International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 4 Issue 2, February 2020 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Fuzzy Logic

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ABSTRACT

This paper proposes a detailed switching model for the medium voltage cascaded H-bridge multi-level inverter drive and induction motor system using fuzzy logic controller which is suitable for power system dynamic studies. The model includes the We describe in this book recent advances in the fuzzy logic based augmentation of neural networks and in optimization algorithms and their application in areas fuzzy logic can help design robust individual behaviours units. Fuzzy logic controllers incorporate heuristic control knowledge. It is convenient choice when a precise linear model of the system to be controlled cannot be easily found. Another advantage of fuzzy logic control is to use fuzzy logic for representing uncertainties, such as vagueness or imprecision which cannot be solved by probability theory. Also fuzzy logic offers greater flexibility to user, among which we can choose the one that best, fits the type of combination to be performed.

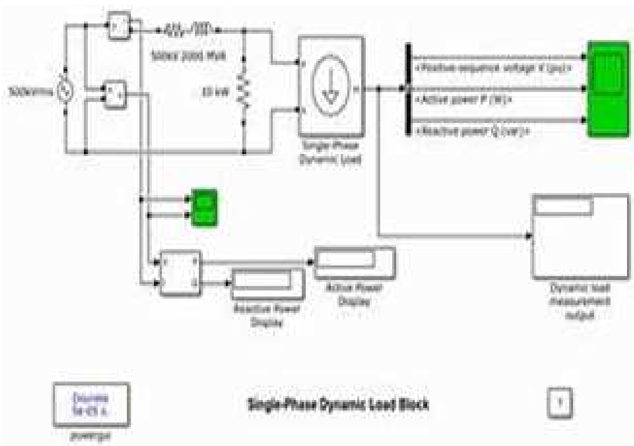
How to cite this paper: M. Bhuvaneswari | P. Daniel Samson | V. Anish "Fuzzy Logic" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-2, February 2020, pp.884-887, URL: www.ijtsrd.com/papers/ijtsrd30186.pdf

IJTSRD30186

1. INRODUCTION

IT HAS been perceived for over two decades that portrayals of energy system loads for dynamic performance examination can have significant effect on control system soundness. As power systems are planned and worked with a lower soundness edge, sufficient load models are of major significance. Regardless of colossal research endeavours and gained learning, stack demonstrating stays a standout amongst the most questionable ranges in huge scale control system reproductions due to the changing idea of burdens and the development of new sorts of burdens, for example, factor recurrence drives.

Fuzzy dynamic programming model was used for Harked dam in the State of Orissa in India in which irrigation; hydropower generation and flood control were considered as fuzzy variables.



The neural network and fuzzy systems were also adopted or dam control in which comparison was made between reservoir operations using the fuzzy and neural network systems and actual one by operator, using examples of floods during flood and non-flood seasons.

It is a technique to embody human-like thinking into a control system.

It may not be designed to give accurate reasoning but it is designed to give acceptable reasoning.

It can emulate human deductive thinking, that is, the process people use to infer conclusions from what they know.

Any uncertainties can be easily dealt with the help of fuzzy logic.

2. ADVANTAGES OF FUZZY LOGIC SYSTEM

This system can work with any type of inputs whether it is imprecise, distorted or noisy input information.

The construction of Fuzzy Logic Systems is easy and understandable.

Fuzzy logic comes with mathematical concepts of set theory and the reasoning of that is quite simple.

It provides a very efficient solution to complex problems in all fields of life as it resembles human reasoning and decision making.

The algorithms can be described with little data, so little memory is required.

3. DISADVANTAGES OF FUZZY LOGIC SYSTEMS

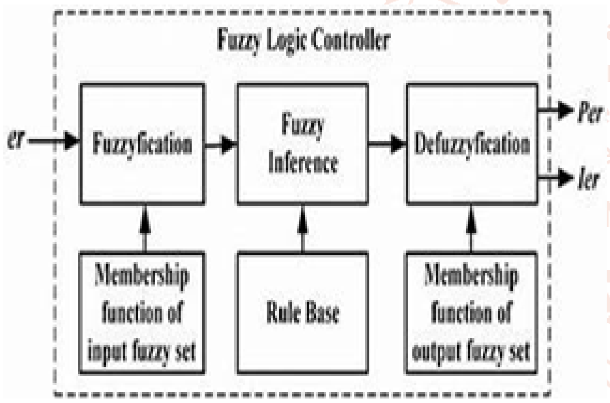
Many researchers proposed different ways to solve a given problem through fuzzy logic which lead to ambiguity. There is no systematic approach to solve a given problem through fuzzy logic.

Proof of its characteristics is difficult or impossible in most cases because every time we do not get mathematical description of our approach.

As fuzzy logic works on precise as well as imprecise data so most of the time accuracy is compromised.

4. DEVELOPMENT OF DYNAMIC LOAD MODEL

The medium voltage cascaded H-bridge multi-level inverter drives are one of the topologies for high power applications. The drive is built utilizing a series of low voltage control modules. Typically, 9 control modules shape a 18-pulse system, and 12 control modules shape a 24-pulse system at the drive input. The topology of a 9- control module 18-pulse medium voltage drive can be found. For these 18-pulse drives, there are three power modules in a phase leg, and the drives can create as much as 1,440 V line-to-neutral, or, then again 2,494 V line-to-line at the yield. The topology of a nine-control module 18-pulse medium voltage drive and an enlistment motor system is appeared in Figure 1(a).



Distribution of forces between upper and lower torso 5.3.1 L5/S1 shear force

In his book on low back disorders, McGill (2002) summarized a list of risk factors for low back disorders from a review of epidemiological and tissue based studies. This composite list includes "static posture...specifically prolonged trunk flexion and a twisted or laterally bent trunk" and "peak and cumulative low back shear force, compression force and extensor moment." Static posture, trunk flexion and exposure to low back shear are typical in most backpack load carriage situations. In Figure 16, shear force is in the Y direction and vertical force is in the Z direction. The medial lateral shear in the X direction is approximately 0, indicating that the load is balanced side to side. Torques can also be plotted in the same way.

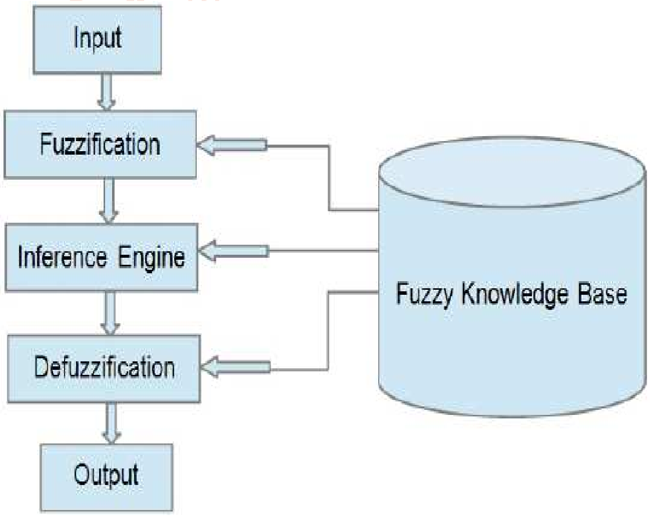
5. CRITICAL FACTOR OUTPUTS

The concept of critical factor output pertains to creating analysis capabilities that evaluate known mechanisms where injury risk modes have been documented. Model output refinement will be directed at reflecting the degree of potential peril a user is experiencing given the physical demands of the mobility tasks. This concept of determining the potential injury modes and creating a model to determine the risk state of the human subject is applicable to a variety of human device interfaces. The software permits the calculation of contact forces, displacements of bodies, forces in constraints and internal stresses using linear finite element analysis. Given a prescribed velocity profile, the model currently calculates:

- X, Y and Z contact force between the pack and the body
- Distribution of load between the upper and lower torso
- Shoulder strap forces in the upper and lower straps
- Estimated L4/L5 compression, shear and torque
- 3D displacement of the subject
- 3D displacement of the pack

6. FUZZIFICATION

Fuzzification is the process of assigning the numerical input of a system to fuzzy sets with some degree of membership. This degree of membership may be anywhere within the interval [0,1]. If it is 0 then the value does not belong to the given fuzzy set, and if it is 1 then the value completely belongs within the fuzzy set. Any value between 0 and 1 represents the degree of uncertainty that the value belongs in the set. These fuzzy sets are typically described by words, and so by assigning the system input to fuzzy sets, we can reason with it in a linguistically natural manner.



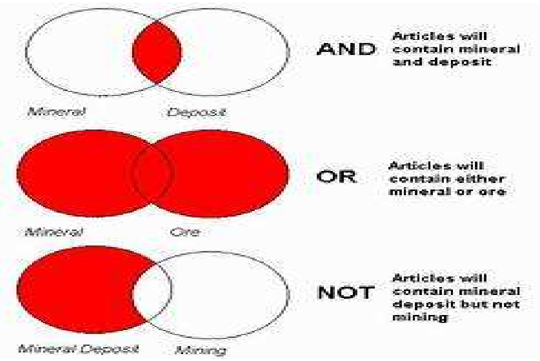
Fuzzy logic operators

Fuzzy logic works with membership values in a way that mimics Boolean logic. To this end, replacements for basic operators AND, OR, NOT must be available. There are several ways to this. A common replacement is called the Zadeh operators:

Boolean	Fuzzy
AND(x,y)	MIN(x,y)
OR(x,y)	MAX(x,y)
NOT(x)	1 – x

For TRUE/1 and FALSE/0, the fuzzy expressions produce the same result as the Boolean expressions.

There are also other operators, more linguistic in nature, called hedges that can be applied. These are generally adverbs such as very, or somewhat, which modify the meaning of a set using a mathematical formula



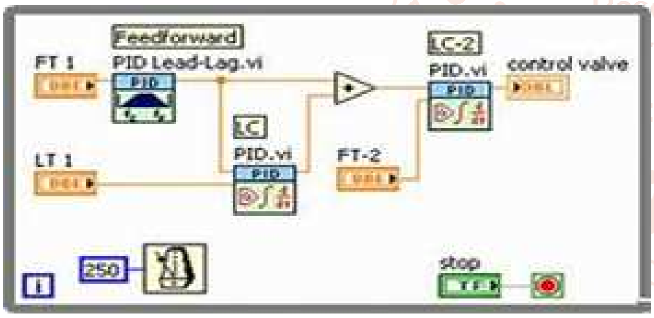
IF-THEN rules Main article: Fuzzy rule IF-THEN rules map input or computed truth values to desired output truth values. Example:

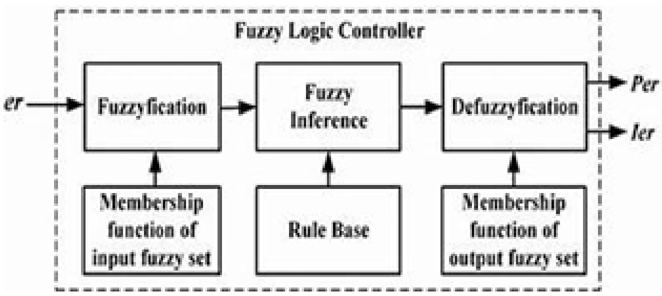
IF temperature IS very cold THEN fan_speed is stopped
IF temperature IS cold THEN fan_speed is slow
IF temperature IS warm THEN fan_speed is moderate
IF temperature IS hot THEN fan_speed is high

7. FUZZY INFERENCE PROCESS

Fuzzy inference is the process of formulating the mapping from a given input to an output using fuzzy logic. The mapping then provides a basis from which decisions can be made, or patterns discerned. The process of fuzzy inference involves all the pieces that are described in Membership Functions, Logical Operations, and If-Then Rules.

This section describes the fuzzy inference process and uses the example of the two-input, one-output, three-rule tipping problem from The Basic Tipping Problem. The basic structure of this example is shown in the following diagram:





8. AGGREGATE ALL OUTPUTS

Since decisions are based on testing all the rules in a FIS, the rule outputs must be combined in some manner. Aggregation is the process by which the fuzzy sets that represent the outputs of each rule are combined into a single fuzzy set. Aggregation only occurs once for each output variable, which is before the final defuzzification step. The input of the aggregation process is the list of truncated output functions returned by the implication process for each rule. The output of the aggregation process is one fuzzy set for each output variable.

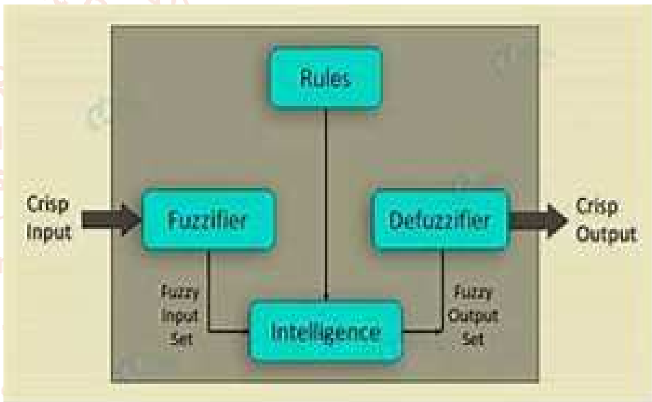
As long as the aggregation method is commutative, then the order in which the rules are executed is unimportant. Three built-in methods are supported:

max (maximum) probor (probabilistic OR) sum (sum of the rule output sets) In the following diagram, all three rules are displayed to show how the rule outputs are aggregated into a single fuzzy set whose membership function assigns a weighting for every output (tip) value.

9. DEFUZZIFY

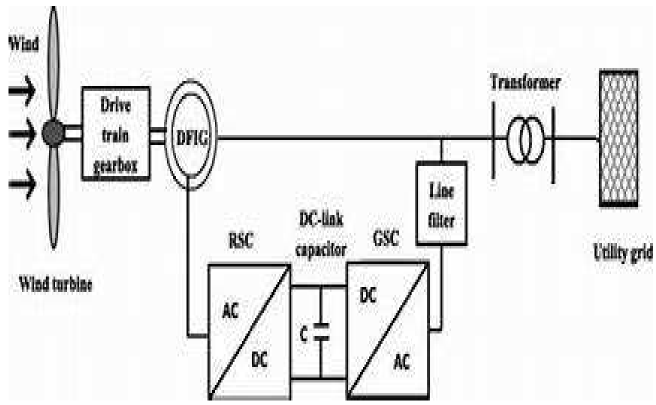
The input for the defuzzification process is a fuzzy set (the aggregate output fuzzy set) and the output is a single number. As much as fuzziness helps the rule evaluation during the intermediate steps, the final desired output for each variable is generally a single number. However, the aggregate of a fuzzy set encompasses a range of output values, and so must be defuzzified to obtain a single output value from the set.

There are five built-in defuzzification methods supported: centroid, bisector, middle of maximum (the average of the maximum value of the output set), largest of maximum, and smallest of maximum. Perhaps the most popular defuzzification method is the centroid calculation, which returns the center of area under the curve, as shown in the following:



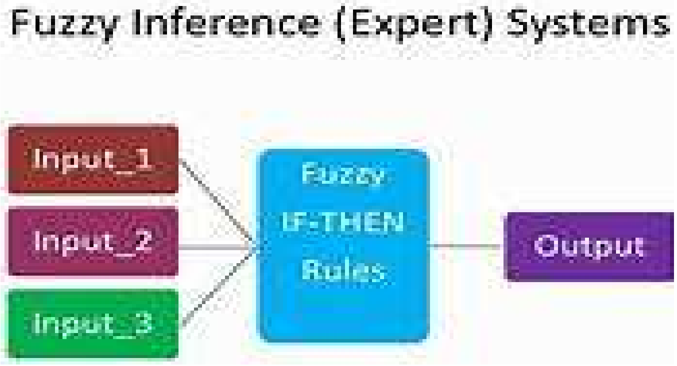
10. FUZZY INFERENCE DIAGRAM

The fuzzy inference diagram is the composite of all the smaller diagrams presented so far in this section. It simultaneously displays all parts of the fuzzy inference process you have examined. Information flows through the fuzzy inference diagram as shown in the following figure.



11. CONCLUSION

The dynamic load display for a medium voltage cascaded H-bridge multi-level PWM inverter motor drive system is created in this paper, which is inferred utilizing a scientific strategy called the linearization approach.



The designed system can be extended for any number of inputs and outputs. The drain valve control output can be utilized further for land irrigation according to the need and water release control valve for electric generation to fulfill the dire need of this system in automation

The exactness of the proposed demonstrate is verified by a contextual analysis utilizing a specimen medium voltage motor drive system. The influence of key parameters of the model on unique reaction qualities is assessed through an affectability think about. The created dynamic load model of the medium voltage motor drive system is communicated by seventh request exchange

12. REFERENCES LINKS

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