

Fuzzy Logic Applications:-

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- Fuzzy logic starts with and builds on a set of user-supplied human language rules.

- The fuzzy systems convert these rules to their mathematical equivalents.

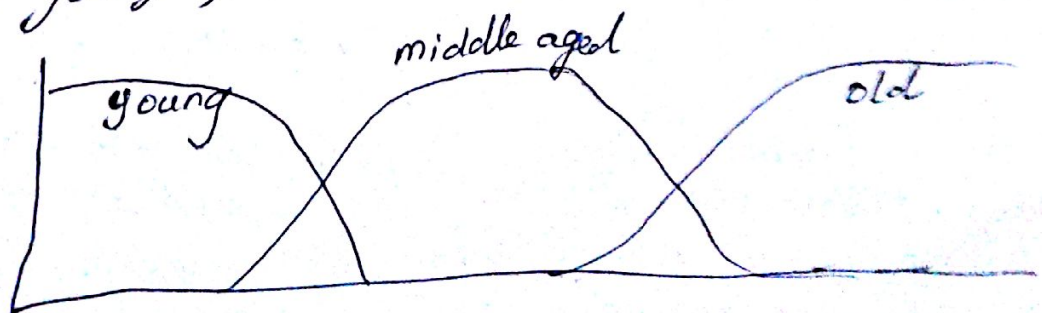
- This simplifies the job of the system designer and the computer and the result is much more accurate representation of the way systems behave in the real world.

- In a sense, fuzzy logic resembles human decision making with its ability to work from approximate data and find precise solutions.

- Fuzziness is deterministic uncertainty it is concerned with the degree to which events occur rather than the likelihood of their occurrence.

- For example, the degree to which a person is tall is a fuzzy event rather than a random event.

- Fuzzy partitions formed by the linguistic values "young", "middle aged" and "old"



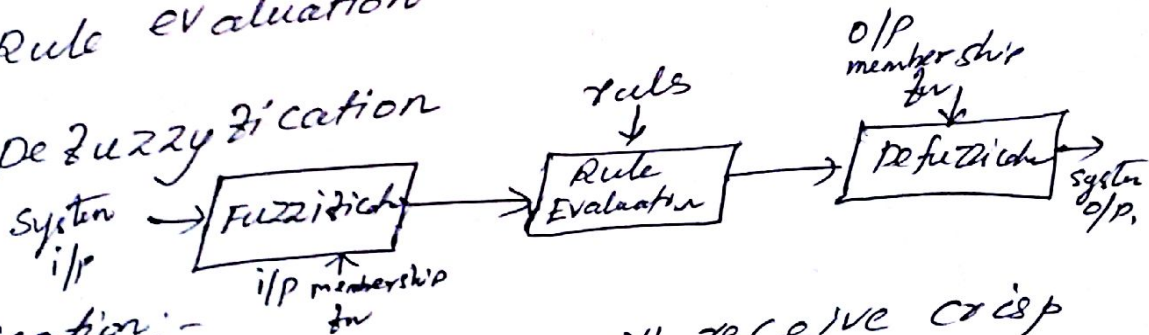
- Fuzzy membership extends the notation of binary membership to accommodate various "degree of membership" on the real continuous interval $[0, 1]$, where the end points conform to membership and full membership respectively. The sets on the universe x that can accommodate "degree of membership" are referred as "fuzzy sets".

- fuzzy math involves in general three operations,

(1) Fuzzification - membership function

(2) Rule evaluation

(3) Defuzzification



Fuzzification:-

- A fuzzy controller will receive crisp inputs on its input / communications ports & initially fuzzy them.

- 2 Steps

< crisp i/p readed & scaled to a value b/w 0 and 255.

The i/p must be translated to a degree of membership (b/w 0 & 255) for each i/p membership function.

- Thus the fuzzification function produced a set of fuzzy i/p by reading a real-time crisp i/p, scaling it to 8 bits, & assigning a degree for each i/p membership in defined by the user.

Rule Evaluation:-

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- Fuzzified i/p's are processed through a predefined set of rules using a min-max evaluation to form fuzzified o/p.

- Rules are arranged in an IF-Then format.
(i.e) if two (or) more i/p's are all true then an o/p function is executed to the degree of the minimum value antecedent.

Defuzzification:-

- defuzzify its fuzzy o/p's into a single raw or crisp o/p for an external device.
- many other types of fuzzy inference exist and may be required for complex or highly accurate solutions, but min-max inference is applicable to a majority of control applications.

Application of Fuzzy Logic:-

- Recognition of hand written symbols with pocket computers (Sony)
- Flight aid for helicopters.
- Controlling of subway systems in order to improve driving comfort, precision of halting & power economy