Project Report

Topic: Fuzzy logic implementation in washing machine

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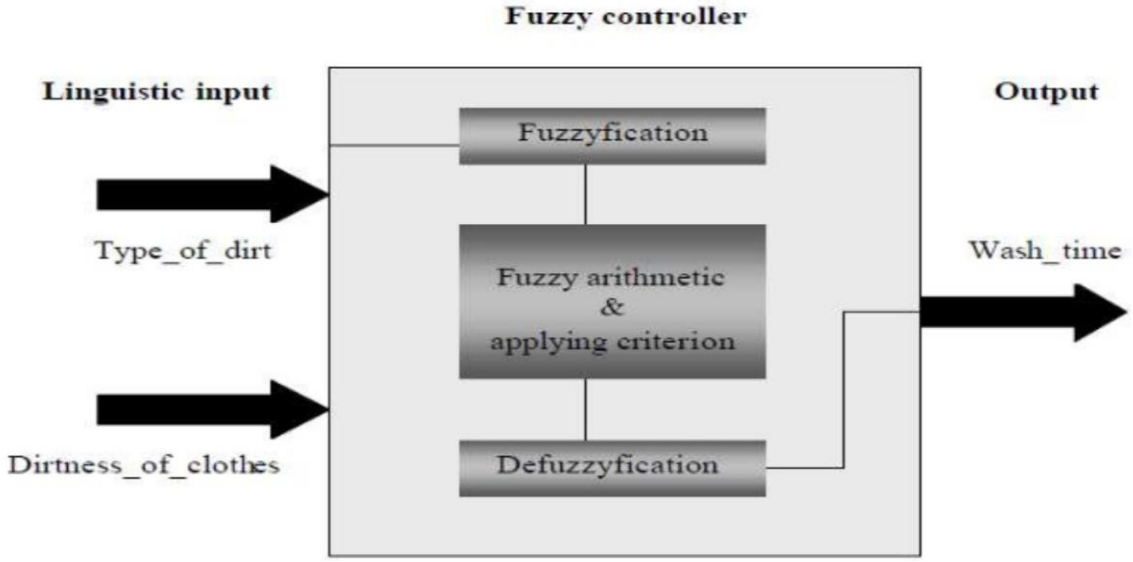
Abstract

Fuzzy logic washing machines offer the advantages of performance, productivity, simplicity, productivity, and less cost. Sensors continually monitor varying conditions inside the machine and accordingly adjust operations for the best wash results.

The Fuzzy logic checks for the extent of dirt and grease, the amount of soap and water to add, direction of spin, and so on. The machine rebalances washing load to ensure correct spinning. Neuro fuzzy logic incorporates optical sensors to sense the dirt in the water and a fabric sensor to detect the type of fabric and accordingly adjust wash cycle.



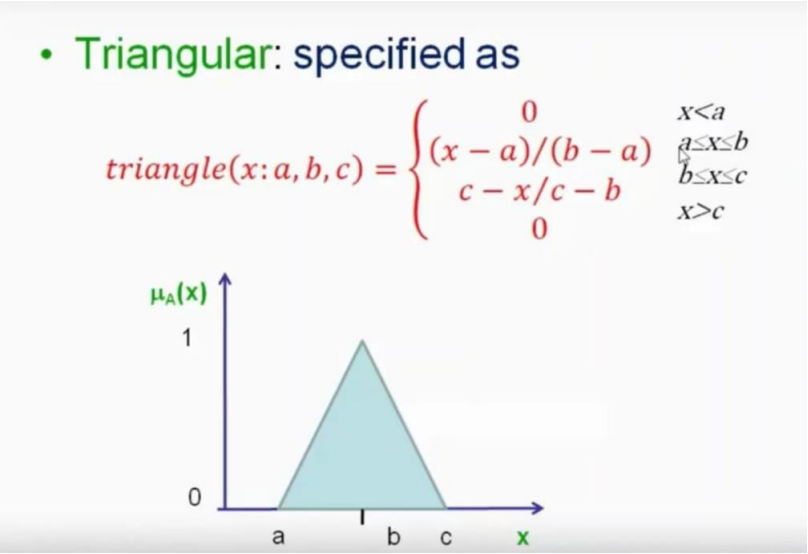
(consider 2 inputs and 1 output for simplicity)

Fuzzy logic approach:

- Fuzzification
- Rule evaluation (rule application based on rule base)
- Defuzzification

Fuzzification:

1. Convertion of crisp input values into fuzzy values:
   Fuzzy take the information from a system which is in normal language and converts it to values. The values of input quantities, which are associated with of membership functions, are given in form of words such as small, smallest, How to get these two inputs can be left to the sensors.
2. Using membership function: To deal with the details of fuzzy logic controller, the values for the input and output variables are determined in advanced. There is membership function which is used to map the crisp input values to the fuzzy values and after that suitable operation is applied on them.



(Triangular membership function suits best)

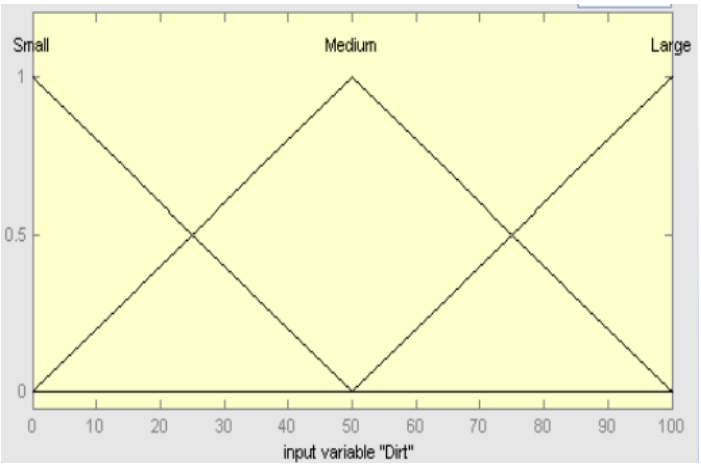
Rule evaluation:

Type of Dirtiness

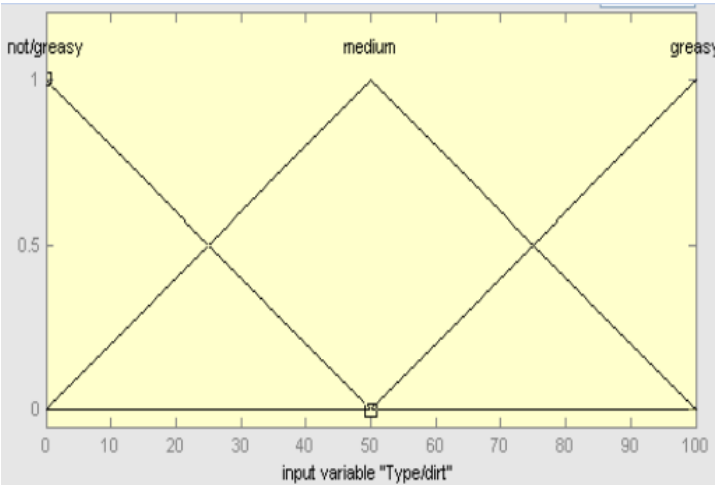
Dirtiness	notGreasy	medium1	greasy
small	Vshort	midium	long
medium	short	midium	long
large	midium	long	Vlong

(Rule base for the given input and output variables)

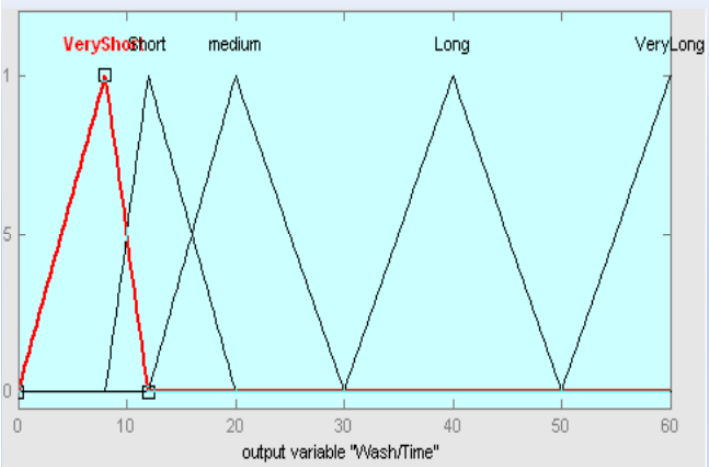
- Selection of the triangular block in the output membership function is based on application of rule base on the input membership function.



(membership function for level of dirt)



(membership function for type of dirt)



(membership function for output : veryshort=small(dirtiness) & non-greasy(type of dirt)

Defuzzification :

- Defuzzification process is used to interpret the membership degrees of the fuzzy sets in some specific real value (i.e. in crisp value opposite to that Fuzzification do).
- Commonly used defuzzification methods:
  - Center of gravity
  - Height method
  - First of maximum
  - Last of maximum
- The crisp value obtained is our desired output(wash time).

Conclusion: Using fuzzy logic control we are able to obtain optimum wash time for different type of dirt and different degree of dirt.

References:

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