Questions 8

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Question 1

Answer the following questions:

a) What is a fuzzy set?

b) What is a membership function of a fuzzy set?

c) Can a fuzzy membership be `True` and `False` at the same time?

d) What is a fuzzy variable?

Question 2

Consider the following real variables from everyday life:

- Income measured in £UK.
- Speed measured in meters per second.
- A TV show measured in how much you are interested watching it.
- A meal measured in how much you like to eat it.
- A traffic light measured in what colour is on.

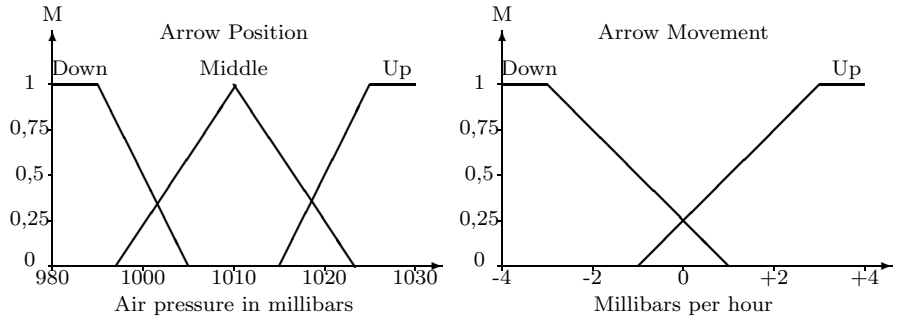
In each case, suggest a fuzzy variable corresponding to these real variables. For which of these five variables the use of a fuzzy variable is not really necessary? Why?

Question 3

Consider the following fuzzy expert system for weather forecast:

Rule	Condition	Action	Confidence
R1:	IF *arrow is down*	THEN *clouds*	$M = 0.8$
R2:	IF *arrow is in the middle* AND *moving down*	THEN *clouds*	$M = 0.6$
R3:	IF *arrow is in the middle* AND *moving up*	THEN *sunny*	$M = 0.6$
R4:	IF *arrow is up*	THEN *sunny*	$M = 0.8$

The following two plots represent the membership functions of two fuzzy variables describing the position of the arrow of barometer (left) and the direction of its movement (right):



The air pressure is measured in millibars, and the speed of its change in millibars per hour. Answer the following questions:

a) How much is the arrow `Down`, `Up` or in the `Middle` if it indicates that the pressure is 1020 millibars? Use membership functions on the graphs.

b) How much is the arrow moving `Down` or `Up` if the pressure changes -2 millibars every hour?

c) Using the membership values found above and confidences of the rules in the table calculate the degree of confidence in that the sky is clear or cloudy.

Question 4

What is the purpose of defuzzyfication? Name at least one method used for defuzzyfication.

Question 5

Name three strengths and three weaknesses of fuzzy expert systems.