



Computational Thinking

Prof. Madhavan Mukund

Department of Computer Science
Chennai Mathematical Institute

Prof. G. Venkatesh

Indian Institute of Technology Madras

Mr. Omkar Joshi

Course Instructor
IITM Online Degree Programme

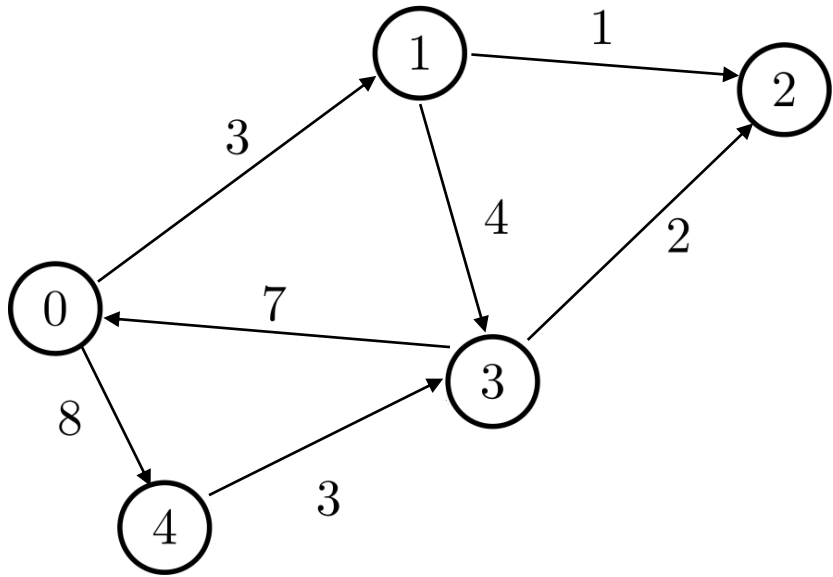


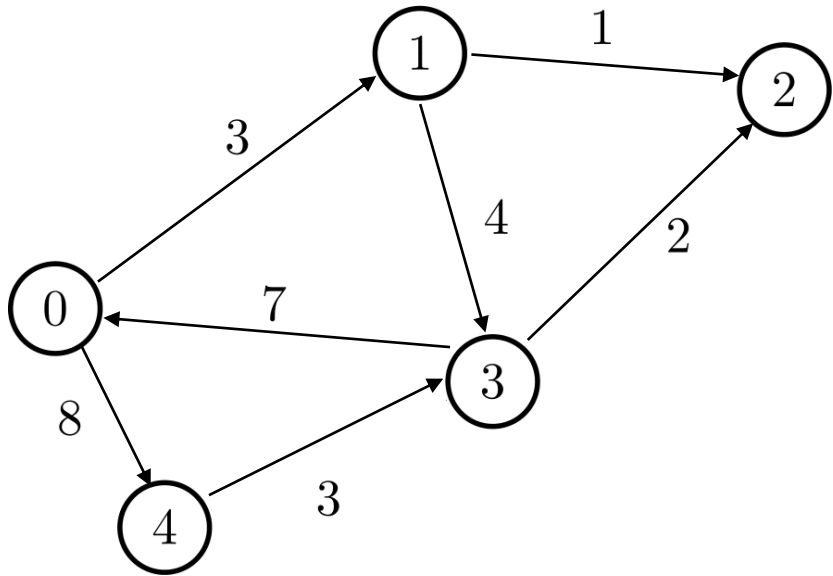
Computational Thinking

Tutorial on pseudocode for graph, adjacency matrix and dictionary for graph/adjacency matrix

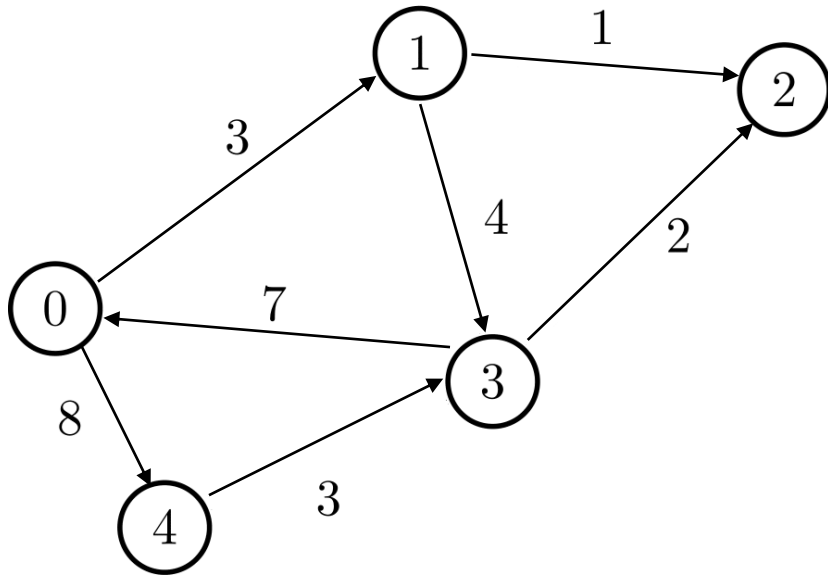
Content

- Graph
- Adjacency matrix
- Dictionary representation of a graph/adjacency matrix
- Pseudocode to create matrix with all zeros using dictionary



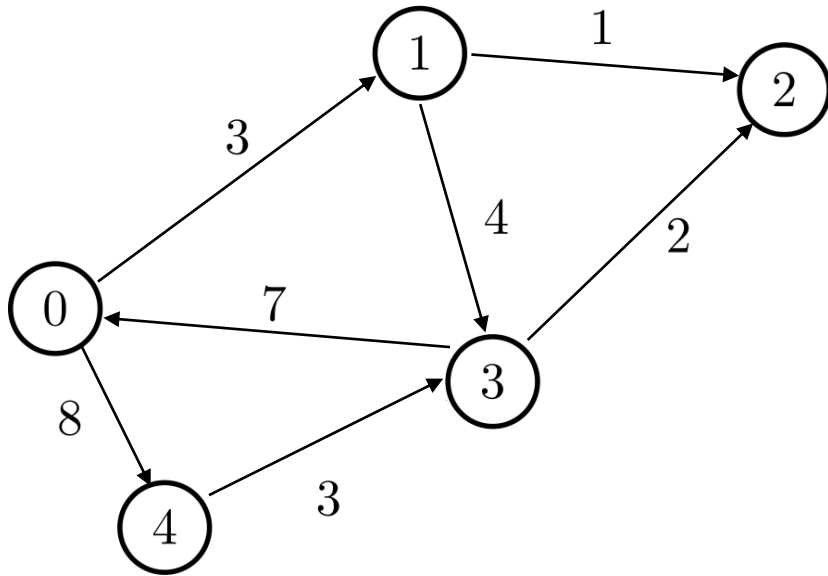


	0	1	2	3	4
0	0	3	0	0	8
1	0	0	1	4	0
2	0	0	0	0	0
3	7	0	2	0	0
4	0	0	0	3	0



	0	1	2	3	4
0	0	3	0	0	8
1	0	0	1	4	0
2	0	0	0	0	0
3	7	0	2	0	0
4	0	0	0	3	0

matrix = {0: {0: 0, 1: 3, 2: 0, 3: 0, 4: 8},
 1: {0: 0, 1: 0, 2: 1, 3: 4, 4: 0},
 2: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
 3: {0: 7, 1: 0, 2: 2, 3: 0, 4: 0},
 4: {0: 0, 1: 0, 2: 0, 3: 3, 4: 0}}



matrix = {0: {0: 0, 1: 3, 2: 0, 3: 0, 4: 8},
 1: {0: 0, 1: 0, 2: 1, 3: 4, 4: 0},
 2: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
 3: {0: 7, 1: 0, 2: 2, 3: 0, 4: 0},
 4: {0: 0, 1: 0, 2: 0, 3: 3, 4: 0}}

List of edges
matrix[0][1] == 3
matrix[0][4] == 8
matrix[1][2] == 1
matrix[1][3] == 4
matrix[3][0] == 7
matrix[3][2] == 2
matrix[4][3] == 3

	0	1	2	3	4
0	0	3	0	0	8
1	0	0	1	4	0
2	0	0	0	0	0
3	7	0	2	0	0
4	0	0	0	3	0

Procedure createMatrix (rows, cols)

 matrix = { }

 i = 0

 while (i < rows) {

 matrix[i] = { }

 j = 0

 while (j < cols) {

 matrix[i][j] = 0

 j = j + 1

 }

 i = i + 1

 }

 return (matrix)

end createMatrix

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

e.g. matrix = createMatrix (5, 5)

matrix = { }

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	

e.g. matrix = createMatrix (5, 5)

matrix = {0: {}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0
	1
	2
	3
	4

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0
	1
	2
	3
	4
1	0
	1
	2
	3
	4

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
1: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0
	1
	2
	3
	4
1	0
	1
	2
	3
	4
2	0
	1
	2
	3
	4

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
1: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
2: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0
	1
	2
	3
	4
1	0
	1
	2
	3
	4
2	0
	1
	2
	3
	4
3	0
	1
	2
	3
	4

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
1: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
2: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
3: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0}}

Procedure createMatrix (rows, cols)

matrix = { }

i = 0

while (i < rows) {

matrix[i] = { }

j = 0

while (j < cols) {

matrix[i][j] = 0

j = j + 1

}

i = i + 1

}

return (matrix)

end createMatrix

i	j
0	0
	1
	2
	3
	4
1	0
	1
	2
	3
	4
2	0
	1
	2
	3
	4
3	0
	1
	2
	3
	4
4	0
	1
	2
	3
	4

e.g. matrix = createMatrix (5, 5)

matrix = {0: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
1: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
2: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
3: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0},
4: {0: 0, 1: 0, 2: 0, 3: 0, 4: 0}}