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Assignment 3 (Graphs and Networks)

Q1.

1) Adjacency Matrix

	1	2	3	4	5	6	7
1	0	1	0	1	0	1	0
2	1	0	0	1	0	1	0
3	0	0	0	1	1	0	0
4	1	1	1	0	0	1	0
5	0	0	1	0	0	0	0
6	1	1	0	1	0	0	1
7	0	0	0	0	0	1	0

2) Adjacency List

1	-------->	2	4	6	X
2	-------->	1	4	6	X
3	-------->	4	5	X	X
4	-------->	1	2	3	6
5	-------->	3	X	X	X
6	-------->	1	2	4	7
7	-------->	6	X	X	X

Q2.

Node to process	Stack contents	Notes
empty	empty	Initilize the stack
Startnode = 1	[1]	Mark 1 as visited. Explore any unvisited adjacent nodes from 1. There are 3 nodes adjacent; 2, 4, 6
6	[1,6]	Mark 6 as visited. Explore any unvisited adjacent nodes from 6. There are 4 nodes adjacent; 1, 2, 4, 7
7	[1,6,7]	Mark 7 as visited. Explore any unvisited adjacent nodes from 7. There are no unvisted nodes from 7, so we remove it from the stack
6	[1,6]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 6 to be on the top of the stack.
2	[1,6,2]	One of the unvisted nodes from 6 is 2. Mark 2 as visited. Explore any unvisited adjacent nodes from 2. There is 1 node adjacent; 4
4	[1,6,2,4]	Mark 4 as visited. Explore any unvisited adjacent nodes from 4. There is 1 node

		adjacent; 3
3	[1,6,2,4,3]	Mark 3 as visited. Explore any unvisited adjacent nodes from 3. There is 1 node adjacent; 5
5	[1,6,2,4,3,5]	Mark 5 as visited. Explore any unvisited adjacent nodes from 5. There are no available nodes so we remove 5 from the stack
3	[1,6,2,4,3]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 3 to be on the top of the stack. 3 has no unvisited nodes so we remove it from the stack
4	[1,6,2,4]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 4 to be on the top of the stack. 4 has no unvisited nodes so we remove it from the stack
2	[1,6,2]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 2 to be on the top of the stack. 2 has no unvisited nodes so we remove it from the

		stack
6	[1,6]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 6 to be on the top of the stack. 6 has no unvisited nodes so we remove it from the stack
1	[1]	We check the stack top for return to the previous node and check if it has any unvisited nodes. Here, we find 1 to be on the top of the stack. 1 has no unvisited nodes so we remove it from the stack
empty	empty	The stack is now empty

Q3.

Node to process	Queue contents	Notes
Empty	Empty	Initialize the queue

| Startnode = 1	empty	Start from visiting 1 and mark it as visited
1	[6]	Look for unvisited adjacent nodes from 1. There are 3 nodes. 6 is chosen and enqueued
1	[6,4]	Look for unvisited adjacent nodes from 1. There are 2 nodes. 4 is chosen and enqueued
1	[6,4,2]	Look for unvisited adjacent nodes from 1. There is 1 node. 2 is chosen and enqueued
1	[4,2]	1 is left with no unvisited adjacent nodes. So we dequeue and find 6
6	[4,2,7]	Look for unvisited adjacent nodes from 1. There is 1 node. 7 is chosen and enqueued
6	[2,7]	6 is left with no unvisited adjacent nodes. So we dequeue and find 4
4	[2,7,3]	Look for unvisited adjacent nodes from 4. There is 1 node. 3 is chosen and enqueued
4	[7,3]	4 is left with no unvisited adjacent nodes. So we dequeue

		and find 2
7	[3]	7 has no unvisited adjacent nodes. So we dequeue and find 3
7	empty	7 has no unvisited adjacent nodes. So we dequeue and find 3
3	[5]	Look for unvisited adjacent nodes from 3. There is 1 node. 5 is chosen and enqueued
3	empty	3 is left with no unvisited adjacent nodes. So we dequeue and find 5
5	empty	5 is left with no unvisited adjacent nodes. The queue is empty

Q4.

Intuition and pattern recognition are two very different things. Intuition is when you follow your gut feeling without using any analytical reasoning. However, these days many researchers see intuition as our brain's way of taking a shortcut based on our memories and knowledge. But many people still consider intuition to be a gut feeling or a sixth sense. In short, intuition is knowing something or coming to a conclusion without proof. Usually, intuitive judgments instantly without much conscious thought. Pattern recognition also happens instantaneously. Pattern recognition is the use of computer algorithms to recognize data regularities and patterns. Humans can also perform pattern recognition. However is a game of

chess, a machine can use pattern recognition much better than a human. Intuition only works in chess if you can predict your partner's thoughts or simply use your previous experience to fuel your intuition to help you choose better, and it's quite hard to use this against a machine. In chess, machines pattern recognition is superior because Computers are good at identifying patterns in huge data sets. Humans are better at using pattern recognition to identify classes. Like the differences between people or can tell which face is real or int real.

Q5.

T1

`0,1,0,0,0`

T2

`0,1,0,0,0`

T3

`0,0,0,1,0`

T4

`0,0,0,1,0`   →T5→   `0,0,0,0,1`   →T6→   `1,0,0,0,0`
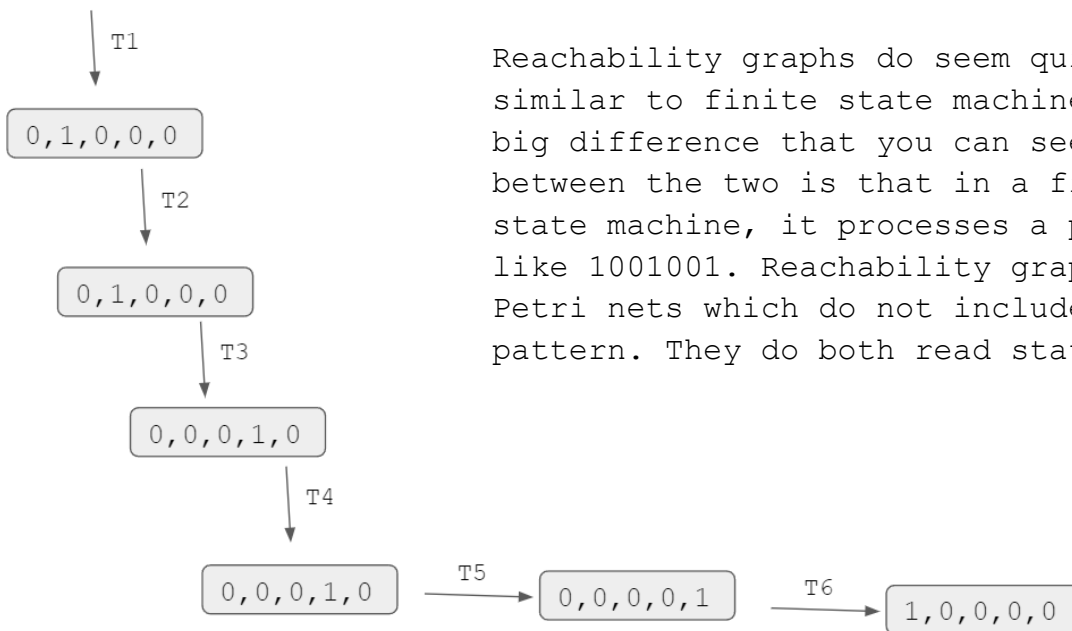
Reachability graphs do seem quite similar to finite state machines. The big difference that you can see between the two is that in a finite state machine, it processes a pattern like 1001001. Reachability graphs read Petri nets which do not include a pattern. They do both read states.