LECTURE # 21

ADA

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→ Dynamic Programming

-Longest common Substring

execution
intention

		e	x	e	c	u	t	i	o	n
	0	0	0	0	0	0	0	0	0	0
i	0	0	0	0	0	0	0	1	0	0
n	0	0	0	0	0	0	0	0	0	1
t	0	0	0	0	0	0	1	0	0	0
e	0	1	0	1	0	0	0	0	0	0
n	0	0	0	0	0	0	0	0	0	1
t	0	0	0	0	0	0	1	0	0	0
i	0	0	0	0	0	0	0	2	0	0
o	0	0	0	0	0	0	0	0	3	0
n	0	0	0	0	0	0	0	0	0	4

tion

Algorithm

```
if ( str1[i] == str2[i])
{
    T[i,j] = T[i-1,j-1] + 1
}
else
{ T[i,j] = 0
}
```

→ Longest Palindromic Subsequence

0 1 2 3 4 5 6 7
i n a t e d r a → String

- Different Path, different largest palindrome subsequence.
  - → How done by brute force.

a t a

a d a

a r a

a e a

~~a a~~

3 = length

1,4 = n a t e

2,5 = a t e d

3,6 = t e d

	0	1	2	3	4	5	6	7
0	1	1	1	1	1	1	1	3
1		1	1	1	1	1	1	3
2			1	1	1	1	1	2
3				1	1	1	1	1
4					1	1	1	1
5						1	1	1
6							1	1
7								1

→ not a match

a t a a r a c e c a

ithm :-

```
if ( str[i] = str[j]
{
    T[i,j] = T[i+1, j-1] + 2
}
else
{
    T[i,j] = Max { T[i, j-1]
                   T[i+1, j]
```

→ PALINDROM PARTITION

- Different Splits.

0 1 2 3 4

a | bcb | W

← 2 Splits, we exhaust after all splits.
3 partition

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

→ split on i, j basis.

T[0,4] = 1 + min { T[0][0] + T[1][3]
T[0][1] + T[2,3]
T[0][2] + T[3,3]

= 1 + 1

Algorithm

~~if (str[i] = = str[j])~~
~~{ T[i,j] = T[i+1]~~

if ispalindrome(i,j)
T[i,j] = 0
else
T[i,j] = 1 + min { T[i][k] + T[k+1][j]
i ≤ k < j

a|b|c → 2

b c b → 0

c|b|m → 2

$2 \le k < 4$

$k = 2$

$k = 3$

$k = 2$

$$T[2,4] = 1 + \min \begin{cases} T[2][2] + T[3][4] \\ T[2][3] + T[4][4] \end{cases}$$

$$= 1 + \min \begin{cases} 0 + 1 = 1 \\ 1 + 0 = 1 \end{cases}$$

$$= 1 + 1 = 2 \quad (k = 2)$$

$0 \le k < 3$ $\quad k = 0, 1, 2$

$$T[0,3] = 1 + \min \begin{cases} T[0][0] + T[1][3] \\ T[0][1] + T[2][3] \\ T[0][2] + T[3][3] \end{cases}$$

$$= 1 + \min \begin{cases} 0 + 0 = 0 \\ 1 + 1 = 2 \\ 2 + 0 = 1 + 0 = 1 \end{cases}$$

$1 \le k < 4$ $\quad k = 1, 2, 3$

$= 1^0$

$$T[1,4] = 1 + \min \begin{cases} T[1][1] + T[2][4] = 0 + 2 = 2 \\ T[1][2] + T[3][4] = 1 + 1 = 2 \\ T[1][3] + T[4][4] = 0 + 0 = 0 \end{cases} = 0^3$$

$$T_0[0,4] = 1 + \min \begin{cases} T[0][0] + T[1][4] = 0 + 1 = 1 \\ T[0][1] + T[2][4] = 1 + 2 \\ T[0][2] + T[3][4] = 2 + 1 \\ T[0][3] + T[4][4] = 1 + 0 \end{cases}$$

$0 \le k < 4 \quad k = 0, 1, 2, 3$

$= 2^0$

Example # 2

a	i	a	d	a	p	s	p