**Q:** Implement Max-membership method and Mean-max membership method of defuzzifications. Your program should contain functions for both methods. The program should generate defuzzified value of the input fuzzy set for the above functions.

Solution:

**Code available at:** https://colab.research.google.com/drive/1fqd4F0BvjVYISciTCCFFTHQsxeK8zVwq?usp=sharing

class FuzzySet:

def \_\_init\_\_(self):

self.elements = []

self.memberships = []

def add\_element(self, element, membership):

if membership < 0 or membership > 1:

print("Invalid membership value. Membership value should be between 0 and 1.")

again\_membership = float(input(f"Enter membership value of {element} AGAIN! (between 0 and 1): "))

self.elements.append(element)

self.memberships.append(again\_membership)

else:

self.elements.append(element)

self.memberships.append(membership)

def max\_mem(self):

max\_index = self.memberships.index(max(self.memberships))

max\_value = self.elements[max\_index]

print("Deffuz of Set: ", max\_value)

def mean\_max(self):

combined = list(zip(self.elements, self.memberships))

sorted\_combined = sorted(combined, key=lambda x: x[0])

sorted\_element = [x[0] for x in sorted\_combined]

sorted\_mem = [x[1] for x in sorted\_combined]

max\_members = []

max\_membership = max(sorted\_mem)

for i in range(len(sorted\_element)):

if sorted\_mem[i] == max\_membership:

max\_members.append(sorted\_element[i])

if(len(max\_members) > 1):

mean\_max\_value = (float(max\_members[0]) + float(max\_members[-1])) / 2

else:

mean\_max\_value = max\_members

print("Deffuz of Set: ", mean\_max\_value)

def print\_set(self):

for i in range(len(self.elements)):

print(self.elements[i], self.memberships[i])

set1 = FuzzySet()

n = int(input("Enter the number of elements in set: "))

for i in range(n):

element = input(f"Enter element {i+1} in set: ")

membership = float(input(f"Enter membership value of {element} in set A (between 0 and 1): "))

set1.add\_element(element, membership)

print("\nSet:")

set1.print\_set()

print("\nMax Membership:")

set1.max\_mem()

print("\nMean-Max Membership:")

set1.mean\_max()

**Output**

Enter the number of elements in set: 5

Enter element 1 in set: 9

Enter membership value of 9 in set A (between 0 and 1): 0.6

Enter element 2 in set: 6

Enter membership value of 6 in set A (between 0 and 1): 0.8

Enter element 3 in set: 5

Enter membership value of 5 in set A (between 0 and 1): 0.8

Enter element 4 in set: 7

Enter membership value of 7 in set A (between 0 and 1): 0.8

Enter element 5 in set: 3

Enter membership value of 3 in set A (between 0 and 1): 0.7

Set:

9 0.6

6 0.8

5 0.8

7 0.8

3 0.7

Max Membership:

Deffuz of Set: 6

Mean-Max Membership:

Deffuz of Set: 6.0