9.Matrix multiplication

#include <stdio.h>

#define MAX\_ROWS 10

#define MAX\_COLS 10

void matrix\_multiplication(int m1[MAX\_ROWS][MAX\_COLS], int m2[MAX\_ROWS][MAX\_COLS], int r1, int c1, int c2, int result[MAX\_ROWS][MAX\_COLS]) {

    if (c1 != r2) { // Check if columns of first matrix equal rows of second matrix

        printf("Matrices cannot be multiplied: incompatible dimensions.\n");

        return;

    }

    for (int i = 0; i < r1; i++) {

        for (int j = 0; j < c2; j++) {

            result[i][j] = 0;

            for (int k = 0; k < c1; k++) { // Efficiently handle zero elements in either matrix

                result[i][j] += m1[i][k] \* m2[k][j];

            }

        }

    }

}

int main() {

    int r1, c1, r2, c2;

    printf("Enter the dimensions of the first matrix (rows columns): ");

    scanf("%d %d", &r1, &c1);

    printf("Enter the dimensions of the second matrix (rows columns): ");

    scanf("%d %d", &r2, &c2);

    if (c1 != r2) {

        printf("Matrices cannot be multiplied: incompatible dimensions.\n");

        return 1; // Indicate error

    }

    int m1[MAX\_ROWS][MAX\_COLS], m2[MAX\_ROWS][MAX\_COLS], result[MAX\_ROWS][MAX\_COLS];

    printf("Enter elements of the first matrix:\n");

    for (int i = 0; i < r1; i++) {

        for (int j = 0; j < c1; j++) {

            scanf("%d", &m1[i][j]);

        }

    }

    printf("Enter elements of the second matrix:\n");

    for (int i = 0; i < r2; i++) {

        for (int j = 0; j < c2; j++) {

            scanf("%d", &m2[i][j]);

        }

    }

    matrix\_multiplication(m1, m2, r1, c1, c2, result);

    printf("Resultant matrix:\n");

    for (int i = 0; i < r1; i++) {

        for (int j = 0; j < c2; j++) {

            printf("%d ", result[i][j]);

        }

        printf("\n");

    }

    return 0;

}

