**'Fuzzy Sets operations'**

import numpy as np

def union(A,B):

result={}

for i in A:

if(A[i]>B[i]):

result[i]=A[i]

else:

result[i]=B[i]

print("Union of two sets is",result)

def intersection(A,B):

result={}

for i in A:

if(A[i]<B[i]):

result[i]=A[i]

else:

result[i]=B[i]

print("Intersection of two sets is",result)

def complement(A,B):

result={}

result1={}

for i in A:

result[i]=round(1-A[i],2)

for i in B:

result1[i]=round(1-B[i],2)

print("Complement of 1st set is",result)

print("Complement of 2nd set is",result1)

def difference(A,B):

result={}

for i in A:

result[i]=round(min(A[i],1-B[i]),2)

print("Difference of two sets is",result)

def cartprod(A,B):

R = [[] for i in range(len(A))]

i = 0

for x in A:

for y in B:

R[i].append(min(A[x], B[y]))

i += 1

print("Cartesian Product is",np.array(R),"\n")

def maxmin():

R = None

S = None

with open("./relations.json") as f:

relations = json.load(f)

R = relations["R"]

S = relations["S"]

print("\nR: " + str(R))

print("S: " + str(S))

m, n = len(R), len(R[0])

o = len(S[0])

composition = dict()

for i in range(m):

composition[i] = dict()

for k in range(o):

composition[i][k] = max([min(R[i][j], S[j][k]) for j in range(n)])

return composition

import json

def main():

while True:

print("Menu Driven Program")

print("1.Union")

print("2.Intersection")

print("3.Complement")

print("4.Difference")

print("5.Cartesian product")

print("6.MaxMin Composition")

print("7.Exit")

choice=int(input("Enter your choice:"))

if choice==1:

union(d,d1)

elif choice==2:

intersection(d,d1)

elif choice==3:

complement(d,d1)

elif choice==4:

difference(d,d1)

elif choice==5:

cartprod(d,d1)

elif choice==6:

composition=maxmin()

print("\nMax-min composition:", composition, sep="\n")

elif choice==7:

break

else:

print("Wrong choice")

if \_\_name\_\_ == "\_\_main\_\_":

print("----------------------"+

"FUZZY SET OPERATIONS"+

"----------------------")

n = int(input("enter no.of elements of set 1:"))

d = {}

for i in range(n):

keys = input()

values = float(input())

d[keys] = values

n1 = int(input("enter no.of elements of set 2:"))

d1 = {}

for i in range(n1):

keys1 = input()

values1 = float(input())

d1[keys1] = values1

main()

**## Output**

----------------------FUZZY SET OPERATIONS----------------------

enter no.of elements of set 1:3

x1

0.2

x2

0.5

x3

0.8

enter no.of elements of set 2:3

x1

0.4

x2

0.2

x3

0.1

Menu Driven Program

1.Union

2.Intersection

3.Complement

4.Difference

5.Cartesian product

6.MinMax Transformation

7.Exit

Enter your choice:3

Complement of 1st set is {'x1': 0.8, 'x2': 0.5, 'x3': 0.2}

Complement of 2nd set is {'x1': 0.6, 'x2': 0.8, 'x3': 0.9}

Menu Driven Program

1.Union

2.Intersection

3.Complement

4.Difference

5.Cartesian product

6.MinMax Transformation

7.Exit

Enter your choice:4

Difference of two sets is {'x1': 0.2, 'x2': 0.5, 'x3': 0.8}

Menu Driven Program

1.Union

2.Intersection

3.Complement

4.Difference

5.Cartesian product

6.MinMax Transformation

7.Exit

Enter your choice:5

Cartesian Product is [[0.2 0.2 0.1]

[0.4 0.2 0.1]

[0.4 0.2 0.1]]

Menu Driven Program

1.Union

2.Intersection

3.Complement

4.Difference

5.Cartesian product

6.MinMax Transformation

7.Exit

Enter your choice:6

R: [[0.6, 0.3], [0.2, 0.9]]

S: [[1, 0.5, 0.3], [0.8, 0.4, 0.7]]

Max-min composition:

{0: {0: 0.6, 1: 0.5, 2: 0.3}, 1: {0: 0.8, 1: 0.4, 2: 0.7}}

Menu Driven Program

1.Union

2.Intersection

3.Complement

4.Difference

5.Cartesian product

6.MinMax Transformation

7.Exit

Enter your choice:7