SNS COLLEGE OF TECHNOLOGY

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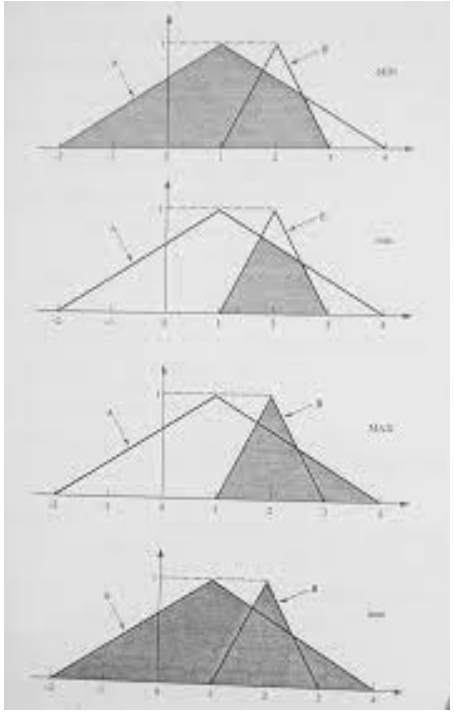
ARTIFICIAL INTELLIGENCE FOR ELECTRICAL ENGINEERING

TOPIC: **ARITHMETIC OPERATIONS OF FUZZY NUMBERS**

TOPIC OUTLINE



The arithmetic operators on fuzzy numbers are **basic content in fuzzy mathematics**. Multiplication operation on fuzzy numbers is defined by the extension principle. The procedure of addition or subtraction is simple, but the procedure of multiplication or division is complex.

INTRODUCTION

The development of fuzzy set theory ,since its introduction in 1965 has been dramatic. The fuzzy set theory has pervaded almost all fields of study and its applications have percolated down to consumer goods level! Apart from this ,it is being applied on a major scale in industries through intelligent robots for machine – building (cars ,engines , turbines ,ship ,etc.) And controls and of course for military purposes.

CLASSIFICATIONS OF FUZZY NUMBERS

- Triangular Fuzzy Number (TFN)
- Trapezoidal Fuzzy Number (TrFN)
- Pentagonal fuzzy numbers
- Hexagonal fuzzy numbers
- Octagonal fuzzy numbers
- pyramid fuzzy numbers

FUZZY SET

If X is a collection of objects denoted generally by X, then a fuzzy set A in X is a set of order pairs. $A\sim=\{X , \mu A \sim x / x\epsilon X \}$

Where $\mu A \sim x$ is called membership function or grade of membership.

EXAMPLE:

Let X is a ten natural numbers

A ~

NOTE:

(A+B) (z) = min Ax , ByZ = x+y

(A−B) (z) = min Ax , ByZ = x−y

(A.B) (z) = min Ax , ByZ = x.y

(A/B) (z) = min Ax , ByZ = xy

ARITHMETIC OPERATION ON INTERVALS

Let * denote any of the four arithmetic operations on closed intervals,

“+” → Addition , “–” → Subtraction , “×” → Multiplication , “/” → Division .

Then [a , b] * [d , e] = { f * g / a≤f≤b ,d≤g≤e} is a general property of all arithmetic operations on closed intervals accept that a,b/d,e is not defined when 0∈d,e.

The result of an arithmetic operation on closed intervals is again a closed intervals.

l x α = A x n α

l x α ≥ α

Similarly, we can prove that,

y α ϵ α A

αA is closed interval

x α , y α ϵ α A

[xα,yα≤ αA

A is a fuzzy number.

DEFINITION

The four arithmetic operation on closed intervals are defined as followed.

- [a,b] + [d,e] = [a+d , b+c]
- [a,b] - [d,e] = [a-d , b-c]
- [a,b] * [d,e] = [min (ad ,ae ,bd ,be) max (ad, ae ,bd ,be)]
- [a,b] / [d,e] = [a,b] * [1d,1e m i n (a d , a e , b d , b e) , m a x (a d , a e , b d , b e)]

EXAMPLES

“+” → Addition:

[a,b] + [d,e] = [a+d , b+c]

[1,2] + [3,4] = [1+3, 2+4]

= [4 , 6]

“–” → Subtraction:

[a,b] – [d,e] = [a-e ,b-d]

[1,2] – [3,4] = [1,2,3,4,2,3]

= [-3 ,-1]

EXAMPLES

"×" → Multiplication:

[a,b] * [d,e] = [min (ad,ae,bd,be) , max (ad,ae,bd,be)]

[1,2] * [3,4] = [min (3,4,6,8) , max (3,4,6,8)]

= [3,8]

"/" → Division:

[a,b] / [d,e] = [min (ad,ae,bd,be) , max (ad,ae,bd,be)]

[1,2] / [3,4] = [min (13,14,23,24) , max (13,14,23,24)]

= [13,24]

[1,2] / [3,4] = [13,12]

CONCLUSION

In the paper discussed some result in fuzzy set theory and fuzzy arithmetic number. Here provide the fuzzy numbers as well as explain and example. This results obtained by using fuzzy arithmetic are applicable for the control system. In applied of fuzzy set theory the field of engineering has undoubtedly been leader. Fuzzy set theory is also becoming important in computer engineering.

THANK YOU