

Exercise No. 3: Fuzzy Expert System

Input Variables

- Height of Flood (in meters)
- Rainfall (in millimeters per hour)

Output Variables

- Flood Alert Classification

Fuzzy Sets

Input Variable: Height of Flood

Linguistic Terms	Universe of Discourse
Low	[0 .75 1.5]
Moderate	[1 1.75 2.5]
High	[2 3 4]

Input Variable: Rainfall

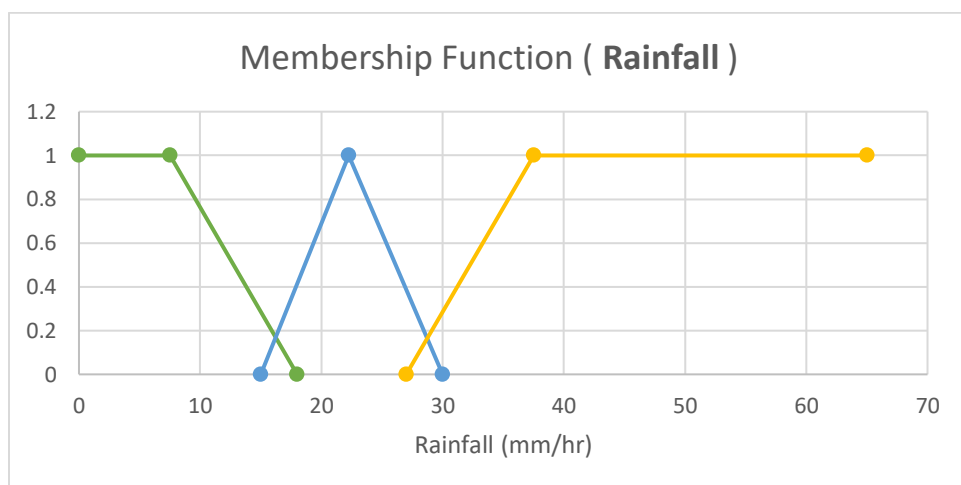
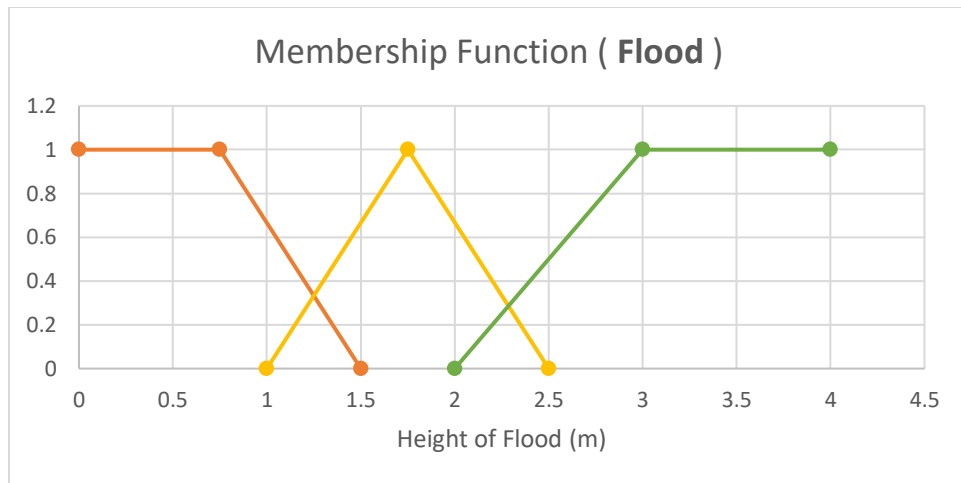
Linguistic Terms	Universe of Discourse
Light	[0 7.5 18]
Moderate	[15 22.5 30]
Heavy	[27 37.5 65]

Output Variable: Classification

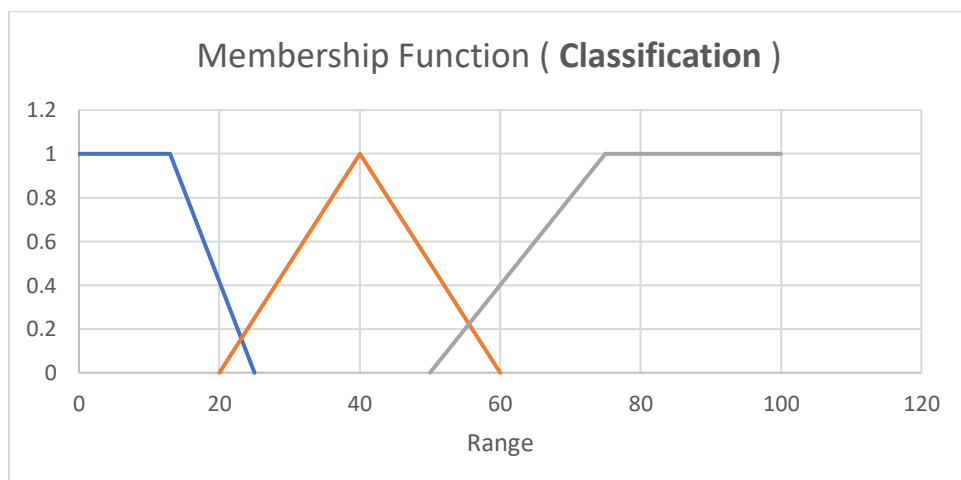
Linguistic Terms	Universe of Discourse
Yellow	[0 13 25]
Orange	[20 40 60]
Red	[50 75 100]

Membership Function

Input Variables



Output Variable



Fuzzy Rules

		Rainfall		
		Light	Moderate	Heavy
Flood	Low	Yellow	Yellow	Orange
	Moderate	Orange	Orange	Red
	High	Red	Red	Red

Application Screenshots

Once the system run/opened, the initial value of the flood height is set to .30 meters and the value of the rainfall is set to 7.50 millimeters per hour. Also, the Degree of Membership is calculated and initially set.

River Flood Warning System

The height of the levee is 3 meters and the river will overflow if the height of the flood is above 3 meters.
This system helps the user to decide whether evacuation is necessary given the height of the flood and the amount of rainfall.

Input Variables	Degree of Membership		
	Low	Moderate	High
Flood Height (m) <input type="text" value="0.30"/>	1	0	0
Rainfall (mm per hr) <input type="text" value="7.50"/>	1	0	0

Degree of Membership	Yellow	Orange	Red
	Centroid	-----	-----

Result

If the user change/update the values of the flood height and rainfall, the degree of membership is automatically calculated and displayed.

River Flood Warning System

The height of the levee is 3 meters and the river will overflow if the height of the flood is above 3 meters.
This system helps the user to decide whether evacuation is necessary given the height of the flood and the amount of rainfall.

Input Variables	Degree of Membership		
	Low	Moderate	High
Flood Height (m) <input type="text" value="1.46"/>	0.0533333333333333	0.613333333333333	0
Rainfall (mm per hr) <input type="text" value="16.53"/>	0.14	0.211034482758621	0

Degree of Membership	Yellow	Orange	Red
	Centroid	-----	-----

Result

If the user clicked the Analyze button, the system will calculate and display the centroid and degree of membership and will also display the result in which can help the user decide what action to take.

River Flood Warning System

River Flood Warning System

The height of the levee is 3 meters and the river will overflow if the height of the flood is above 3 meters.
This system helps the user to decide whether evacuation is necessary given the height of the flood and the amount of rainfall.

Input Variables

Flood Height (m)

1.46

Rainfall (mm per hr)

16.53

Degree of Membership

Low

0.0533333333333333

Moderate

0.6133333333333333

High

0

Low

0.14

Average

0.211034482758621

Heavy

0

Degree of Membership

Yellow

0

Orange

0.771789180364995

Red

0

Centroid

35.4357836072999

Result

ORANGE | Flooding is Threatening. Alert for possible evacuation.

Analyze

Reset

If the user clicked the Reset button, all the data that is inputted and generated will return/reset to its initial values.

River Flood Warning System

River Flood Warning System

The height of the levee is 3 meters and the river will overflow if the height of the flood is above 3 meters.
This system helps the user to decide whether evacuation is necessary given the height of the flood and the amount of rainfall.

Input Variables

Flood Height (m)

0.30

Rainfall (mm per hr)

7.50

Degree of Membership

Low

1

Moderate

0

High

0

Low

1

Average

0

Heavy

0

Degree of Membership

Yellow

Orange

Red

Centroid

Result

Analyze

Reset