

EXPERT SYSTEM LAB WORK

Creating FIS Sugeno using MATLAB Code

Chapter #12



Step by step Sugeno fuzzy Inference

1. Define the membership function
2. Define the rule
3. Build the code
4. Run



Membership functions

MFs for **Demand** variable :

Down is Trapezoidal (X; 0,0,1000,5000)

Up is Trapezoidal (X; 1000,5000,6000,6000)

MFs for **Stock** variable :

Low is Trapezoidal (X; 0,0,100,600)

High is Trapezoidal (X; 100,600,700,700)



Rules

If Demand is Down	And Stock is High,	Then Quantity = 4000
If Demand is Down	And Stock is Low,	Then Quantity = 3500
If Demand is Up	And Stock is High,	Then Quantity = 5500
If Demand is Up	And Stock is Low,	Then Quantity = 4250
If Demand is Up	And Stock is Low,	Then Quantity = 4500
If Demand is Up	And Stock is Low,	Then Quantity = 4750



Source Code

```
function sr=sup_2(a,b)
ikk=newfis('Supplier');

ikk.type='sugeno';

ikk.impMethod='prod';

ikk.defuzzMethod='wtaver'

ikk=addvar(ikk,'input','Demand',[0 6000]);
ikk=addmf(ikk,'input',1,'Down','trapmf',[0 0 1000 5000]);
ikk=addmf(ikk,'input',1,'Up','trapmf',[1000 5000 6000 6000]);
```



Source Code (continue)

```
ikk=addvar(ikk,'input','Stock',[0 600]);  
ikk=addmf(ikk,'input',2,'Low','trapmf',[0 0 100 600]);  
ikk=addmf(ikk,'input',2,'High','trapmf',[100 600 700 700]);  
  
ikk=addvar(ikk,'output','Quantity',[0 1]);  
ikk=addmf(ikk,'output',1,'mf1','linear',[1 -1 0]);  
ikk=addmf(ikk,'output',1,'mf2','linear',[1 0 0]);  
ikk=addmf(ikk,'output',1,'mf3','linear',[1.25 -1 0]);
```



Source Code (continue)

```
therule=[  
    1 2 1 1 1;  
    1 1 2 1 1;  
    2 2 2 1 1;  
    2 1 3 1 1;  
];  
  
% Evaluate Sugeno FIS Model  
  
ikk=addrule(ikk,therule);  
  
sr=evalfis([a,b],ikk);
```



Evaluate

Demand = 2500

Stock = 550

Quantity = ?

In the command window :

Quantity = Sup_2(2500,550)

The result :

Quantity = 2219.888

