Date : 14th - 09 - 2020
Morning Session : 9am – 11.00 PM
By ~ Rohan Kumar

Topics: 2D Arrays in Python

2D Arrays means Matrix form

Two dimensional array is an array within an array. It is an array of arrays. In this type of array the position of a data element is referred to by two indices instead of one. So it represents a table with rows and columns of data

Real world examples: chess board, car parking, seating theater, classroom.

Day 1 - 11 12 5 2
Day 2 - 15 6 10
Day 3 - 10 8 12 5
Day 4 - 12 15 8 6

The above data can be represented as a two dimensional array as below.

```
T = [[11, 12, 5, 2], [15, 6,10], [10, 8, 12, 5], [12,15,8,6]]
```

Accessing Values in a Two Dimensional Array

The data elements in two dimensional arrays can be accessed using two indices. One index referring to the main or parent array and another index referring to the position of the data element in the inner array. If we mention only one index then the entire inner array is printed for that index position.

T = [[11, 12, 5, 2], [15, 6,10], [10, 8, 12, 5], [12,15,8,6]]

print(T[0])

print(T[1][2])

Output: [11, 12, 5, 2]
10

If we want use array we want to import numpy (it's a library) from *

```
from numpy import *

arr = array(list2)
arr
```

```
array([[1, 2, 3],
       [2, 3, 4],
       [4, 5, 6]])
```

```
arr[2][2]
```

```
6
```

Change 2D Array To 1D :

```
#change it to 1D
arr.flatten()
```

```
array([1, 2, 3, 2, 3, 4, 4, 5, 6])
```

Change 1D to 2D:

```
array([1, 2, 3, 2, 3, 4, 4, 5, 6])
```

```
arr1.reshape(3,3) #changes from 1D to 2D
```

```
array([[1, 2, 3],
       [2, 3, 4],
       [4, 5, 6]])
```

Convert to 2x3 or 3x2 :

```
arr2 = array([[1,2],[2,3],[3,4]])
arr1 = arr2.flatten()
arr1
```

```
array([1, 2, 2, 3, 3, 4])
```

```
arr1.reshape(2,3)
```

```
array([[1, 2, 2],
       [3, 3, 4]])
```

```
arr2 = array([[1,2],[2,3],[3,4]])
arr1 = arr2.flatten()
arr1
```

```
array([1, 2, 2, 3, 3, 4])
```

```
arr1.reshape(3,2)
```

```
array([[1, 2],
       [2, 3],
       [3, 4]])
```

```
#matrix() we can perform many functions or operations - diagonal, max,min
mat = matrix('1 2 3; 3 2 5; 3 4 7')
diagonal(mat)
```

```
array([1, 2, 7])
```

```
#rows inddex and col index should be same?
```

```
mat.min()
```

```
1
```

```
mat.max()
```

```
7
```

Adding matrix:

```
mat1 = matrix('1 2 3; 4 5 6; 7 8 9')
mat2 = matrix('1 4 7; 8 11 10; 2 5 9')
mat3 = mat1 + mat2
mat3
```

```
matrix([[ 2,  6, 10],
        [12, 16, 16],
        [ 9, 13, 18]])
```

Multiplication Matrix:

```
mat4 = mat1 * mat2
mat4
```

```
matrix([[ 23,  41,  54],
        [ 56, 101, 132],
        [ 89, 161, 210]])
```

Insert and Delete :

```
list2.insert(1,[4, 4, 4])
list2
```

```
[[1, 2, 3], [4, 4, 4], [2, 3, 4], [4, 5, 6]]
```

```
del list2[1]
```

```
list2
```

```
[[1, 2, 3], [2, 3, 4], [4, 5, 6]]
```

MCQ 1:

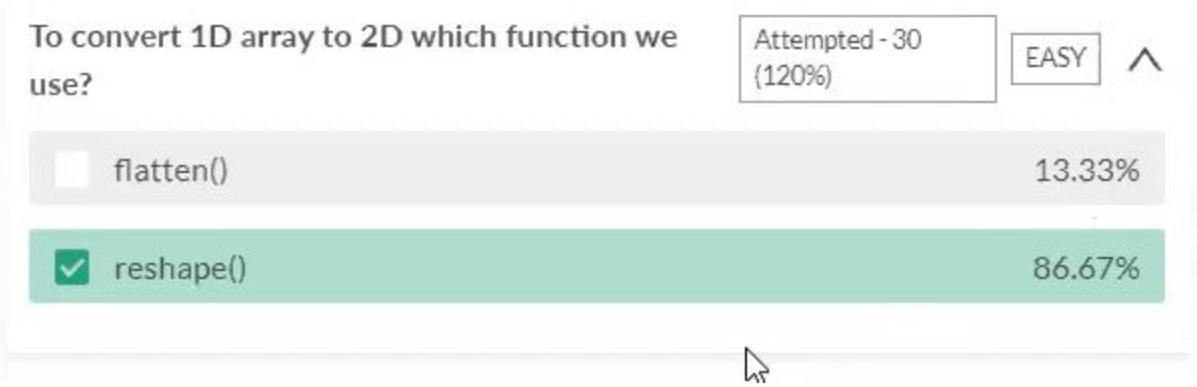
```
]: list1 = [1,2,3,4,5]
```

how to convert to array

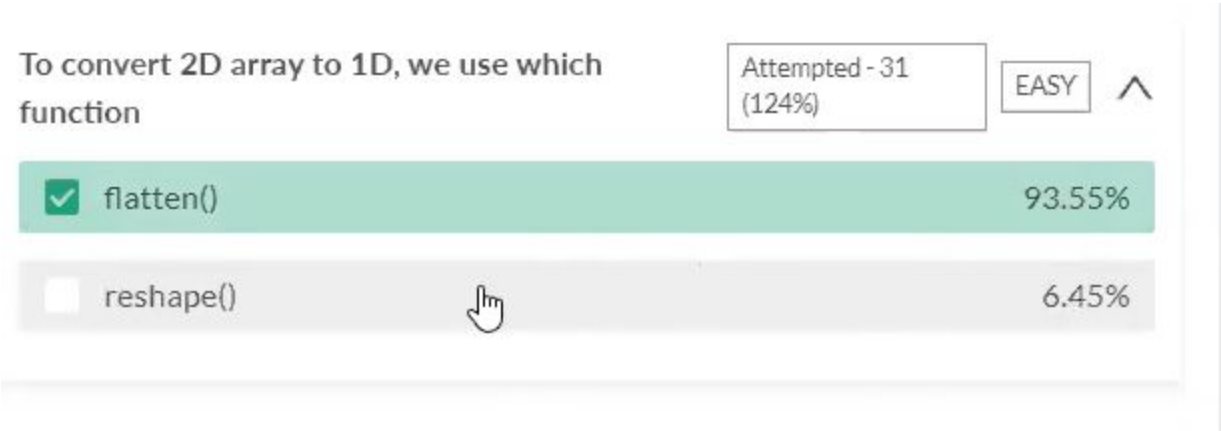
Attempted - 29 (116%) | EASY

- [x] array(list1) 82.76%
- [ ] list1.array() 17.24%

MCQ 2:

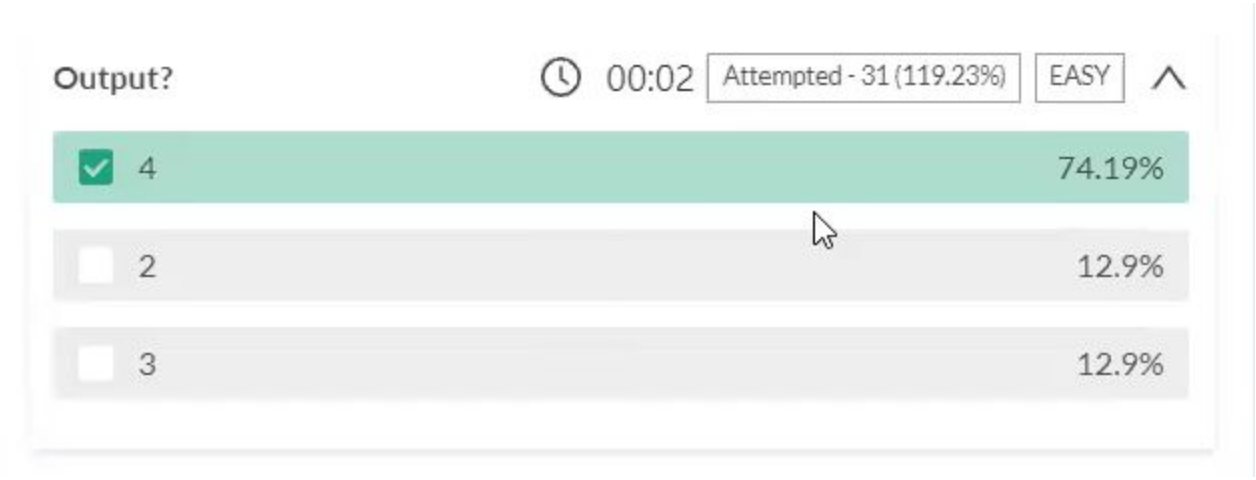


MCQ 3:



MCQ 4:

```
list1 = [[1,2,3],[1,2,3,4],[3,4,5,6]]
list1[1][3]
```



Resources:
https://www.tutorialspoint.com/python_data_structure/python_2darray.htm
https://www.tutorialspoint.com/python_data_structure/python_matrix.htm