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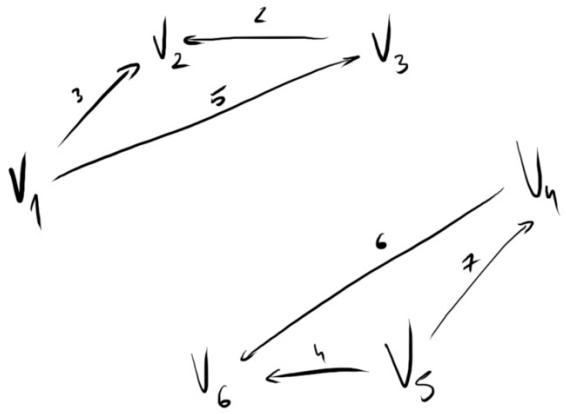
Data Engineering

Labs 3

Exercise 1:



Graph Representation:

V_1 has connections to:
- V_2 with weight 3
- V_3 with weight 5

V_3 has connections to:
- V_2 with weight 2

V_4 has connections to:
- V_6 with weight 6

V_5 has connections to:
- V_4 with weight 7
- V_6 with weight 4.

Yes, it is directed graph, because the weights are different from one to another on both ways

Eg. V_4 → V_6 has a weight 6, while V_6 → V_4 does not have a path at all.

Exercise 2:

Store the following matrix using: Coordinate list (COO), Dictionary of Keys (DOK), compressed space row (CSR), and compressed space column (CSC).

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

1. Coordinate List (COO):

Row	Column	Value
0	2	1
0	3	3
1	0	7
2	1	4
2	4	2
3	0	1
3	3	3
3	4	5
4	1	2
4	2	7

2. Dictionary of Keys (DOK):

Key	Value
(0,2)	1
(0,3)	3
(1,0)	7
(2,1)	4
(2,4)	2
(3,0)	1
(3,3)	3
(3,4)	5
(4,1)	2
(4,2)	7

3. Compressed Sparse Row (CSR):

   Data: [1,3,7,4,2,1,3,5,2,7]

   Row ind.: [2,3,1,2,5,1,3,4,1,2]

   Col ptr.: [0,2,3,5,8,10]

4. Compressed Sparse Column (CSC):

   Data: [7,1,4,2,1,7,3,3,5,7]

   Indices: [1,3,2,4,0,4,0,3,2,3]

   Indptr: [0,2,4,6,8,10]

Exercise 3:

First line:

	Star	Circles
Left	7	5
Right	18	20

Precision = 0.58, Recall = 0.28, F1-Score = 0.38, Accuracy = 0.54

Second line:

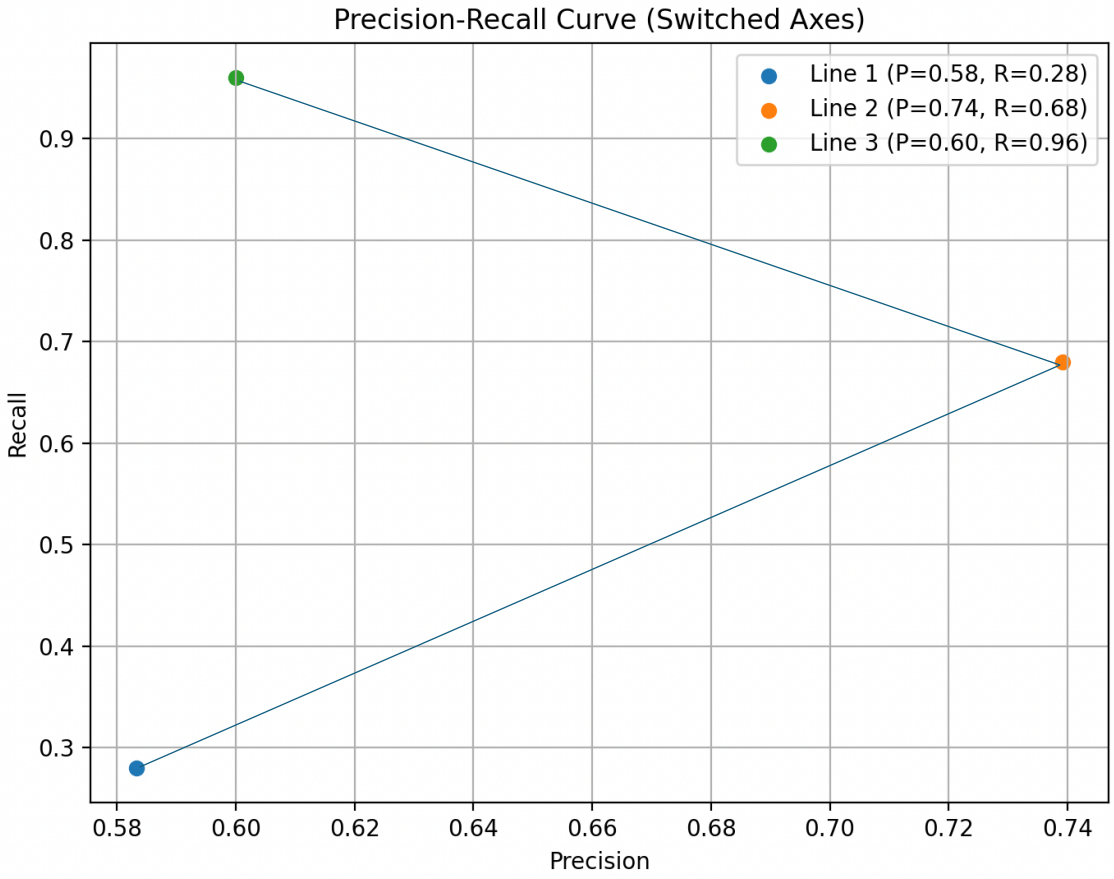
	Stars	Circles
Left	17	6
Right	8	19

Precision = 0.74, Recall = 0.68, F1-Score = 0.71, Accuracy = 0.72

Third line:

	Stars	Circles
Left	24	16
Right	1	9

Precision = 0.60, Recall = 0.96, F1-Score = 0.74, Accuracy = 0.66



Exercise 4:

0-1 Normalized Data:

```
[[0.03571429 0.57692308 0.67307692 0.         0.04166667 ]
 [0.14285714 0.32692308 0.         0.33333333 0.         ]
 [0.25       0.67307692 0.80769231 0.44444444 1.         ]
 [0.         0.44230769 0.32692308 0.19444444 0.025      ]
 [0.42857143 1.         1.         0.55555556 0.20833333 ]
 [0.08928571 0.28846154 0.23076923 0.27777778 0.05833333 ]
 [0.33928571 0.71153846 0.86538462 0.47222222 0.16666667 ]
 [0.05357143 0.48076923 0.51923077 1.         0.08333333 ]
 [0.21428571 0.63461538 0.76923077 0.41666667 0.10833333 ]
 [1.         0.         0.28846154 0.16666667 0.01666667 ]]
```

Mean Normalized Data:

```
[[-0.21964286  0.06346154  0.125      -0.38611111 -0.12916667]
 [-0.1125     -0.18653846 -0.54807692 -0.05277778 -0.17083333 ]
 [-0.00535714 0.15961538  0.25961538  0.05833333  0.82916667 ]
 [-0.25535714 -0.07115385 -0.22115385 -0.19166667 -0.14583333 ]
 [ 0.17321429  0.48653846  0.45192308  0.16944444  0.0375     ]
 [-0.16607143 -0.225      -0.31730769 -0.10833333 -0.1125     ]
 [ 0.08392857 0.19807692  0.31730769  0.08611111 -0.00416667 ]
 [-0.20178571 -0.03269231 -0.02884615  0.61388889 -0.0875     ]
 [-0.04107143  0.12115385  0.22115385  0.03055556 -0.0625     ]
 [ 0.74464286 -0.51346154 -0.25961538 -0.21944444 -0.15416667 ]]
```

Z-score Normalized Data:

```
[[-0.78261442  0.24420337  0.4044764   -1.49635475  -0.45551801 ]
 [-0.40085129 -0.71780992 -1.77347347  -0.2045377   -0.6024593  ]
 [-0.01908816  0.61420849  0.84006638   0.22606798   2.92413171 ]
 [-0.90986879 -0.27380378 -0.7156121   -0.7427948   -0.51429452 ]
 [ 0.61718373  1.87222587  1.46233777   0.65667367   0.13224716 ]
 [-0.59173285 -0.86581197 -1.0267478   -0.41984054  -0.39674149 ]
 [ 0.29904779  0.76221053  1.0267478    0.3337194   -0.01469413 ]
 [-0.71898723 -0.12580174 -0.09334071   2.3790964   -0.30857671 ]
 [-0.14634253  0.46620644  0.7156121    0.11841656  -0.22041194 ]
 [ 2.65325375 -1.97582731 -0.84006638  -0.85044622  -0.54368278 ]]
```

Outliers (row, column):

```
[]
```