Laxmi Institute of Technology, Sarigam
Approved by AICTE, New Delhi; Affiliated to Gujarat Technological University, Ahmedabad

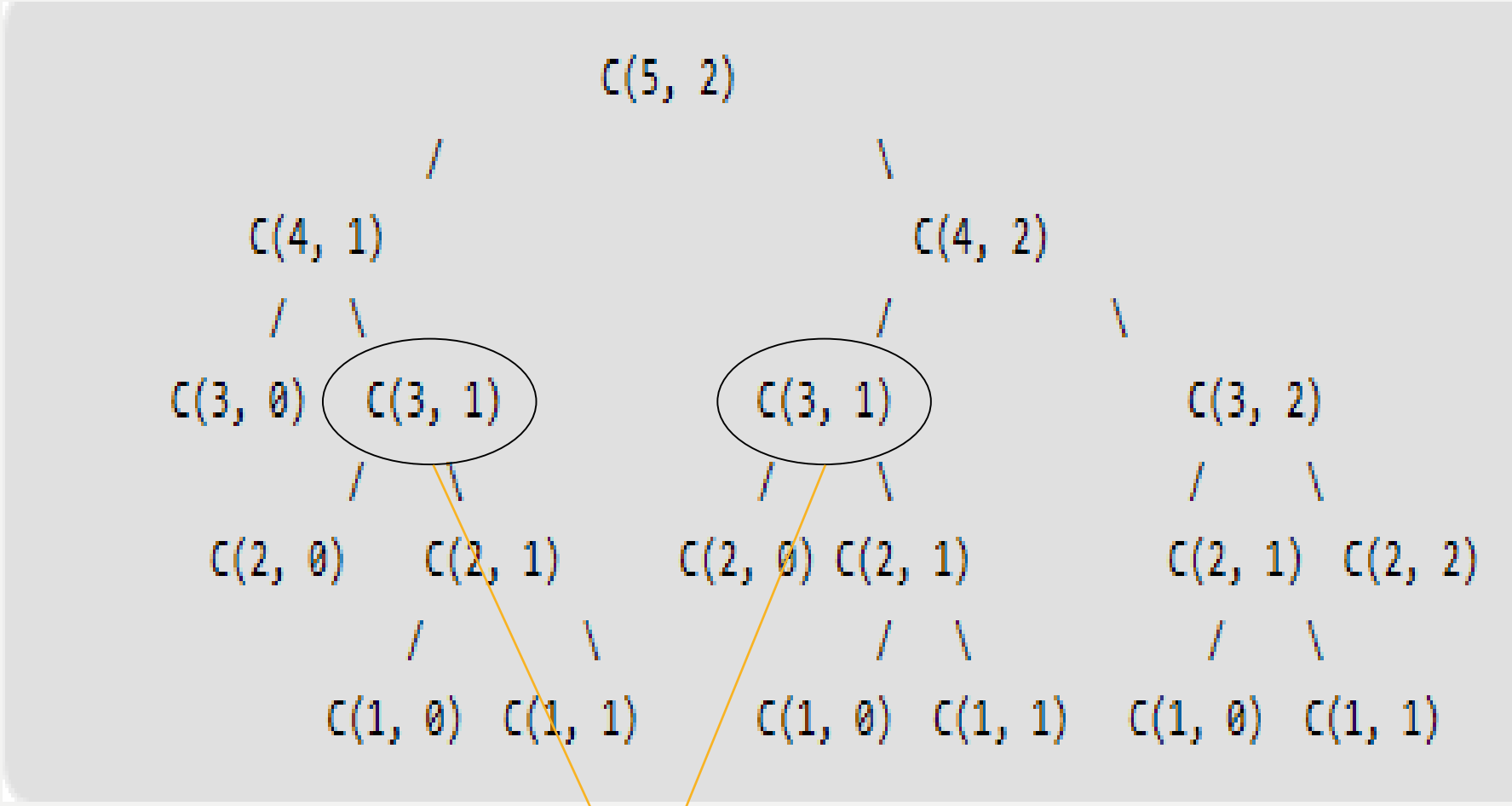
BINOMIAL COEFFICIENT

BY
VIKSHIT GANJOO
(150860107009)

INTRODUCTION

- Firstly, Dynamic programming is technique for solving problems in overlapping with sub problems.

- There are many problems when they are divided into sub problems and while dividing of those problems are many term which are repeatedly solved which takes time. There are same problems in binomial coefficient.



As you can see there are repetition of sub problems which takes time to execute. To solve this problem in binomial coefficient we use dynamic programming

BINOMIAL COEFFICIENT

- A binomial coefficient C(n, k) gives the number of ways, disregarding order, that k objects can be chosen from among n objects, more formally, the number of k-element subsets (or k-combinations) of an n-element set.

- Binomial coefficient are represented by C(n,k) or C_k^n and can be used to represent the coefficients of binomial:

$$(a + b)^n = C(n, 0)a^n + \ldots + C(n, k)a^{n-k}b^k + \ldots + C(n, n)b^n$$

- And

- C_k^n = (n!) / k!(n-k)!

where, $C_n^n = 1$

$C_0^n = 1$

SOLUTION TO PROBLEM

- Dynamic programming gives solution of this problem of repetition of subproblems in binomial coefficient.

- Dynamic algorithm constructs n*k table, with the first column and diagonal filled once the subproblem is solved and can be used again from table when its value is needed it is needed, as shown in following:

n	$\binom{n}{0}$	$\binom{n}{1}$	$\binom{n}{2}$	$\binom{n}{3}$	$\binom{n}{4}$	$\binom{n}{5}$	$\binom{n}{6}$	$\binom{n}{7}$
0	1							
1	1	1						
2	1	2	1					
3	1	3	3	1				
4	1	4	6	4	1			
5	1	5	10	10	5	1		
6	1	6	15	20	15	6	1	
7	1	7	21	35	35	21	7	1

ALGORITHM FOR SOLUTION

- Binomial (int n, int k)
- {
- if(k=0||k=n)
- return 1
- else
- return Binomial (n-1,k-1) + Binomial (n-1,k)

THANK YOU