, Application of the Control of the	
7	31/03/2023
Note →	We can optimize the space used in merge sort,
	if we manually free the allocated space by
	the delete keyword but the space complexity
	remains same i.e. O(n) but space used will be
	less.
	1033
12)	Rat in a maze + Sudoku Solver
1-)	Yows = m
	Columns = n
per contract of the contract o	Total cells = m x n
	TOTAL CETIS = MXTL
	To move to a particular cell, we have 4
	Options available.
	Hence time complexity = 0(4 (m*n))
	Profit 221/ CO De palasiajni ovi in 1 m ()
	(mxn levels
	(40ptions available)
,	Space complexity = 0 (m*n) & Both questions
	Large of the second of the sec
	Similarly in sudoky solver, there are 9
	Options available and total cells available
	Similarly in sudoku solver, there are 9 Options available and total cells available m*n TC = 0(9 (m×n))
	$TC = O(9^{(m \times n)})$

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13)	N-Queen Problem
	(Gchoices)
	2 31 4 3 1 Q1-11 1 1 1 1 1 1 1 2 1 2 2 2 2 2 2 2 2 2
	n=6 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
	Z1/0.3/2623
	inter 212 e : no chim calla chim chi chim monge a
	JO2 (4 ways i.e. n-2 choices)
-	Ql-1 n choices
	Q2+ (n-1) choices, however (n-2) choices would
	be there. (Upper bound is considered)
	Q3 - (n-3) choices
	: Exact number would be different.
	$h \times (n-1) \times (n-2) \times - \times I = O(h I)$
	$\frac{1}{1} \frac{1}{1} \frac{1}$
. Note -	If we place QI, just remove that column. Now
- 	we can place Q2 in n ways.
	The Ways of the Avenue of the
	$n \times n \times n \times \dots = O(n^n)$
	Average case complexity of O(n) lies non
	about O(n!)
	Space complexity = O(n2) 4 ans away
	The above share complexity is a series
	The above space complexity is for single solution. For multiple solutions, it will depend on the no.
	of solutions.
1	and the state born state in a second
14]	Phone keypad problem
	(102.07)
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We will assume for each character, 4 calls will go as we can see from the mappings.

No of characters = 12 and hence time complexity is $O(4^n)$.

Space complexity = $0(4^n)$ We are storing the answers in vector (string) ans.

7 → pars / n=2 9 + wxyz J

pw, px, py, pz, qw, qx, qy, qz, rw, rx, ry, rz, sw, sx, s y, sz

Total 16 combinations possible for 2 digits
16-142

Hence we can write it as 4ⁿ. Now we
need to store 4ⁿ combinations in the
ans vector 4 hence space complexity is
0(4ⁿ)

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