

# **Genetic Algorithm & Fuzzy Logic**

## **Semester-5**

### **Practical - 8**

**Name:** Shivam Tawari

**Roll no:** A-58

**Aim:** Implementation of different fuzzy membership functions

**Theory:**

#### **What is Fuzzy Membership Function?**

The membership function of a fuzzy set is a generalization of the indicator function for classical sets. In fuzzy logic, it represents the degree of truth as an extension of valuation. Degrees of truth are often confused with probabilities, although they are conceptually distinct, because fuzzy truth represents membership in vaguely defined sets, not likelihood of some event or condition.

#### **Fuzzy Membership Function :**

- Membership functions were first introduced in 1965 by Lofti A. Zadeh in his first research paper “fuzzy sets”.
- Membership functions characterize fuzziness (i.e., all the information in fuzzy set), whether the elements in fuzzy sets are discrete or continuous.
- Membership functions can be defined as a technique to solve practical problems by experience rather than knowledge.
- Membership functions are represented by graphical forms.
- Rules for defining fuzziness are fuzzy too.

**Code and Output:**

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## Practical 8

Name: Shivam Tawari

Roll no: A-5

```
[2] pip install -U scikit-fuzzy
```

Collecting scikit-fuzzy  
 Downloading scikit-fuzzy-0.4.2.tar.gz (993 kB)  
 993 kB 5.2 MB/s  
 Requirement already satisfied: numpy>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from scikit-fuzzy) (1.19.5)  
 Requirement already satisfied: scipy>=0.9.0 in /usr/local/lib/python3.7/dist-packages (from scikit-fuzzy) (1.4.1)  
 Requirement already satisfied: networkx>=1.9.0 in /usr/local/lib/python3.7/dist-packages (from scikit-fuzzy) (2.6.3)  
 Building wheels for collected packages: scikit-fuzzy  
 Building wheel for scikit-fuzzy (setup.py) ... done  
 Created wheel for scikit-fuzzy: filename=scikit\_fuzzy-0.4.2-py3-none-any.whl size=894089 sha256=5b954c591b0d6d323e1caf57cc6ab708586c171e0fb65112d60d2aea4cb9b65  
 Stored in directory: /root/.cache/pip/wheels/d5/74/fc/38588a3d2e3f34f74588e6daa3aa5b0a322bd6f9420a707131  
 Successfully built scikit-fuzzy  
 Installing collected packages: scikit-fuzzy  
 Successfully installed scikit-fuzzy-0.4.2

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## Triangular membership function

```
[4] # Triangular membership function
import matplotlib.pyplot as plt
a= float(input("Enter first value: "))
b= float(input("Enter second value: "))
m=(a+b)/2
X=(a,m,b)
Y=(0,1,0)
plt.plot(X,Y)
plt.show()
```

Enter first value: 2  
 Enter second value: 5

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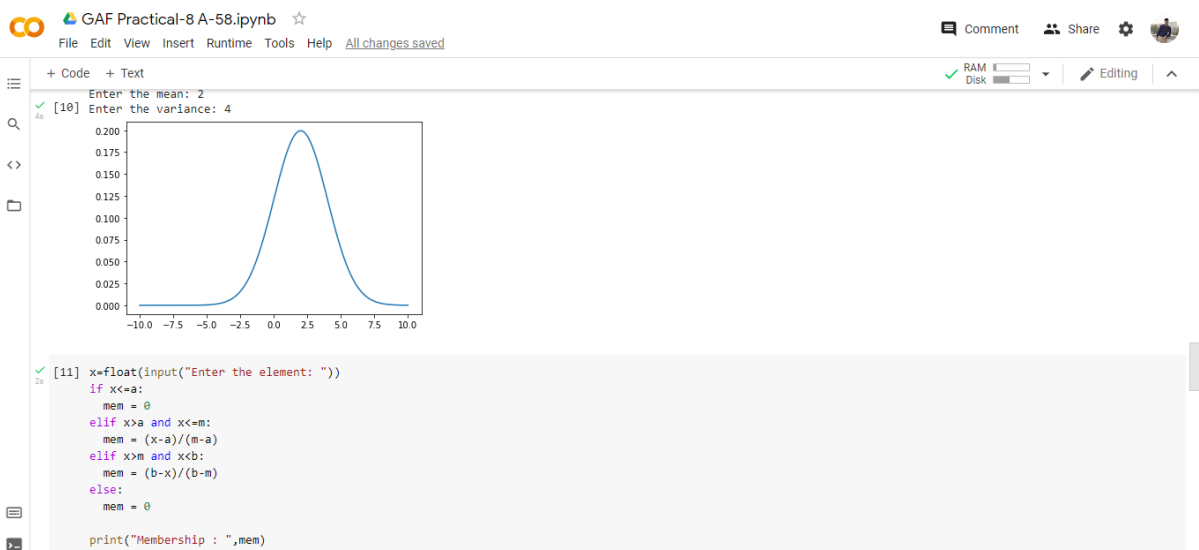
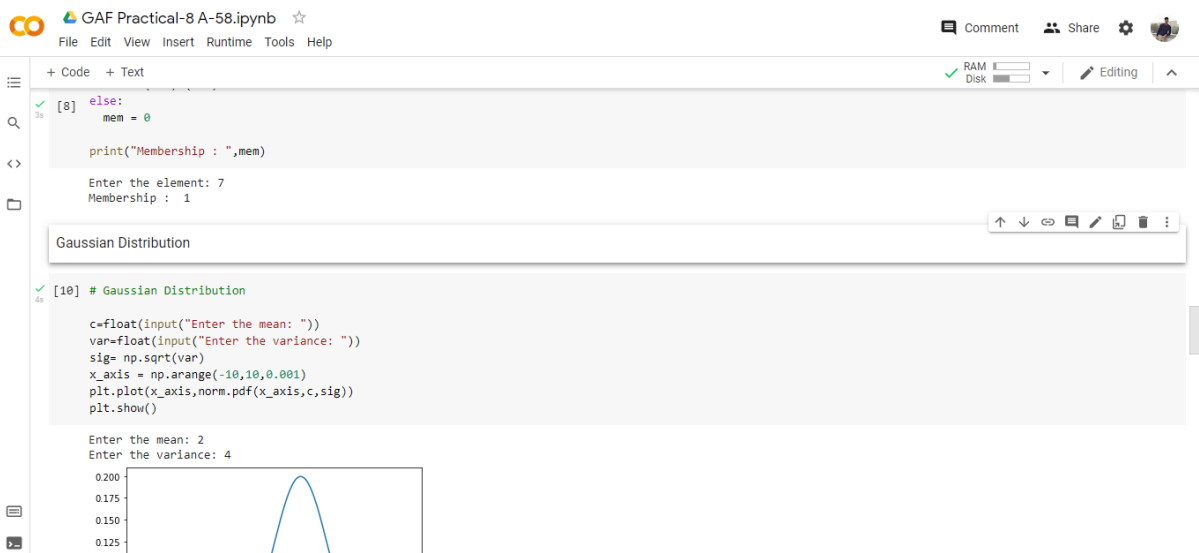
```
[5] x=float(input("Enter the element: "))
if x<=a:
    mem = 0
elif x>a and x<=m:
    mem = (x-a)/(m-a)
elif x>m and x<b:
    mem = (b-x)/(b-m)
else:
    mem = 0

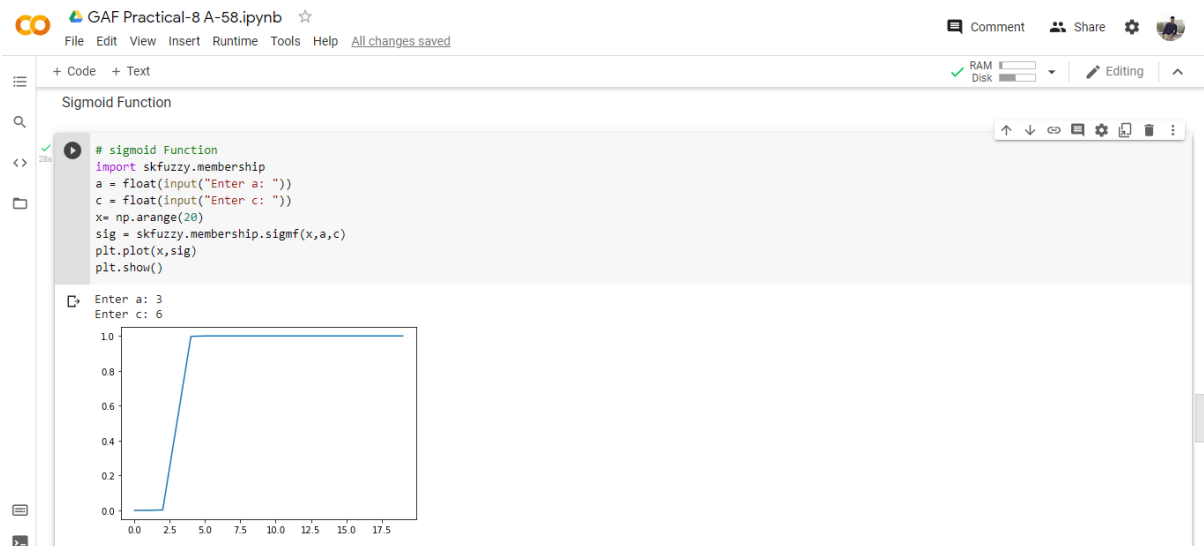
print("Membership : ",mem)
```

Enter the element: 3  
 Membership : 0.6666666666666666

## Trapezoidal membership Function

```
[6] # Trapezoidal membership Function
print("Enter a: ")
a=input()
a=float(a)
print("Enter b: ")
b=input()
b=float(b)
print("Enter c: ")
c=input()
c=float(c)
```





**Conclusion:** Hence, Implementation of different fuzzy membership functions has been successfully.