**[Range Sum Query 2D - Immutable](https://leetcode.com/problems/range-sum-query-2d-immutable/)**

class NumMatrix {

int[][] dp;

public NumMatrix(int[][] matrix) {

if(matrix == null || matrix.length == 0 || matrix[0].length == 0) {

return;

}

dp = new int[matrix.length][matrix[0].length + 1];

for(int row = 0 ; row < matrix.length ; row++) {

for(int col = 0 ; col < matrix[0].length ; col++) {

dp[row][col + 1] = dp[row][col] + matrix[row][col];

}

}

}

public int sumRegion(int row1, int col1, int row2, int col2) {

int sum = 0;

for(int row = row1 ; row <= row2 ; row++) {

sum += dp[row][col2 + 1] - dp[row][col1];

}

return sum;

}

}

Time Complexity :

NumMatrix : O(mn) , m is no of rows and n is no of cols

sumRegion: O(m), m is no of rows

Space Complexity : O(mn), m is no of rows and n is no of cols