

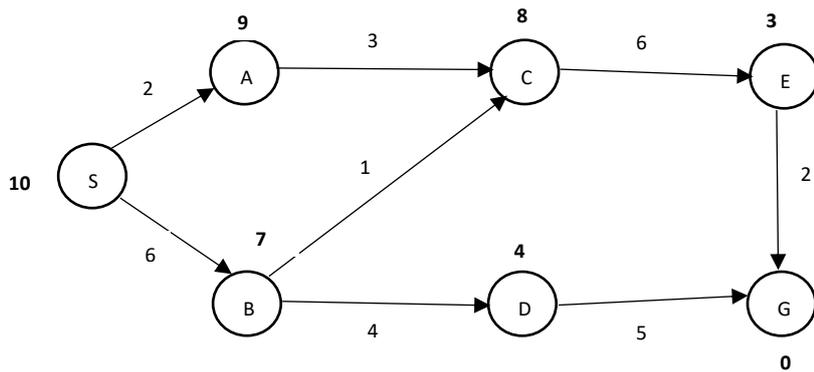
Correct type of exam

Dr.MENAD

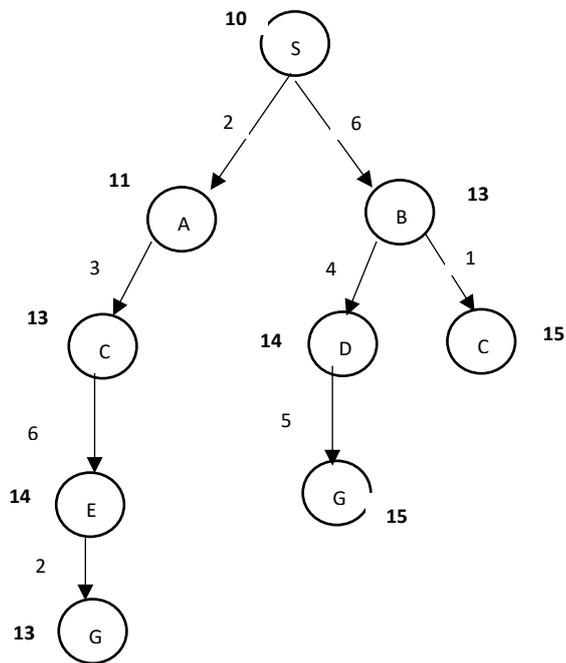
Exercise 1 : (3,75 points)

1. The difference between a parameter and a hyperparameter:
 - Parameter: A value that the model automatically adjusts during the learning phase.
 - Hyperparameter: Value set by the user before training.
2. The most important hyperparameters in a neural network:
 - Number of hidden layers
 - Number of neurons in each layer
 - Optimizer
 - Activation function
 - Learning rate
3. the difference between gene, chromosome and individual:
 - A gene : is one element position of a chromosome.
 - Chromosome: is composed of genes; it is a long molecule of DNA.
 - Individual: An individual is a complete living being. It possesses a set of chromosomes.
4. An activation function is essential in a neural network because: It determines how much a neuron contributes to the final decision.
5. Applications of image recognition:
 - Medicine: medical diagnosis (tumor detection, radiological image analysis).
 - Transportation / autonomous vehicles: sign recognition, obstacle and pedestrian detection.
 - Security: facial recognition and video surveillance.
 - Industry: quality control, defect detection on products
 - Agriculture: plant disease detection, crop estimation
 - Robotics: navigation and interaction with the environment
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6. Yes, a robot cleaner uses sensors such : as distance sensors, fall sensors, dust sensors: to identify very dirty areas.....
7. A Markov chain is a probabilistic model that describes the evolution of a system state by state, where the future state depends only on the present state and not on past states.

Exercise 2 : (7 points)



A*:



- Shortest path : S-> A -> C-> E-> G = 13

Exercise 2 : (9,25 points)

A : 10110 = $22^2 = 484$

B : 01101 = $13^2 = 169$

C : 11001 = $25^2 = 625$

D : 00111 = $7^2 = 49$

8. It 1:

Selection:

22 => 10110

25 => 11001

Crossing:

10001

11110

Mutation :

10101 => 21

11010 => 26

⇒ $g(22) = 484$

⇒ $g(25) = 625$

⇒ $g(21) = 441$

⇒ $g(26) = 676$

It 2:

We select 25 and 26 because the solutions checked the criteria (25 and 26 belongs to the range [0-31]); and it maximize the function $f(x)$.

Crossing:

11000

11011

Mutation :

01000 => 8

01011 => 11

⇒ $g(8) = 64$

⇒ $g(11) = 121$

⇒ $g(25) = 625$

⇒ $g(26) = 676$

It 3:

We select 25 and 26 because the solutions checked the criteria (25 and 26 belongs to the range [0-31]); and it maximize the function $f(x)$.

Crossing:

11010

11001

Mutation :

10010 => 18

10001 => 17

⇒ $g(18) = 324$

⇒ $g(17) = 289$

$$\Rightarrow g(25) = 625$$

$$\Rightarrow g(26) = 676$$

It 4:

We select 25 and 26 because the solutions checked the criteria (25 and 26 belongs to the range [0-31]); and it maximize the function $f(x)$.

Crossing:

11010

11001

Mutation :

11110 => 30

11101 => 29

$$\Rightarrow g(30) = 900$$

$$\Rightarrow g(29) = 841$$

$$\Rightarrow g(25) = 625$$

$$\Rightarrow g(26) = 676$$

The optimal solution is 30 because according to the objective function, $g(30) = 900$ is the value maximize of all values tested on $f(x)$, and its belongs to the range [0-31]