05/06/2024 (Dynamic programming + graph).

Algorithm of palindrome :-

for ($i=0$; $i < 6$; $i++$) {

 for ($j=i$; $j < 6$; $j++$) {

 if ($i == j$)

~~T[i-1][j-1] = 1,~~

 else { if ($s[i] == s[j]$) {

~~T[i][j] = 2 + T[i+1][j-1];~~

 else $T[i][j] = \max(T[i+1][j], T[i][j-1]);$

}

i, j টির value

অবশ্যই রেখা

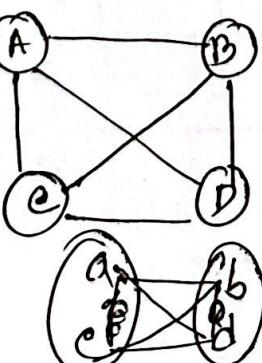
২+ diagonal

অবশ্যই রেখা

এটু Max

Graph & BFS

- Complete graph \Rightarrow



$$\frac{n(n-1)}{2}$$

- Bipartite graph

(connected graph bipartite হলে সম্ভব)

