CSE461

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Final
Sec-09

1

Ans to the Q. No-1

(a)

3	5	2	8	1
9	7	5	4	3
2	0	6	0	6
6	3	7	9	0
1	4	0	5	1

image

$f = n - k + 1$

$= 5 - 3 + 1$

$= 3$

×

1	0	0
1	1	0
0	0	1

filter

=

25	18	17
18	22	14
20	15	23

feature map(X)

Ans.

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rafs: a ⇒ 3+9+7+6 = 25

b ⇒ 18

c ⇒ 17

d ⇒ 18

e ⇒ 22

f ⇒ 14

g ⇒ 20

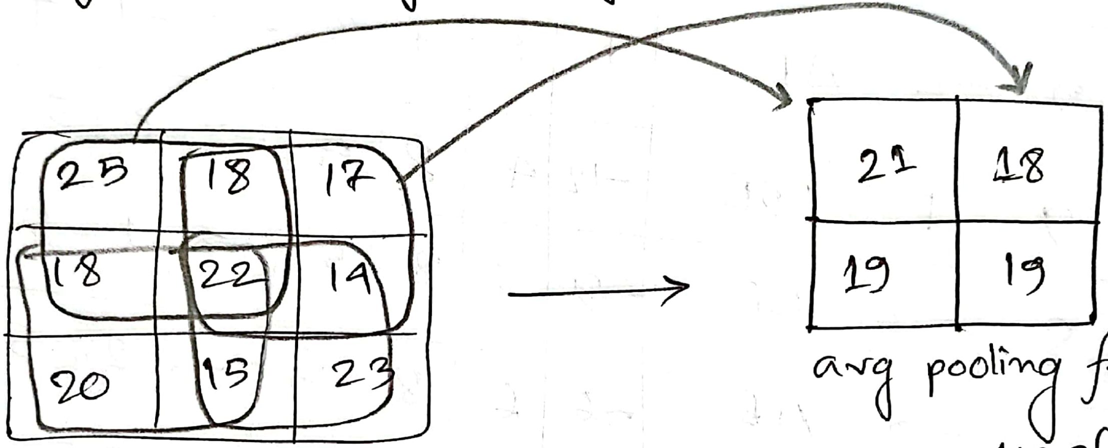
h ⇒ 15

i ⇒ 23

(b) from 'a' we got,

25	18	17
18	22	14
20	15	23

doing 2x2 avg pooling,



avg pooling feature map(X)

Ans

~~25+18+18+22~~

raf:

$25 + 18 + 18 + 22 = 83$

$18 + 17 + 22 + 14 = 71$

$18 + 22 + 20 + 15 = 75$

$22 + 14 + 15 + 23 = 74$

(c) from (b) we got,

$$\begin{bmatrix} 21 & 18 \\ 19 & 19 \end{bmatrix} \xrightarrow{\text{flattened}} \begin{bmatrix} 21 \\ 18 \\ 19 \\ 19 \end{bmatrix} \begin{matrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{matrix}$$

here,

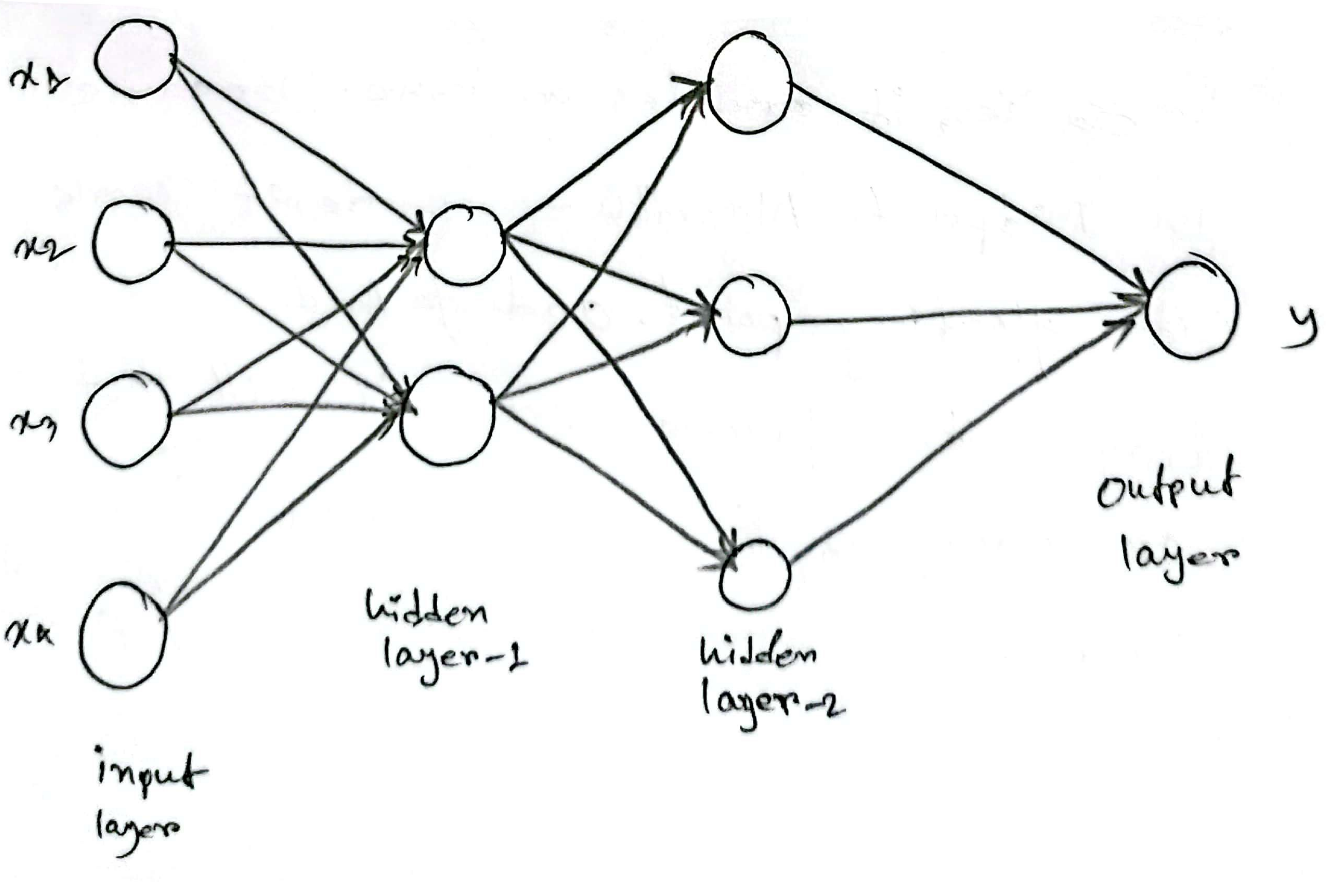
input = 4

hidden layer = 2

neron in hidden layer-1 = 2

neron in " " -2 = 3

output = 1



Ans to the Q. No - 2

(a) Given,

target value = 1

$\therefore$ overshoot $= \frac{1.45-1}{1} \times 100\%$

$= 45\%$ (Ans)

here,

0.9 unit → ~~0.6 msec~~ 0.6 msec

0.1 unit → 0.1 msec

$\therefore$ Rise time $= (0.6 - 0.1) = 0.5$ msec (Ans)

now,

0.05 unit → 1.05 unit, 0.95 unit

So, 1.05 unit and 0.95 unit settling time = 4.3 msec (Ans)

(b) Given,

gain of controller, $G(s) = 10$

gain of feedback, $H(s) = 4$

input, $X(s) = 15$ units.

output, $Y(s) = ?$

Now,

$$Y(s) = G(s) * [X(s) - H(s) * Y(s)]$$

$$\Rightarrow Y(s) = \frac{G(s) * X(s)}{1 + G(s) * H(s)}$$

$$= \frac{10 * 15}{1 + (10 * 4)}$$

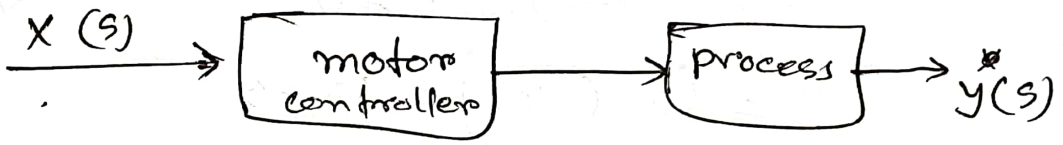
$$= 3.65 \text{ units}$$

(Ans.)

(c) Open Loop Controll:

Open loop control system is a system where we can not get any feedback of our input and for that we can not do any correction in our system. Because of that we can not get our desired value.

Suppose, a motor ~~is given~~ has a input of 5 volt and we set a open loop control system then the output will be 4.2 volt something.

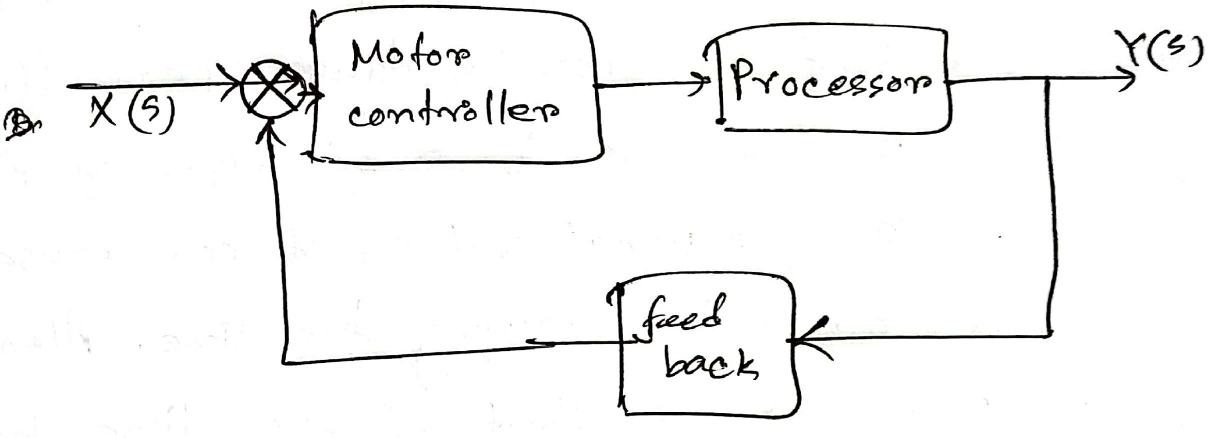


V = 5 Volt

V = 4.2 Volt

close loop Control:

In close loop control system we can get a feedback of ~~out in~~ our input and we can do correction to ~~out~~ our input by increasing or decreasing the input to get our desired output. We can monitor our output by the feedback controller. We connect a feedback controller with our system to get a feedback. We can ~~ea~~ change the input according to the feedback and can get our target output



Ans to the Q. No-3

~~(a) Navigation~~

(a) The main components of Navigation are,

- (1) Path Planning
- (2) Localization
- (3) Mapping
- (4) Exploration

In robotics, navigation determines the ability of a robot to find its position and go to a target position by planning the path using any map or explore the environment. Using navigation, a robot sense its current position. Then the robot plan a path using different algo based on the information and the ability of the robot. If the robot ~~does not~~ have the ~~knowlade~~ knowladge of the environment then it will create a map and plan the path to reach the goal. But if the robot do not have ~~any map~~ any map then it will explore the environment and make a map of the env. Then the robot will make a path plan and navigate to the goal. So, by ~~using~~ calculating own position and sensing the robot can create a map and then using the map the robot can plan the path and reach the goal. This is how the navigation integrate each other.

(V)

(b) Occupancy Grid Alogrithm: This is a mapping algorithm where the robot divide the environment into grids and make name of the grid's empty, occupied and unknown. This algorithm is use to build a sensor model and then a robot perform according to the model. ~~All the~~ this algorithm first mark all the grids as unknown. When a robot find an empty grid, it ~~mak on~~ mark the grid as empty or if the robot find any obstacles then it mark the grid as occupied. This occupancy grid can be represented by a Matrix where the 0 value represents the grid is ~~occupied~~ empty ~~and~~ and the ~~1 value~~ 1 value represents the grid is occupied.

(c) To perform this task Bug-based algo will help more ~~that~~ than visual homing algo. Because in visual homing ~~we~~ the robot will ony have one information. If the robot see the 'X' ~~mar~~ spot then it will go straight line but when any obstacles come then it will move randomly in the cricket ground. But if we use bug based ~~algo~~ algo then the robot will move to the boundary ~~a~~ of any obstacles like players to reach to the 'X' spot. As we have GPS ~~and~~ so we can calculate the distance ~~In the sa senerio, we have~~ and reach to the goal in shortest distance by using bug-based algo.

In the senerio, we have GPS, so we can use Land Mark based localization where the robot can fixed the land mark and calculate its position. But if we use Dead-Reckoning Algo then the robot ~~have~~

have to calculate each position and the robot have to ~~set~~ remember ~~t~~ ~~last~~ last position as a reference position. But ~~as~~ we have ~~gps~~ GPS, we can easily use LandMarks based localization ~~to~~ technique which will be best fit for our given application.