Crack a hack

Matrix Layer Rotation

Algorithm Problem Solving
17ECSE309

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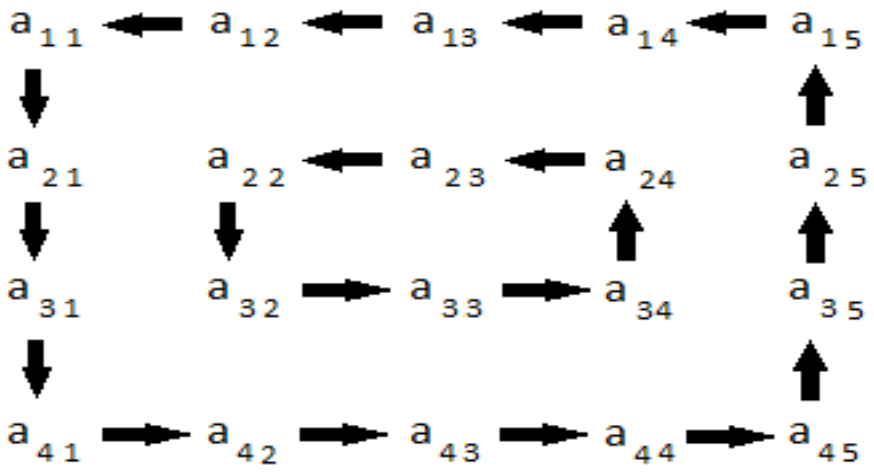
Problem statement

- You are given a 2D matrix of dimension m x n and a positive integer r. You have to rotate the matrix r times and print the resultant matrix. Rotation should be in anti-clockwise direction.
- Rotation of a matrix is represented by the following figure. Note that in one rotation, you have to shift elements by one step only.



Matrix Rotation

Algorithm

- Find minimum of Number of rows and column
- Compute the number of layers
- Convert 2D array into 1D
- Rotate it by r times and assign back it to 2D array

Code:

```
#include <math.h>
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <assert.h>
#include <limits.h>
#include <stdbool.h>



int main() {
    long long m;
    long long n;
    long long r;
    scanf("%lli %lli %lli", &m, &n, &r);
    long long matrix[m][n];
    for (long long matrix_i = 0; matrix_i < m; matrix_i++) {
       for (long long matrix_j = 0; matrix_j < n; matrix_j++) {

          scanf("%lli",&matrix[matrix_i][matrix_j]);
       }
    }
```

```
long long count = 0; // number of layers
   long long temp[n*m];
   long long k;
   if(m>n)
      k=n;
   else
      k=m;

   if(k%2 == 0){
      count = k/2;
   }
   else
   {
      count = k/2 +1;
   }
```

```
for(long long k =0;k<count;k++){  //converting 2-D matrix into 1-D array
      long long g =0;
      for(long long i =k;i<n-k;i++){
        temp[g] = matrix[k][i];
          g++;
      }
      for(long long i = k+1;i<m-k;i++){
          temp[g] = matrix[i][n-1-k];
          g++;
      }
      for(long long i = n-k-2;i>=k;i--){
          temp[g] = matrix[m-1-k][i];
          g++;
      }
      for(long long i = m-k-2;i>=k+1;i--){
          temp[g] = matrix[i][k];
          g++;
      }
```

```
long long *a = malloc(sizeof(long long) * g); //1-D array used for rotating

        for(long long i=0; i<g; i++){
      long long j = ((i - r)% g + g) % g;
            a[j] = temp[i] ;
       }
       g =0;
       for(long long i =k;i<n-k;i++){  //coverting to 2-D array
        matrix[k][i] = a[g];
          g++;
       }
       for(long long i = k+1;i<m-k;i++){
          matrix[i][n-1-k] = a[g];
          g++;
       }
       for(long long i = n-k-2;i>=k;i--){
          matrix[m-1-k][i] = a[g];
          g++;
       }
       for(long long i = m-k-2;i>=k+1;i--){
          matrix[i][k] = a[g];
          g++;
       }

  }
```

```
 for(long long i =0;i<m;i++){
        for(long long j =0;j<n;j++){
    printf("%lld ",matrix[i][j]); //print the rotated matrix
        }
        printf("\n");
    }
    return 0;
}
```

REFERENCES

- https://www.hackerrank.com/challenges/matrix-rotation-algo/problem