**S.Y. B. Tech. Academic Year 2018-19 Trimester: IV**

CS221

**Data Structure-I**

**LABORATORY WRITE UP**

###### Experiment Number: 02

### **TITLE: Sparse Matrix Operations**

**PROBLEM STATEMENT**:

Write a C program for sparse matrix realization and operations on it- Transpose, Fast Transpose.

**OBJECTIVE:**

1. To Study the concept of sparse matrix, how it is stored and display.
2. To understand the implementation of sparse matrix operations – Simple Transpose, Fast Transpose.

**THEORY: *//To be written by Students***

***// Write theory by elaborating below points***

* Sparse Matrix
* Representation of Sparse Matrix
* Need for conversion of Sparse Matrices to its Compact Form
* Advantage of fast transpose over simple transpose

**IMPLEMENTATION:**

* **PLATFORM:** 
  + 64-bit Open source Linux or its derivatives.
  + Open Source C Programming tool like gcc/Eclipse Editor.
* I**INPUT & OUTPUT:**

|  |  |  |
| --- | --- | --- |
| **TEST CASE NO** | **INPUT** | **OUTPUT** |
| TC001 | Size of matrix SP[5][6] | * Compact form matrix * Simple Transpose matrix * Fast Transpose matrix |

* **TEST CONDITIONS:-**

1. Size [5][5] SP= {0,0,0,0,0,1,0,0,0,2,0,0,3,0,0,0,4,0,5,0,0,0,0,0,6}
2. Size [4][4] SP={1,0,0,0,0,2,0,0,0,0,3,0,0,0,0,4}
3. Size [6][4] SP={0,0,1,0,2,0,3,0,4,0,5,0,6,0,7,0,8,0,9,0,10,0,0,0}
4. Size [4][4] SP={1,0,2,3,4,0,5,6,7,8,0,9,11,12,13,0}

* **PSEUDO CODE: *//To be Written by Students***

Write pseudo code for input matrix to compact form, Simple Transpose and Fast Transpose.

* **TIME COMPLEXITY: *//To be Written by Students***

Find out time complexity of Simple Transpose and Fast Transpose

* **CONCLUSION:**

Thus, implemented sparse matrix Operations assignment. This System is able to perform different operations on sparse matrix such as simple and fast transpose and their time complexities.

* **FAQs *//To be Written by Students***
  1. What is sparse matrix? List the applications?
  2. Represent sparse matrix with suitable data structures? Explain with example simple and fast transpose?
  3. Find out the addition of two sparse matrices in triplet form and also find Simple and Fast transpose?

|  |  |  |
| --- | --- | --- |
| **4** | **5** | **6** |
| 0 | 3 | 5 |
| 1 | 3 | 8 |
| 1 | 4 | 45 |
| 2 | 3 | 4 |
| 3 | 2 | 45 |
| 4 | 1 | 2 |

M1 =

|  |  |  |
| --- | --- | --- |
| **4** | **5** | **6** |
| 0 | 3 | 7 |
| 0 | 4 | 6 |
| 1 | 4 | 4 |
| 2 | 1 | 8 |
| 3 | 2 | 45 |
| 4 | 4 | 21 |

M2 =

* **PRACTICE ASSIGNMENTS**

###### Write a program to perform sparse matrix operations – addition and multiplications.