Submitted To:

Mam Yasmeen Jana

Submitted by:

Name:- Farwa Khan

Reg No:- FA20-BSE-043

Subject:- Artificial Intelligence

COMSATS University Islamabad, Vehari Campus

Artificial Intelligence
(Python Programming)

Activity 8:-

Imagine two matrices given in the form of 2D lists as under;

$$a = [[1,0,0],[0,1,0],[0,0,1]]$$

$$b = [[1,2,3],[4,5,6],[7,8,9]]$$

write a python code that finds another matrix/2D list that is a product of a and b

$c = a * b$

Solution:-

indrow	indcol	indaux	c[indrow][indcol] = c[indrow][indcol] + a[indrow][indaux] * b[indcol][indaux]
0	0	0	c[0][0] = c[0][0] + a[0][0] * b[0][0] = 0 + 1 * 1 = 0 + 1 = 1
0	0	1	c[0][0] = c[0][0] + a[0][1] * b[0][1] = 1 + 0 * 2 = 1 + 0 = 1
0	0	2	c[0][0] = c[0][0] + a[0][2] * b[0][2] = 1 + 0 * 3 = 1 + 0 = 1

0	1	0	$c[0][1] = c[0][1] + a[0][0] * b[1][0]$ $= 0 + 1 * 4 = 4$
0	1	1	$c[0][1] = c[0][1] + a[0][1] * b[1][1]$ $= 4 + 0 * 5 = 4$
0	1	2	$c[0][1] = c[0][1] + a[0][1] * b[1][2]$ $c[0][1] = 4 + 0 * 6 = 4$
0	2	0	$c[0][2] = c[0][2] + a[0][0] * b[2][0]$ $= 0 + 1 * 7 = 0 + 7 = 7$
0	2	1	$c[0][2] = c[0][2] + a[0][1] * b[2][1]$ $= 7 + 0 * 8 = 7 + 0 = 7$
0	2	2	$c[0][2] = c[0][2] + a[0][2] * b[2][2]$ $= 7 + 0 * 9 = 7 + 0 = 7$
1	0	0	$c[1][0] = c[1][0] + a[1][0] * b[0][0]$ $= 0 + 0 * 1 = 0$
1	0	1	$c[1][0] = c[1][0] + a[1][1] * b[0][1]$ $= 0 + 1 * 2 = 0 + 2 = 2$
1	0	2	$c[1][0] = c[1][0] + a[1][2] * b[0][2]$ $= 2 + 0 * 3 = 2 + 0 = 2$
1	1	0	$c[1][1] = c[1][1] + a[1][0] * b[1][0]$ $= 0 + 0 * 4 = 0$
1	1	1	$c[1][1] = c[1][1] + a[1][1] * b[1][1]$ $= 0 + 1 * 5 = 0 + 5 = 5$

1	1	2	$c[1][1] = c[1][1] + a[1][2] * b[1][2]$ $= 5 + 0 * 6 = 5 + 0 = 5$
1	2	0	$c[1][2] = c[1][2] + a[1][0] * b[2][0]$ $= 0 + 0 * 7 = 0$
1	2	1	$c[1][2] = c[1][2] + a[1][1] * b[2][1]$ $= 0 + 1 * 8 = 8$
1	2	2	$c[1][2] = c[1][2] + a[1][2] * b[2][2]$ $= 8 + 0 * 9 = 8$
2	0	0	$c[2][0] = c[2][0] + a[2][0] * b[0][0]$ $= 0 + 0 * 1 = 0 + 0 = 0$
2	0	1	$c[2][0] = c[2][0] + a[2][1] * b[0][1]$ $= 0 + 0 * 2 = 0$
2	0	2	$c[2][0] = c[2][0] + a[2][2] * b[0][2]$ $= 0 + 1 * 3 = 3$
2	1	0	$c[2][1] = c[2][1] + a[2][0] * b[1][0]$ $= 0 + 0 * 4 = 0$
2	1	1	$c[2][1] = c[2][1] + a[2][1] * b[1][1]$ $= 0 + 0 * 5 = 0$

2	1	2	$c[2][1]=c[2][1]+a[2][2]*b[1][2]$ $=0+1*6=6$
2	2	0	$c[2][2]=c[2][2]+a[2][0]*b[2][0]$ $=0+0*7=0+0=0$
2	2	1	$c[2][2]=c[2][2]+a[2][1]*b[2][1]$ $=0+0*8=0$
2	2	2	$c[2][2]=c[2][2]+a[2][2]*b[2][2]$ $=0+1*9=0+9=9$

(2nd Procedure)

indrow	indcol	indaux	c[indrow][indcol] = c[indrow][indcol] + a[indaux][indrow] * b[indaux][indcol]
0	0	0	c[0][0] = c[0][0] + a[0][0] * b[0][0] = 0 + 1 * 1 = 1
0	0	1	c[0][0] = c[0][0] + a[1][0] * b[1][0] = 1 + 0 * 4 = 1
0	0	2	c[0][0] = c[0][0] + a[2][0] * b[2][0] = 1 + 0 * 7 = 1
0	1	0	c[0][1] = c[0][1] + a[0][0] * b[0][1] = 0 + 1 * 2 = 2
0	1	1	c[0][1] = c[0][1] + a[1][0] * b[1][1] = 2 + 0 * 5 = 2
0	1	2	c[0][1] = c[0][1] + a[2][0] * b[2][1] = 2 + 0 * 8 = 2

0	2	0	$c[0][2]=c[0][2]+a[0][0]*b[0][2]$ $=0+1*3=3$
0	2	1	$c[0][2]=c[0][2]+a[1][0]*b[1][2]$ $=3+0*6=3+0=3$
0	2	2	$c[0][2]=c[0][2]+a[2][0]*b[2][2]$ $=3+0*9=3$
1	0	0	$c[1][0]=c[1][0]+a[0][1]*b[0][0]$ $=0+0*1=0$
1	0	1	$c[1][0]=c[1][0]+a[1][1]*b[1][0]$ $=0+1*4=4$
1	0	2	$c[1][0]=c[1][0]+a[2][1]*b[2][0]$ $=4+0*7=4$
1	1	0	$c[1][1]=c[1][1]+a[0][1]*b[0][1]$ $=0+0*2=0$
1	1	1	$c[1][1]=c[1][1]+a[1][1]*b[1][1]$ $=0+1*5=5$
1	1	2	$c[1][2]=c[1][1]+a[2][1]*b[2][1]$ $=5+0*8=5$

1	2	0	$c[1][2]=c[1][2]+a[0][1]*b[0][2]$ $c[1][2]=0+0*3=0$
1	2	1	$c[1][2]=c[1][2]+a[1][1]*b[1][2]$ $=0+1*6=6$
1	2	2	$c[1][2]=c[1][2]+a[2][1]*b[2][2]$ $=6+0*9=6$
2	0	0	$c[2][0]=c[2][0]+a[2][2]*b[0][0]$ $=0+0*1=0$
2	0	1	$c[2][0]=c[2][0]+a[1][2]*b[1][0]$ $=0+0*4=0$
2	0	2	$c[2][0]=c[2][0]+a[2][2]*b[2][0]$ $=0+1*7=0+7=7$
2	1	0	$c[2][1]=c[2][1]+a[0][2]*b[0][1]$ $=0+0*2=0$
2	1	1	$c[2][1]=c[2][1]+a[1][2]*b[1][1]$ $=0+0*5=0$
2	1	2	$c[2][1]=c[2][1]+a[2][2]*b[2][1]$ $=0+1*8=0+8=8$

2	2	0	$c[2][2] = c[2][2] + a[0][2] * b[0][2]$ $= 0 + 0 * 3 = 0$
2	2	1	$c[2][2] = c[2][2] + a[1][2] * b[1][2]$ $= 0 + 0 * 6 = 0$
2	2	2	$c[2][2] = c[2][2] + a[2][2] * b[2][2]$ $= 0 + 1 * 9 = 9$

Activity 9:-

A closed polygon with N sides can be represented as a list of tuples of N coordinates

$[(x_1, y_1), (x_2, y_2), (x_3, y_3), \ldots, (x_N, y_N)]$. Write a Python program that takes a list of N tuples as input and returns the perimeter of the polygon

Solution:-

l1 = [(1,3), (2,7), (3,9), (-1,8)]

Perimeter = 0

i		leng	
	(((listing[i][0]-listing[i+1][0])**2)+((listing[i][1]-listing[i+1][1])**2))**0.5		Perimeter+(((listing[0][0]-listing[leng-1][0])**2)+((listing[0][1]-listing[leng-1][1])**2))**0.5
0	(((listing[0][0]-listing[1][0])**2)+((listing[0][1]-listing[1][1]**2))**0.5 $=\sqrt{(1-2)^2+(3-7)^2}=\sqrt{17}$	4	0+(((listing[0][0]-listing[3][0])**2)+((listing[0][1]-listing[3][1])**2))**0.5 $= +\sqrt{(1+1)^2+(3-8)^2}$ $=\sqrt{17}+\sqrt{29}=9.5082$

1

(((listing[1][0]-listing[2][0])**2)+((listing[1][1]-listing[2][1])**2))**0.5

$$=\sqrt{(2-3)^2+(7-9)^2}$$

$$=\sqrt{5}$$

2

(((listing[2][0]-listing[3][0])**2)+((listing[2][1]-listing[3][1])**2))**0.5

$$=\sqrt{(3+1)^2+(9-8)^2}$$

$$=\sqrt{17}$$