ST THOMAS COLLEGE , THRISSUR

Department of Computer Science

BSc Computer Science (2020-2023) - Semester III

Assignment 1

Compressing a Sparse Matrix

Question 1 Accept a matrix from the user and store the coordinates of non-zero elements and the respective non-zero value in a 2D array as a triplet {x,y,value}. Also , store the number of rows, columns and number of non-zero elements(NNZ) as the first entry in the 2D array {row_count,column_count,NNZ}.

- Accept a matrix from the user
- Compress the matrix into 2D array stroing triplets of form {x,y,value} The first entry must be {row_count,column_count,NNZ}
- Display the 2D array

Input Matrix

```
1 0 0 0
0 2 0 0
1 0 0 0
0 7 0 1
```

Output 2D array

```
4 4 5          // rows columns NNZ
0 0 1          // X Y Value
1 1 2
2 0 1
3 1 7
3 3 1
```

Question 2 Accept a matrix from the user and check if it is a sparse matrix.
If it is a sparse matrix , compress the matrix into a 2D array or linked list

Condition for being a sparse matrix

`number of non zero elements < (total number of elements in the matrix)/2`

- Accept matrix from user
- Check if the matrix is sparse and display the result.
- if sparse , compress the matrix and display the compressed form

Input Matrix

```
0 0 0 5
0 2 0 0
0 0 1 0
7 0 0 0
```

Output

```
The matrix is sparse.

Compressed representation of the sparse matrix:

4 4 4
0 3 5
1 1 2
2 2 1
3 0 7
```

Input Matrix

```
1 1 0
0 1 1
1 0 1
```

Output Matrix

```
The matrix is not sparse
```