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CSE DS D1
DAA Lab Exp 3

Aim: Strassens Matrix Multiplication

Code :

```
// Code for 2*2 matrices

#include<stdio.h>

int main(){

    int p[2][2], q[2][2], r[2][2], i, j;

    int a1, a2, a3, a4 , a5, a6, a7;

    printf("Enter the 4 elements of first matrix: ");

    for(i = 0; i < 2; i++)

        for(j = 0; j < 2; j++)

            scanf("%d", &p[i][j]);

    printf("Enter the 4 elements of second matrix: ");

    for(i = 0; i < 2; i++)

        for(j = 0; j < 2; j++)

            scanf("%d", &q[i][j]);

    printf("\nThe first matrix is\n");

    for(i = 0; i < 2; i++){

        printf("\n");

        for(j = 0; j < 2; j++)

            printf("%d\t", p[i][j]);

    }
```

```
printf("\nThe second matrix is\n");
```

```
for(i = 0; i < 2; i++){
```

```
    printf("\n");
```

```
    for(j = 0; j < 2; j++)
```

```
        printf("%d\t", q[i][j]);
```

```
}
```

```
a1= (p[0][0] + p[1][1]) * (q[0][0] + q[1][1]);
```

```
a2= (p[1][0] + p[1][1]) * q[0][0];
```

```
a3= p[0][0] * (q[0][1] - q[1][1]);
```

```
a4= p[1][1] * (q[1][0] - q[0][0]);
```

```
a5= (p[0][0] + p[0][1]) * q[1][1];
```

```
a6= (p[1][0] - p[0][0]) * (q[0][0]+q[0][1]);
```

```
a7= (p[0][1] - p[1][1]) * (q[1][0]+q[1][1]);
```

```
r[0][0] = a1 + a4- a5 + a7;
```

```
r[0][1] = a3 + a5;
```

```
r[1][0] = a2 + a4;
```

```
r[1][1] = a1 - a2 + a3 + a6;
```

```
printf("\nAfter multiplication using Strassen's algorithm \n");
```

```
for(i = 0; i < 2 ; i++){
```

```
    printf("\n");
```

```
    for(j = 0; j < 2; j++)
```

```
        printf("%d\t", r[i][j]);
```

```
}
```

```
return 0;
```

```
}
```

Output:

```
students@CE-Lab3-603-U09: ~/Desktop
students@CE-Lab3-603-U09:~$
students@CE-Lab3-603-U09:~$
cd desktop
bash: cd: desktop: No such file or directory
students@CE-Lab3-603-U09:~$
cd Desktop
students@CE-Lab3-603-U09:~/Desktop$
gcc strassenmat.c
gcc: error: strassenmat.c: No such file or directory
gcc: fatal error: no input files
compilation terminated.
students@CE-Lab3-603-U09:~/Desktop$
gcc strassensmat.c
students@CE-Lab3-603-U09:~/Desktop$
./a.out
Enter the 4 elements of first matrix: 1
1
1
1
1
Enter the 4 elements of second matrix: 1
1
1
1
1
The first matrix is
1      1
1      1
The second matrix is
1      1
1      1
After multiplication using Strassen's algorithm
2      2
2      2      students@CE-Lab3-603-U09:~/Desktop$
```

Conclusion: In this , experiment i understood Divide and Conquer algorithms and how to implement them . I was also able to compare time complexity of Brute force matrix multiplication and Strassen's Matrix Multiplication.