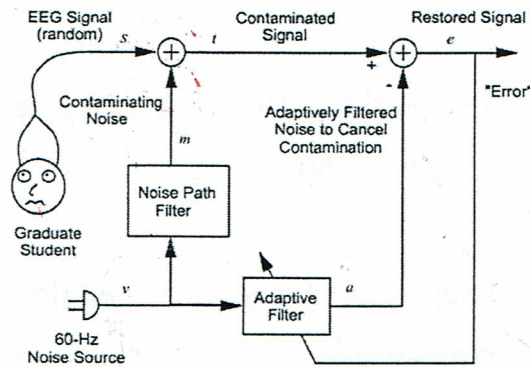


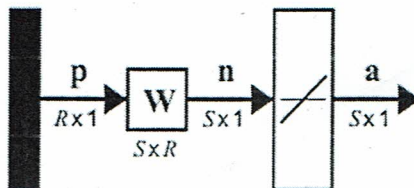


ملاحظة : اجب عن خمسة اسئلة فقط والدرجة موزعة بالتساوي

- Q1-** Use perceptron learning rule to design a network of Hard limit function to classify the following input classes : Class A : $p_1 = [1 \ 1]$ Class B: $p_2 = [2 \ -1]$ Class C: $p_3 = [-1 \ 2]$ Class D : $p_4 = [-2 \ -2]$, assume all weight and bias parameters are initially zero.
- Q2-** Design an adaptive noise filter using ADALINE neural network for the EEG signal measuring system shown below , where the noise source(60-Hz sine wave sampled at 180 Hz) is given by $v(k) = 4 \sin(\frac{4\pi k}{3})$ and the output of noise filter is $m(k) = 0.4 \sin(\frac{4\pi k}{3} + \frac{\pi}{2})$.



- Q3-** Design a 1-2-1 Radial Basis Network to approximate the following function: $g(p) = 1 + \sin(\frac{\pi p}{5})$ for $-3 \leq p \leq 3$, where the center of hills $(-2, 2)$, and training set of $p = [-3, -2, -1, 0, 1, 2, 3]$. Then verify your learning algorithm by comparing between the output of the network and the output of $g(p)$ for $p = 1.8$, $p = 0$.
- Q4-** Apply Genetic Algorithm to train the Linear Associator Network for the given input vector and target $p = [0.25 \ -0.5 \ 0.35]$, $t = -1$, $w_1 = [0.2 \ 1 \ -1]$, $w_2 = [3 \ -5 \ -4]$, $w_3 = [4 \ 8 \ 0]$, $w_4 = [-1 \ -2 \ 5]$, Random(crossover) = $[0.1, 0.5, 0.2, 0.8]$, Crossover rate = 0.3, Random (selection) = $[0.2, 0.9, 0.75, 0.5]$, Mutation rate = 0.2 ,



Q5 -A / Use the pseudo inverse rule to design a network with bias to classify the following input

and target sets : $p_1=[1 \ 0]$ $t_1=1$, $p_2=[1 \ 1]$ $t_2=-1$, $p_3=[0 \ 1]$ $t_3=1$

B / Design a recaller network for the measured values by using Outstar rule , $\alpha=1$

$\{ p_0(1)=[0 \ 0 \ 0]$ $p(1)=1\}$ $\{ p_0(2)=[1 \ 1 \ 1]$ $p(2)=1\}$ $\{ p_0(3)=[0 \ 0 \ 0]$ $p(3)=1\}$

Q6/ Design a smart Irrigation Decision Support System based on Fuzzy Logic using temperature and moisture sensors to control the time of irrigation.

Soil moisture (%): very low (0-25) , low (20 – 32.5 - 45) , normal (40 – 50 - 60) , high (55 – 67.5- 80) , very high (75 – 100).

Temperature (C°): very cold (0-10) , cold (6 – 14 – 22) , moderate (16 – 25 – 34) , hot (28 – 36 – 44) , very hot (40- 50).

Time (Minute): very short (0-15) , short (10 – 17.5 – 25) , medium (20 – 30 – 40) , long (35 – 42.5 – 50) , very long (45 – 60).

Control Rules :

- 1- If moisture (very low) and temperature (very hot) Then time (very long).
- 2- If moisture (normal) and temperature (moderate) Then time (medium) .
- 3- If moisture (very high) and temperature (very cold) Then time (very short).

Calculate the output of the system when moisture= 58% and temperature=20 C°



رئيس القسم

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