

Department of Computer Science and Engineering PES UNIVERSITY

UE19CS202: Data Structures and its Applications (4-0-0-4-4)

SPARSE MATRIX

Abstract

SPARE MATRIX – overview and its representations

Vandana M Ladwani vandanamd@pes.edu



Contents

Overview			
Representations	2		
Triple notation	2		
Linked Representation	3		



SPARSE MATRIX

Overview

A matrix is represented as 2 dimensional array where every element is accessed by row and column index. Real world data such as image, spectrogram and graph can be modelled using matrices.

A matrix for which most of values are zero is termed as the sparse matrix. If a sparse matrix is stored in a memory as a two dimensional matrix it wastes lot of space.

So alternate representations are preferred for sparse matrix Alternate representations are:

- Triple notation
- Linked representation

Representations

1. Triple notation

In triple notation sparse matrix is represented as an array of tuple values. Each tuple consists of <rowno columno Value>

The first block in array block holds information regarding <total no of rows, total no of columns ,value>

```
Declaration
typedef struct
{
     int col;
     int row;
     int value;
} term;
term a[10];

Various operations that can be performed on sparse matrix are
Create_SparseMatrix()
Transpose_of_SparseMatrix()
Add_SparseMatrices()
```



Multiple_SparseMatrices()



Row No	Column No	Value
5	4	6
0	0	2
1	0	4
1	3	3
3	0	8
3	3	1
4	2	6

2. Linked Representation

Two types of nodes are used

Header Node

next down right

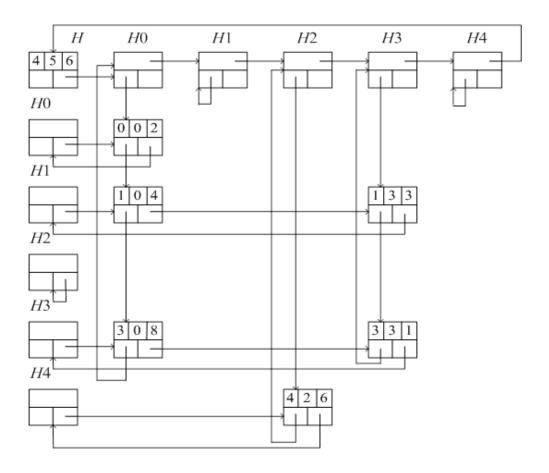
Data Node

row	col	value
dow	n	right

```
#define MAX SIZE 50 /* size of largest matrix */
typedef enum {head, entry} tagfield;
typedef struct matrixNode * matrixPointer;
typedef struct entryNode {
int row;
int col;
int value; };
typedef struct matrixNode {
      matrixPointer down;
      matrixPointer right;
      tagfield tag;
      union
      matrixPointer next;
      entryNode entry;
      } u;
};
```



 $\begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}$



Sparse Matrix representation using Linked Nodes

Courtesy: "Fundamentals of Data Structures" By Ellis Horowitz and Sartaj Sahni