ISCO630E-ASSIGNEMNT-8

Conclusion

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Question 1

We were to create a Fuzzy expert system for assessing home mortgage applications.

The created system has following properties :

[System]

Name='home mortgage' Type='mamdani' Version=2.0

NumInputs=4 NumOutputs=1 NumRules=15

AndMethod='min' OrMethod='max' ImpMethod='min'

AggMethod='max' DefuzzMethod='centroid'

[Input1]

Name='Income' Range=[0 100] NumMFs=4

MF1='Low':'trapmf',[-30 0 10 25] MF2='Medium':'trapmf',[15 35 35 55]

MF3='High':'trapmf',[40 60 60 80] MF4='Very_High':'trapmf',[60 80 100 130]

[Input2]

Name='Interest' Range=[0 10] NumMFs=3

MF1='Low':'trapmf',[-4.5 0 2 5] MF2='Medium':'trapmf',[2 4 6 8]

MF3='High':'trapmf',[6 8.5 10 14.5]

[Input3]

Name='Applicant' Range=[0 10] NumMFs=3

MF1='Low':'trapmf',[-4.5 0 2 4] MF2='Medium':'trapmf',[2 5 5 8]

MF3='High':'trapmf',[6 8 10 14.5]

[Input4]

Name='House' Range=[0 10] NumMFs=5

MF1='Very_Low':'trimf',[-2.5 0 3] MF2='Low':'trimf',[0 3 6]

MF3='Medium':'trimf',[2 5 8] MF4='High':'trimf',[4 7 10]

MF5='Very_High':'trimf',[7 10 12.5]

[Output1]

Name='Credit' Range=[0 500] NumMFs=5

MF1='Very_Low':'trapmf',[-112.5 0 0 125] MF2='Low':'trapmf',[0 125 125 250]

MF3='Medium':'trapmf',[125 250 250 375] MF4='High':'trapmf',[250 375 375 500]

MF5='Very_High':'trapmf',[375 500 500 612.5]

[Rules]

1 2 0 0, 1 (1) : 1 1 3 0 0, 1 (1) : 1 2 3 0 0, 2 (1) : 1

0 0 1 0, 1 (1) : 1 0 0 0 1, 1 (1) : 1 0 0 2 1, 2 (1) : 1

0 0 2 2, 2 (1) : 1 0 0 2 3, 3 (1) : 1 0 0 2 4, 4 (1) : 1

0 0 2 5, 4 (1) : 1 0 0 3 1, 2 (1) : 1 0 0 3 2, 3 (1) : 1

0 0 3 3, 4 (1) : 1 0 0 3 4, 4 (1) : 1 0 0 3 5, 5 (1) : 1

Question 2

We were to create a Fuzzy expert system for assessing home mortgage applications.

The created system has following properties:

[System]

Name='University_Acceptance' Type='mamdani' Version=2.0

NumInputs=3 NumOutputs=1 NumRules=27

AndMethod='min' OrMethod='max' ImpMethod='min'

AggMethod='max' DefuzzMethod='centroid'

[Input1]

Name='CGPA' Range=[0 10] NumMFs=3

MF1='Low':'trapmf',[-4.5 0 6 7.5] MF2='Medium':'trapmf',[7 7.5 8.5 9]

MF3='High':'trapmf',[8.5 9.5 10 14.5]

[Input2]

Name='GRE' Range=[0 340] NumMFs=3

MF1='Low':'trapmf',[-153 0 200 250] MF2='Medium':'trapmf',[200 250 300 320]

MF3='High':'trapmf',[300 320 340 493]

[Input3]

Name='Publications' Range=[0 10] NumMFs=3

MF1='Low':'trapmf',[-4.5 0 1 2] MF2='Medium':'trapmf',[1 2 4 5]

MF3='High':'trapmf',[4 6 10 14.5]

[Output1]

Name='Acceptance' Range=[0 100] NumMFs=3

MF1='Low':'trapmf',[-45 0 20 40] MF2='Medium':'trapmf',[30 40 60 70]

MF3='High':'trapmf',[60 80 100 145]

[Rules]

1 1 1, 1 (1) : 1	1 1 2, 1 (1) : 1	1 1 3, 2 (1) : 1
1 2 1, 1 (1) : 1	1 2 2, 2 (1) : 1	1 2 3, 2 (1) : 1
1 3 1, 2 (1) : 1	1 3 2, 2 (1) : 1	1 3 3, 3 (1) : 1
2 1 1, 1 (1) : 1	2 1 2, 1 (1) : 1	2 1 3, 2 (1) : 1
2 2 1, 1 (1) : 1	2 2 2, 2 (1) : 1	2 2 3, 2 (1) : 1
2 3 1, 2 (1) : 1	2 3 2, 3 (1) : 1	2 3 3, 3 (1) : 1
3 1 1, 2 (1) : 1	3 1 2, 2 (1) : 1	3 1 3, 3 (1) : 1
3 2 1, 2 (1) : 1	3 2 2, 3 (1) : 1	3 2 3, 3 (1) : 1
3 3 1, 2 (1) : 1	3 3 2, 3 (1) : 1	3 3 3, 3 (1) : 1

Question 3

We were to implement Fuzzy Addition

Any operation on two Fuzzy numbers is defined as,

Let A and B denote fuzzy numbers. $*$ denote any of the four basic arithmetic operations.

$$^{\alpha}(A * B) =^{\alpha} A *^{\alpha} B$$

for any $\alpha \in (0, 1]$.

$$A * B = \bigcup_{\alpha \in [0,1]} {}_{\alpha}(A * B).$$

We took two Fuzzy numbers,

A = [[2, 1] , [3, 0.5]] and B = [[3, 1] , [4, 0.5]]

Applying above formula resulted in

A+B = [[5.0, 1.0] , [6.0, 0.5] , [7.0, 0.5]]