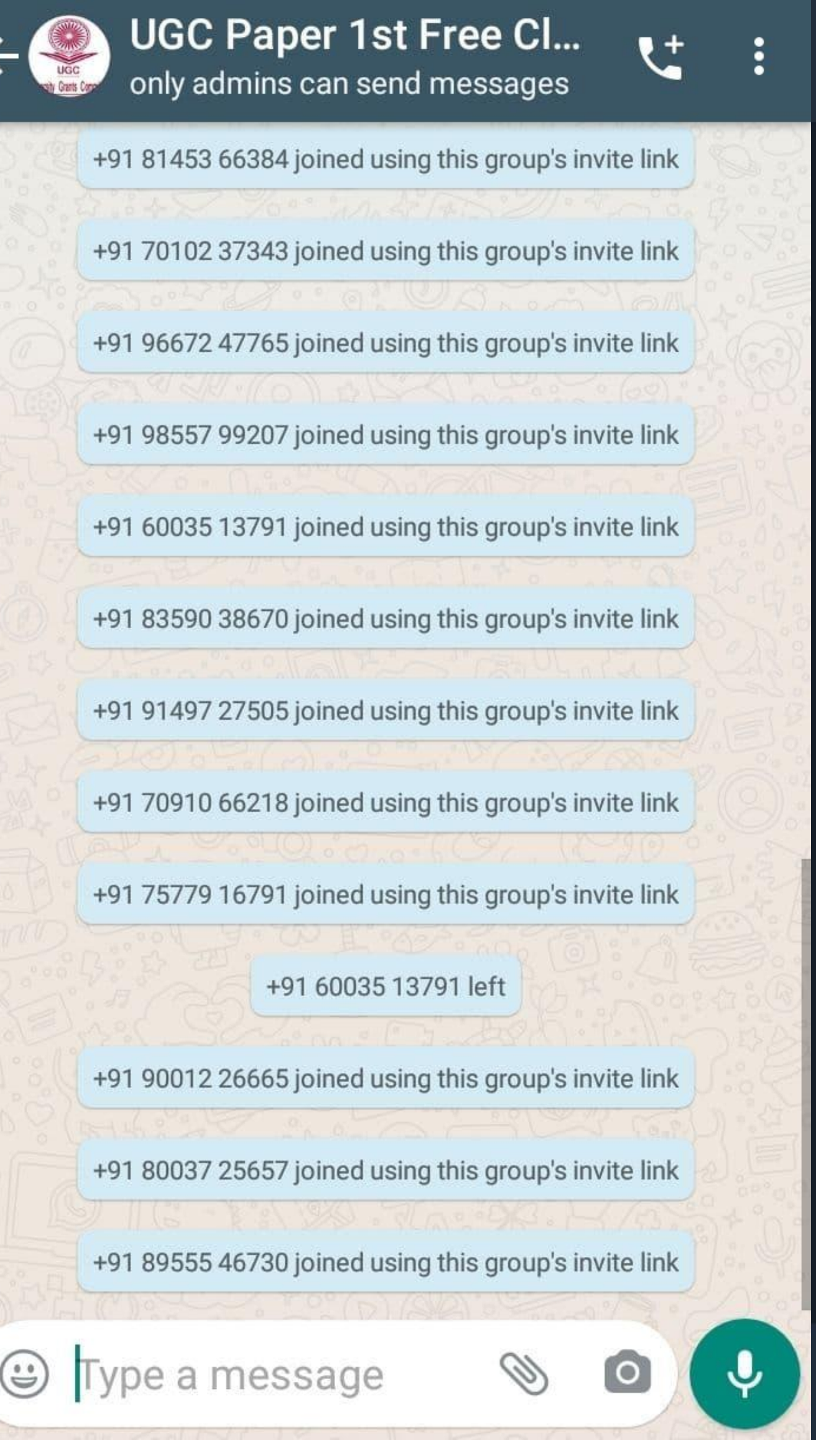
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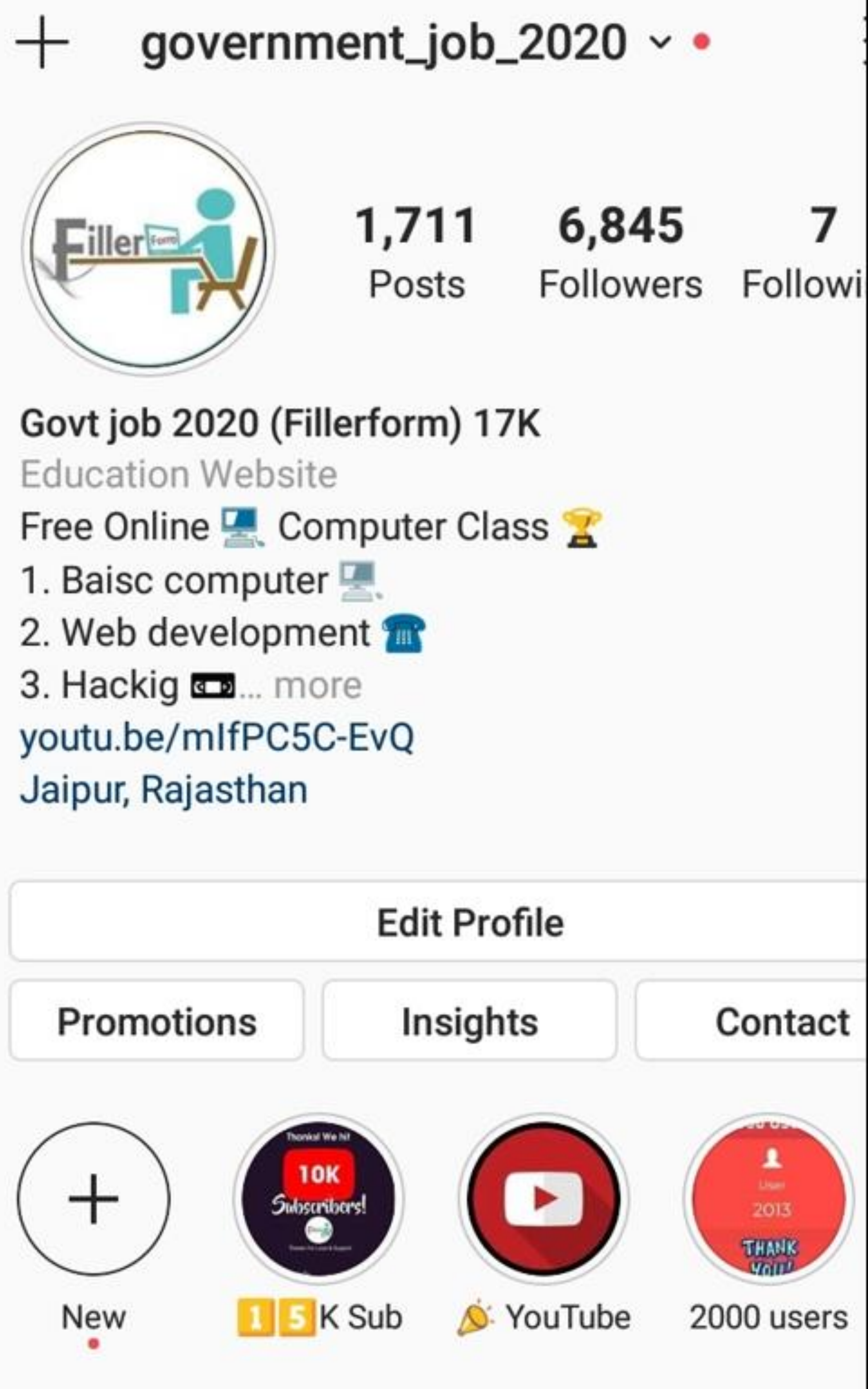
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Home work

Q. Match the following

1. Architecture	(a) History of all that an agent has perceived till date.
2. Agent function	(b) It is machinery that agent executes on.
3. Human agent	(c) has cameras which all as sensors.
4. Robotic Agent	(d) Has eyes, ear and other organs which act as sensors.

A. 1-a, 2-b, 3-c, 4-d

B. 1-b, 2-a, 3-d, 4-c

C. 1-c, 2-d, 3-a, 4-b

D. 1-d, 2-c, 3-b, 4-a

8209837844

❑ Approaches to AI

Content:

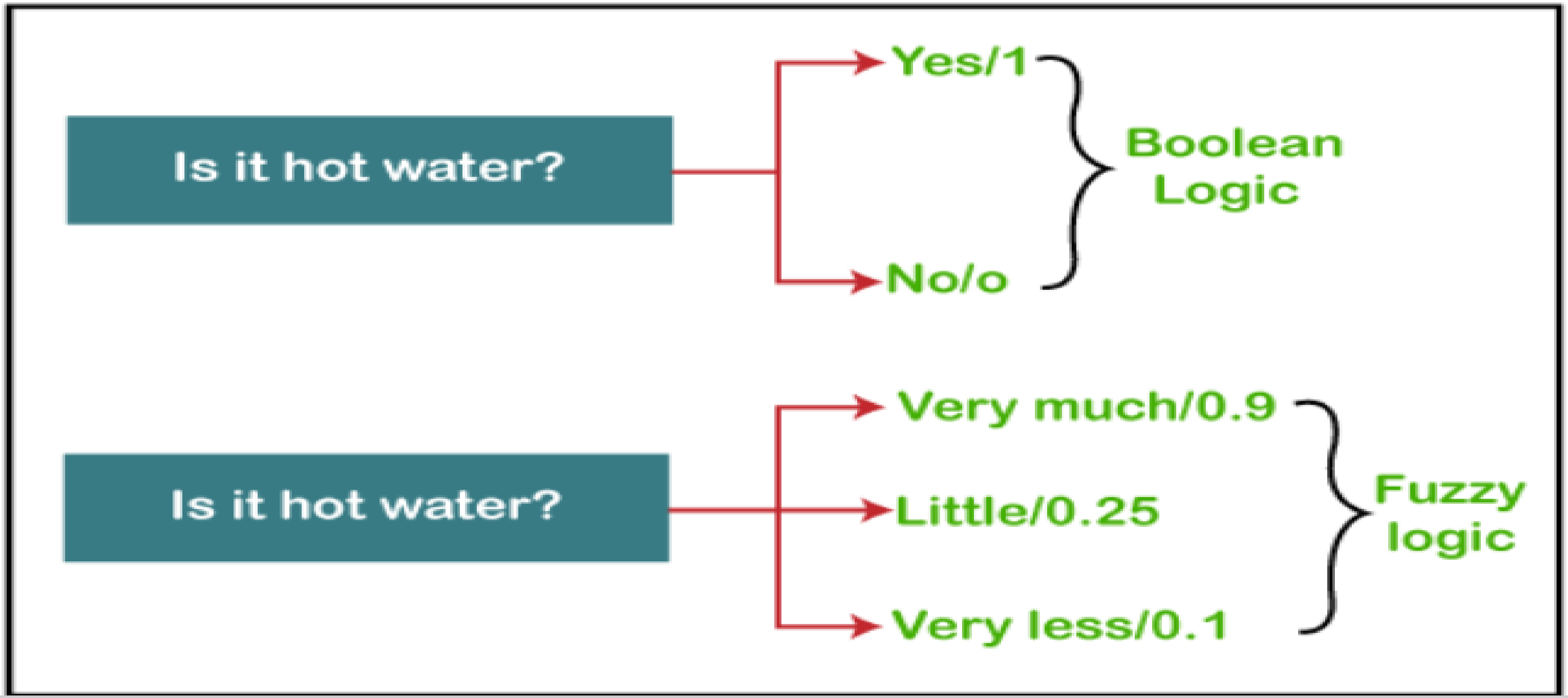
1.Fuzzy set

2.Membership
function

What is Fuzzy Logic?

The **'Fuzzy'** word means the things that are not clear or are vague. Sometimes, we cannot decide in real life that the given problem or statement is either true or false. At that time, this concept provides many values between the true and false and gives the flexibility to find the best solution to that problem.

Example of Fuzzy Logic as comparing to Boolean Logic



- Fuzzy logic contains the multiple logical values and these values are the truth values of a variable or problem between 0 and 1. This concept was introduced by **Lofti Zadeh** in **1965** based on the **Fuzzy Set Theory**. This concept provides the possibilities which are not given by computers, but similar to the range of possibilities generated by humans.

- **Membership Function:** In fuzzy set theory , the characteristics function is defined on a set F is generalized to a membership function that assign to x ∈ X , a value from the unit [0,1] instead of the two element set {0,1}. The membership function μF of a fuzzy set F is a function. $\mu F : X \rightarrow (0,1]$

  0.1 , 0.2 , 0.3 , 0.4 , 0.5 , 0.6 , 0.7 , 0.8 , 0.9

- SO, every element x from X has a membership degree $\mu F(x) \in [0,1]$.

X = {1,2,3} set

A = { (1 ,0.1) (2,0.2) (3,0.3) } fuzzy set

For example , the real numbers 1,2 and 3 with membership grades 0.1 , 0.2 and 0.3 can be written as:

A = { 1/0.1 , 2/0.2, 3/0.3 }

A = { 0.1/1 , 0.2/2 , 0.3/3 }

SOME USEFUL DEFINITIONS:

1) Containment

- fuzzy set A is contained in the fuzzy set B if

$$A \leq B \quad \text{if} \quad \mu A \leq \mu B$$

Then the containment property is satisfied.

2) Normal fuzzy sets

- A fuzzy set A of a set X is called a normal fuzzy set if and only if Max μA (x) = 1
- For example If X = {1,2,3} and A = {1,2,3,4} and A = {1/1 , 1/2 , 2/3 , 5/4 } Then A is a normal fuzzy set
- Otherwise A is subnormal

For example A = { 0.1/1 , 0.6/2 , 0.9/3 }

3) Height of fuzzy set

- The height of a fuzzy set A on the universal set X is the largest membership grade attained by any element of A i.e.

- height(A) = Max $\mu A\ (x)$

4) Support of a Fuzzy set

- The support of a fuzzy set A of a set X is the crisp set that contains all the elements of X that have a non zero membership grade in A and denoted by sup(A) i.e.

- $Supp(A) = \{x \in X: \mu A\ (x) > 0\}$

Example: Let $X = \{1,2,3,4,5,6,7,8,9\}$

$A = \{ 0.1/1 , 0.5/2 , 0.3/4 , 0.8/7 , 1/9 \}$

$supp(A) = \{1,2,4,7,9\}$

5) α –cut or α – level set

- $A\alpha = \{ x \in X: (x) \geq \alpha \}$

(α will be Given)

- Example: suppose

X = {1,2,3,4,5,6}.
A = {(1,0.2), (2,0.5),(3,0.7),(4,1),(5,0.8),(6,0.3)}

Then all possible α-level sets are:
A0.2 = {1,2,3,4,5,6}
A0.3 = {2,3,4,5,6}
A0.5 = {2,3,4,5}

8. Support of a fuzzy set

$$A = \left\{ \frac{x_1}{0.2}, \frac{x_2}{0.15}, \frac{x_3}{0.9}, \frac{x_4}{0.95}, \frac{x_5}{0.15} \right\}$$

Within a universal set X is given as

A. $\left\{ \frac{x_1}{0.15}, \frac{x_2}{0.15}, \frac{x_3}{0.15}, \frac{x_4}{0.15}, \frac{x_5}{0.15} \right\}$

B. $\left\{ \frac{x_1}{0.95}, \frac{x_2}{0.95}, \frac{x_3}{0.95}, \frac{x_4}{0.95}, \frac{x_5}{0.95} \right\}$

C. $\{x_3, x_4\}$

D. $\{x_1, x_2. x_3. x_4. x_5\}$


FEEDBACK

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