**Q:** Write a program to implement functions for computing height, core, boundary, support of given fuzzy set. Your functions should take fuzzy set as input and return above values

Solution:

**Code available at:** [**https://colab.research.google.com/drive/13ET0nrj6nEr\_mW9AX-l5Z1ncyeMeIp4i?usp=sharing**](https://colab.research.google.com/drive/13ET0nrj6nEr_mW9AX-l5Z1ncyeMeIp4i?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 height(self):

print(max(self.memberships))

def supportA(self, other\_set):

support = []

for i in range(len(other\_set.elements)):

if other\_set.elements[i] in self.elements and self.memberships[self.elements.index(other\_set.elements[i])] >= other\_set.memberships[i]:

if(other\_set.memberships[i] > 0):

support.append(other\_set.elements[i])

if(len(support) > 0):

print("Support of Fuzzy Set A: ", support)

else:

print("Support of Fuzzy Set A: NULL")

def coreA(self, other\_set):

core = []

for i in range(len(other\_set.elements)):

if other\_set.elements[i] in self.elements and self.memberships[self.elements.index(other\_set.elements[i])] >= other\_set.memberships[i]:

if(other\_set.memberships[i] == 1):

core.append(other\_set.elements[i])

if(len(core) > 0):

print("Core of Fuzzy Set A: ", core)

else:

print("Core of Fuzzy Set A: NULL")

def boundaryA(self, other\_set):

boundary = []

for i in range(len(other\_set.elements)):

if other\_set.elements[i] in self.elements and self.memberships[self.elements.index(other\_set.elements[i])] >= other\_set.memberships[i]:

if(other\_set.memberships[i] < 1 and other\_set.memberships[i] >0):

boundary.append(other\_set.elements[i])

if(len(boundary) > 0):

print("Boundary of Fuzzy Set A: ", boundary)

else:

print("Boundary of Fuzzy Set A: NULL")

def print\_set(self):

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

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

union = FuzzySet()

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

for i in range(n):

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

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

union.add\_element(element, membership)

setA = FuzzySet()

n = int(input("\nEnter the number of elements in set A: "))

for i in range(n):

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

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

setA.add\_element(element, membership)

print("\nUnion Set:")

union.print\_set()

print("\nSet A:")

setA.print\_set()

print("\nHeight of Fuzzy Set A:")

setA.height()

print("\nSupport: For Fuzzy Set A over Union set (X)")

union.supportA(setA)

print("\nCore: For Fuzzy Set A over Union set (X)")

union.coreA(setA)

print("\nBoundary: For Fuzzy Set A over Union set (X)")

union.boundaryA(setA)

**OUTPUT**

Enter the number of elements in Union Set: 6

Enter element 1 in Union Set: 2

Enter membership value of 2 in Union Set (between 0 and 1): 0.5

Enter element 2 in Union Set: 4

Enter membership value of 4 in Union Set (between 0 and 1): 0.6

Enter element 3 in Union Set: 8

Enter membership value of 8 in Union Set (between 0 and 1): 1

Enter element 4 in Union Set: 10

Enter membership value of 10 in Union Set (between 0 and 1): 1

Enter element 5 in Union Set: 11

Enter membership value of 11 in Union Set (between 0 and 1): 0.4

Enter element 6 in Union Set: 12

Enter membership value of 12 in Union Set (between 0 and 1): 0

Enter the number of elements in set A: 3

Enter element 1 in set A: 2

Enter membership value of 2 in set A (between 0 and 1): 0.4

Enter element 2 in set A: 8

Enter membership value of 8 in set A (between 0 and 1): 1

Enter element 3 in set A: 12

Enter membership value of 12 in set A (between 0 and 1): 0

Union Set:

2 0.5

4 0.6

8 1.0

10 1.0

11 0.4

12 0.0

Set A:

2 0.4

8 1.0

12 0.0

Height of Fuzzy Set A:

1.0

Support: For Fuzzy Set A over Union set (X)

Support of Fuzzy Set A: ['2', '8']

Core: For Fuzzy Set A over Union set (X)

Core of Fuzzy Set A: ['8']

Boundary: For Fuzzy Set A over Union set (X)

Boundary of Fuzzy Set A: ['2']