**Quest**:- ***Where is the minimum criterion used ?***

**Answer:-** A. When there is an AND operation .

**Explanation:** The minimum criterion takes the least value in the set given. In an AND operation all the values have to be true in order for the whole expression to be true. Hence taking the least of the values ensures that the range of all values are met.

**Ques:-** ***What are the following sequence of steps taken in designing a fuzzy logic machine?***

**Ans:-**Fuzzification->Rule evaluation->Defuzzification

Explanation: When designing a fuzzy logic, we first have to define the fuzzy sets, and make appropriate member functions. Then rule evaluation comes in which matches the sets to its corresponding rules(a series of if-then statements).

**EXERCISES1:-**

A neuron with 4 inputs has the weight vector w = [1 2 3 4]t .The activation function is linear, that is, the activation function is given by f(net) = 2 \* net. If the input vector is X = [5 6 7 8] , then find the output of the neuron?

**ANS** :-Net =1\*5+2\*6+3\*7+4\*8=70

F(net)=2\*net=140

**Questions:-**

***A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:***

**Explanation:-**

The output is found by multiplying the weights with their respective inputs, summing the results and multiplying with the transfer function. Therefore:

Output = 2 \* (1\*4 + 2\*10 + 3\*5 + 4\*20) = 238

**QUES:-*What is the Fuzzy Appoximation Theorem(FAT)?***

**Answer:** A fuzzy sytem can model any continous sytem.

***Explanation***: The Fuzzy Approximation Theorem(FAT) as stated by Bart Kosko shows a fuzzy sytem can model any contionous system.

Each of the rules acts as a fuzzy patch that the system places so as to resemble the response of the continous system.

**QUES:-*What is the main difference between probability and fuzzy logic***

**Answer:-** Probability is ADDITIVE, meaning all its values must add up to one.

**Explanation:**-This is the main difference between fuzzy logic and probability. Although, both probability and fuzzy logic contain values between the ranges 1 and 0, fuzzy logic tells the extent of a specific member function, whereas probability gives the frequency, hence all values of its set must add up to one.

***QUES:- What is the best method to go for the game playing problem?***

(A) Optimal Search (B) Random Search (C) Heuristic Search(yes) (D) Stratified Search

**Solution:** A heuristic function, also called simply a heuristic, is a function that ranks alternatives in search algorithms at each branching step based on available information to decide which branch to follow. For example, it may approximate the exact solution.

***A neuron with inputs has the weight vector [0.2 −0.1 0.1]T and a bias θ=0. If the input vector is X=[ 0.2 0.4 0.2 ]T. Then the total number of input to the neuron is:***

A) 0.20 B)1.0 C)0.02(yes) D)-1.0

f(x)=WT∗X+θ

f(x) = 0.2\*0.2 - 0.1\*0.4 + 0.1\*0.2 = 0.02

***Which of the following can be used for clustering the data?***

A)Single layer perception B)Multilayer perception

C)Self organizing map(yes) D)Radial basis function

**Explanation:-**Self-organizing maps are a data visualization technique which reduce the dimensions of data through the use of self-organizing neural networks.It is a type of unsupervised learning. The goal is to discover some underlying structure of the data

***The strategy used to reduce the number of tree branches and the number of static evaluations applied in case of a game tree is***

(A) Minmax strategy (B) Alpha-beta pruning strategy (yes)

(C) Constraint satisfaction strategy (D) Static max strategy

***Given U = {1, 2, 3, 4, 5, 6, 7} A = {(3, 0.7), (5, 1), (6, 0.8)} then ~A will be : (where ~ ® complement)***

(A) {(4, 0.7), (2, 1), (1, 0.8)} (B) {(4, 0.3), (5, 0), (6, 0.2) }

(C) {(1, 1), (2, 1), (3, 0.3), (4, 1),(6, 0.2), (7, 1)}(yes) (D) {(3, 0.3), (6.0.2)}

**Explanation:-**

The first is (1,1). The first 1 is in U but not in A, so it should be added in the complement. The second 1 is because the membership function is 1- µA(x). 1-0=1.

***Consider a fuzzy set old is defined as below Old = {(20, 0.1), (30, 0.2), (40, 0.4), (50, 0.6), (60, 0.8), (70, 1), (80, 1)} Then the alpha-cut for alpha = 0.4 for the set old will be***

(A) {(40, 0.4)} (B) {50, 60, 70, 80} (C) {(20, 0.1), (30, 0.2)}

(D) {(20, 0), (30, 0), (40, 1),(50, 1), (60, 1), (70, 1), (80, 1)}

**Explanation:-**alpha cut means it is the cut off value . the number having member ship value more than or equal to in the given fuzzy set will be considered as present in the result . now in the set OLD person with age 40,50,60,70,80 are having membership values more than or equal to 0.4 so they are considered as member with value 1 and 20 30 with value less than cut off are not member hence they are shown with value 0 so

ans is D ( P.S. it is one form of showing the result another may be {40,50,60,70,80} but it is not in choice )

***Given U = {1, 2, 3, 4, 5, 6, 7} A = {(3, 0.7), (5, 1), (6, 0.8)} then ~A will be : (where ~ ® complement)***

(A) {(4, 0.7), (2, 1), (1, 0.8)} (B) {(4, 0.3), (5, 0), (6, 0.2) }

(C) {(1, 1), (2, 1), (3, 0.3), (4, 1),(6, 0.2), (7, 1)} (D) {(3, 0.3), (6.0.2)}

Explanation:-

Membership of 3=.7

Membership of 5=1.

Membership of 6=.8

Membership of 3’=.3

Membership of 5’=0,

Membership of 6’=.2.

A’ is universe of discourse set not in Set A.

{(1,1),(2,2),(3,.3),(4,1),(6.2),(7,1)}.

***Consider a fuzzy set A defined on the interval X=[0, 10] of integers by the membership function μA(x) = x / (x+2) Then the α cut corresponding to α = 0.5 will be***

a) {0,1,2,3,4,5,6,7,8,9,10}

b) {1,2,3,4,5,6,7,8,9,10}

c) {2,3,4,5,6,7,8,9,10}

d) {}

**Explanation:-**

putting value of X from 0 to 10 in membership function = x / ( x + 2 ) we get

0/2 , 1/3 , 2/4 ,3/5 ,4/6 ,5/7 , 6 /8 , 7/9 , 8/10 , 9/11 , 10/12 means they are belonging with degree 0, 0.33 , 0.5, 0.6 .........0.83 here alpha cut = 0.5 so first two elements will not be included in the result as their degree of belongingness < 0.5

so answer will be C

***Que. If A and B are two fuzzy sets with membership functions***

***μA(x) = {0.6, 0.5, 0.1, 0.7, 0.8}***

***μB(x) = {0.9, 0.2, 0.6, 0.8, 0.5}***

***Then the value of μ(A∪B)’(x) will be***

a. {0.9, 0.5, 0.6, 0.8, 0.8} b. {0.6, 0.2, 0.1, 0.7, 0.5}

c. {0.1, 0.5, 0.4, 0.2, 0.2} d. {0.1, 0.5, 0.4, 0.2, 0.3}

**Answer:**{0.1, 0.5, 0.4, 0.2, 0.2}

Durga Devi S :(November 14, 2019)

μ(AUB)= max(μ(A),μ(B)= {0.9,05,0.6,0.8,0.8}

μ(A∪B)’(x) =1-μ(AUB)={0.1,05,0.4,0.2,0.2}

Answer: {0.1,05,0.4,0.2,0.2}

-------------------------------------------------------------------------

**If A and B are two fuzzy sets with membership functions:**

**μa(χ) ={0.2,0.5.,0.6,0.1,0.9}**

**μb (χ)= {0.1,0.5,0.2,0.7,0.8}**

**then the value of μa ∩ μb will be**

answer choices

{0.2,0.5,0.6,0.7,0.9} {0.2, 0.5,0.2, 0.1,0.8} {0.1, 0.5, 0.6, 0.1,0.8}

{0.1, 0.5, 0.2, 0.1,0.8}(yes)

***A fuzzy conjunction operator denoted as t(x,y) and fuzzy disjunction operator denoted as s(x,Y) form dual pair if they satisfy the condition:***

A. t(x, y) = 1 - s(x, y) B. t(x, y) = s(1 - x, 1 - y) C. t(x, y) = 1 - s(1 - x, 1 - y)

D. t(x, y) = s(1 + x, 1 + y)

**Explanation:-**

**Concept:**

Fuzzy set: A fuzzy set is that which allows its members to have different value in the set interval [0,1].

**Explanation:**

Operations that can be performed on fuzzy set are union, intersection, complement.

Union and intersection operation in fuzzy set are equal to conjunction(AND) and disjunction operation(OR) respectively.

We can consider min for conjunction and max for disjunction. Also, there are various other choices also. Such as to calculate product for conjunction and algebraic sum for disjunction operation.

If fuzzy conjunction operator is denoted as t(x, y) and fuzzy disjunction operator is denoted as s(x, y). Then it forms as dual pair if:

1- t(x, y) = s(1-x, 1-y)

or 1- s(x, y) = t(1-x, 1-y )

Here, it means choice of fuzzy disjunction operator determines the choice of fuzzy conjunction operator and vice versa.

Ref: <https://selfstudy365.com/qa/a-fuzzy-conjunction-operator-denoted-as-txy-and-fuzzy-disjunction-o-5e7cb8bcf60d5d178e393c28>

***In Artificial Intelligence (AI), which agent deals with happy and unhappy state*?** (NET -2021, 2017-NovPIII)

(A) Simple reflex agent (B) Model based agent

(C) Learning agent (D) Utility based agent(yes)

Ref:- <https://study2online.com/question/10641.html>

Ref:- https://www.geeksforgeeks.org/agents-artificial-intelligence/

***An agent can improve its performance by (ugc - Dec 2018)***

a) Perceiving b) Responding c) Learning (yes) d) Observing

***Explanation:*** Any one can improve its performance by storing its previous actions. So, an agent can improve its performance by storing its previous actions, i.e. LEARNING.

***Which of the following is true for semi-dynamic environment? (NET - 2018 - DEC)***

a. The environment may change while the agent is deliberating.

b. The environment itself does not change with the passage of time but the agent’s performance score does. (yes)

c. Even if the environment changes with the passage of time while deliberating, the performance score does not change.

d. Environment and performance score, both change simultaneously.

***Explanation***

https://www.doc.ic.ac.uk/project/examples/2005/163/g0516334/environ.html

<https://www.ics.uci.edu/~welling/teaching/ICS171fall10/Agents171Fall10.pdf>

***Which of the following is NOT true in problem solving in artificial intelligence?(NET - 2020)***

(1) Implements heuristic search techniques

(2) Solution steps are not explicit

(3) Knowledge is imprecise

(4) It works on or implements repetition mechanism(yes)

**Explanation:-**

1. Heuristic search is a search technique that seeks to solve a problem by iteratively enhancing the solution using a heuristic function or a cost analysis. Heuristic search is two types. Direct Heuristic Search Techniques in AI( Breadth-First Search (BFS) and Depth First Search (DFS).) and Weak Heuristic Search Techniques in AI (Best-First Search, A\* Search, etc)

2. Every AI program has to do the process of searching for the solution steps that are not explicit in nature.

3. knowledge plays a vital role in intelligence as well as creating artificial intelligence.

∴ Hence the incorrect statement is It works on or implements a repetition mechanism

***K-mean clustering algorithm has clustered the given 8 observations into 3 clusters after 1st iteration as follows : C1 : {(3, 3), (5, 5), (7, 7)} C2 : {(0, 6), (6, 0), (3, 0)} C3 : {(8, 8), (4, 4)}***

***What will be the Manhattan distance for observation (4, 4) from cluster centroid C1 in second iteration ? (NET - 2019)***

(1) 2 (2) 2 (3) 0 (4) 18

Explanation:-

<https://medium.datadriveninvestor.com/k-means-clustering-b89d349e98e6>

<https://www.geeksforgeeks.org/ugc-net-nta-ugc-net-2019-june-ii-question-29/>

***Criticism free idea generation is a factor of \_\_\_\_\_. (2016 - Aug)***

(A) Decision Support System (B) Group Decision Support System(yes)

(C) Enterprise Resource Support System (D) Artificial Intelligence