Ex. No: 3

Aim: *Expanding and Squeezing a NumPy Array.*

3(A):

Expanding a NumPy array:

- The expand_dims() function is used to expand the shape of an array.
- Insert a new axis that will appear at the axis position in the expanded array shape.

Syntax:

```
numpy.expand_dims(a, axis)
```

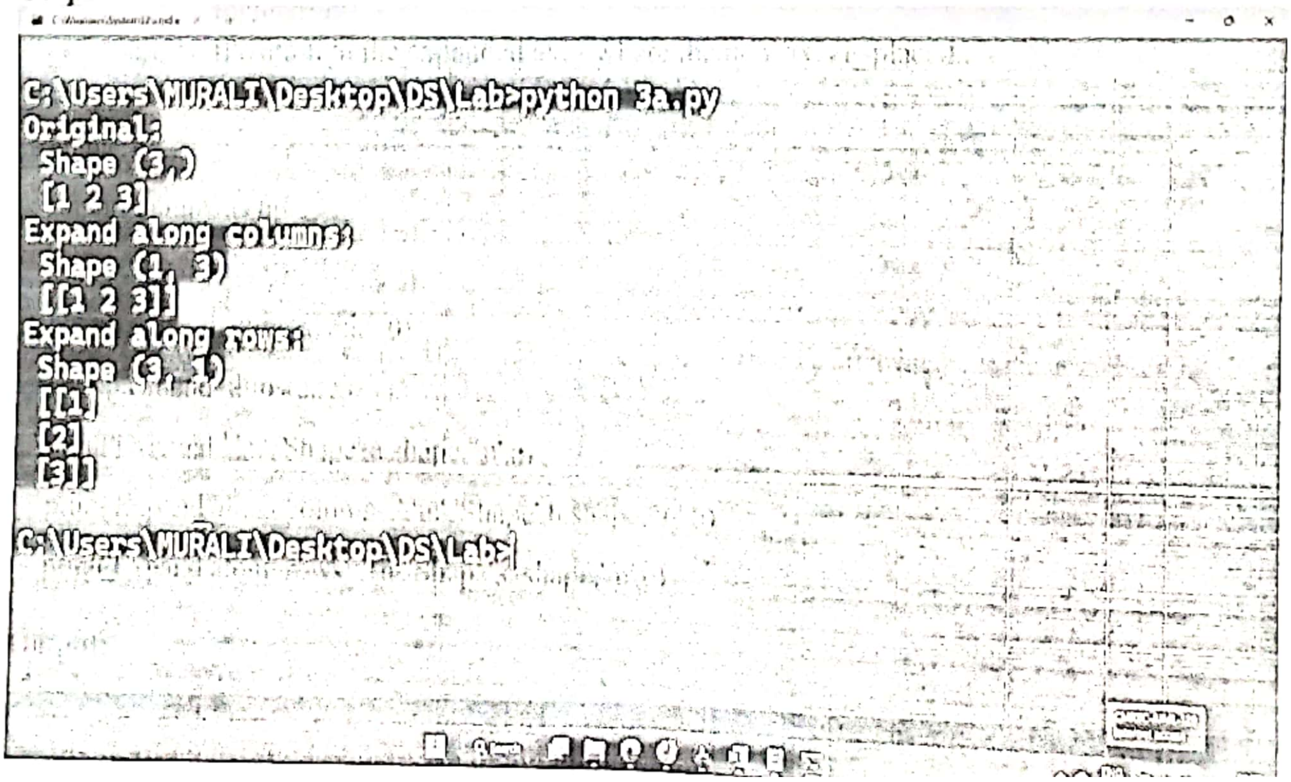
Parameter:

- a - Input array.
- axis - IPosition in the expanded axes where the new axis is placed..

Example:

```
import numpy as np
a = np.array([1,2,3])
b = np.expand_dims(a,axis=0)
c = np.expand_dims(a,axis=1)
print('Original:','\n','Shape',a.shape,'\n',a)
print('Expand along columns:','\n','Shape',b.shape,'\n',b)
print('Expand along rows:','\n','Shape',c.shape,'\n',c)
```

Output:



```
C:\Users\MURALI\Desktop\DS\Lab>python 3a.py
Original:
 Shape (3,)
 [1 2 3]
Expand along columns:
 Shape (1, 3)
 [[1 2 3]]
Expand along rows:
 Shape (3, 1)
 [[1]
 [2]
 [3]]

C:\Users\MURALI\Desktop\DS\Lab>
```

3(B):

Squeezing a NumPy array:

numpy.squeeze() function is used when we want to remove single-dimensional entries from the shape of an array.

Syntax:

    numpy.squeeze(a, axis=None)

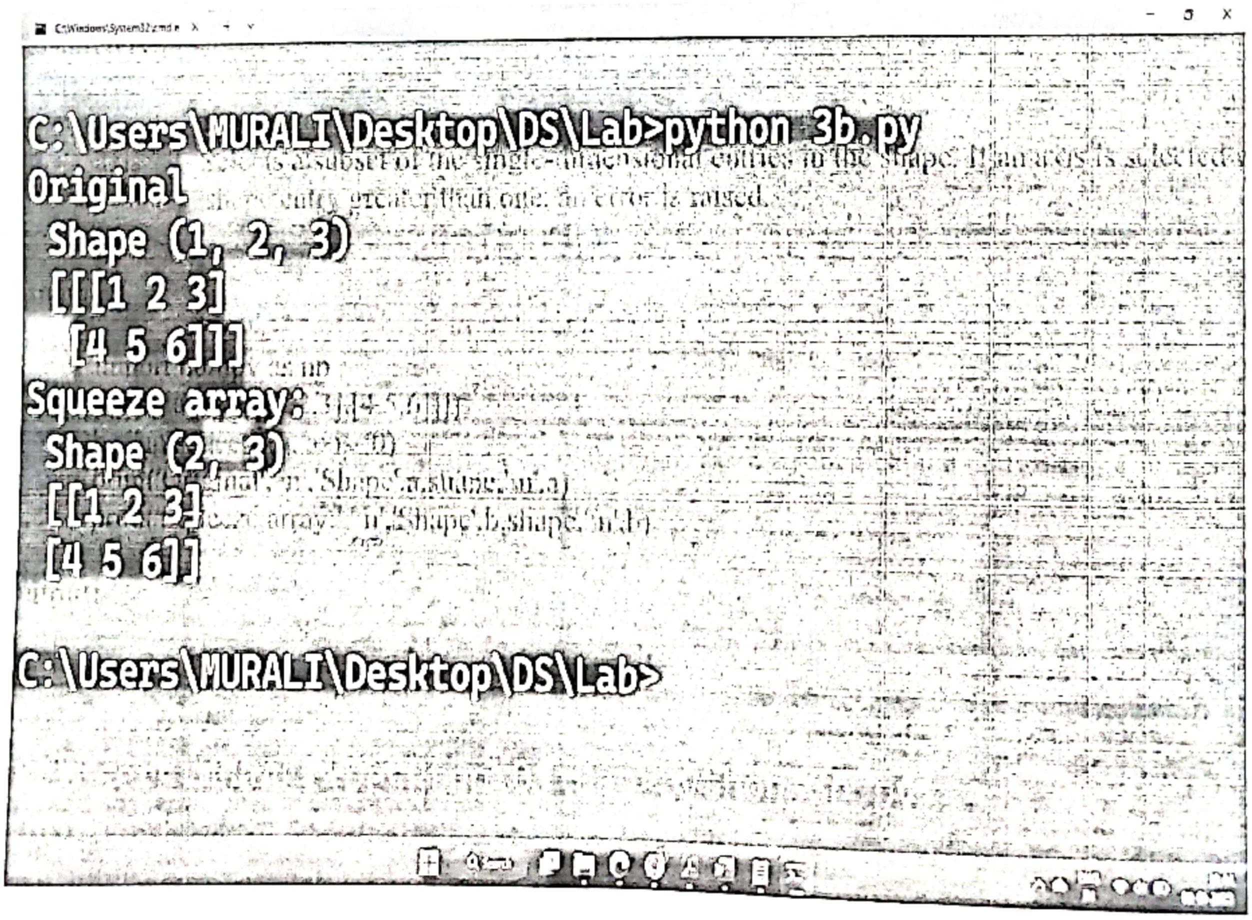
Parameter:

- a - Input array.
- axis - Selects a subset of the single-dimensional entries in the shape. If an axis is selected with shape entry greater than one, an error is raised.

Example:

```
import numpy as np
a = np.array([[[1,2,3],[4,5,6]]])
b = np.squeeze(a, axis=0)
print('Original','\n','Shape',a.shape,'\n',a)
print('Squeeze array:','\n','Shape',b.shape,'\n',b)
```

Output:



```
C:\Users\MURALI\Desktop\DS\Lab>python 3b.py
Original
 Shape (1, 2, 3)
 [[[1 2 3]
  [4 5 6]]]
Squeeze array:
 Shape (2, 3)
 [[1 2 3]
 [4 5 6]]

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```

3(C):

Sorting in NumPy Arrays: The sort() function returns a sorted copy of the input array.

Syntax:

numpy.sort(a, axis, kind, order)

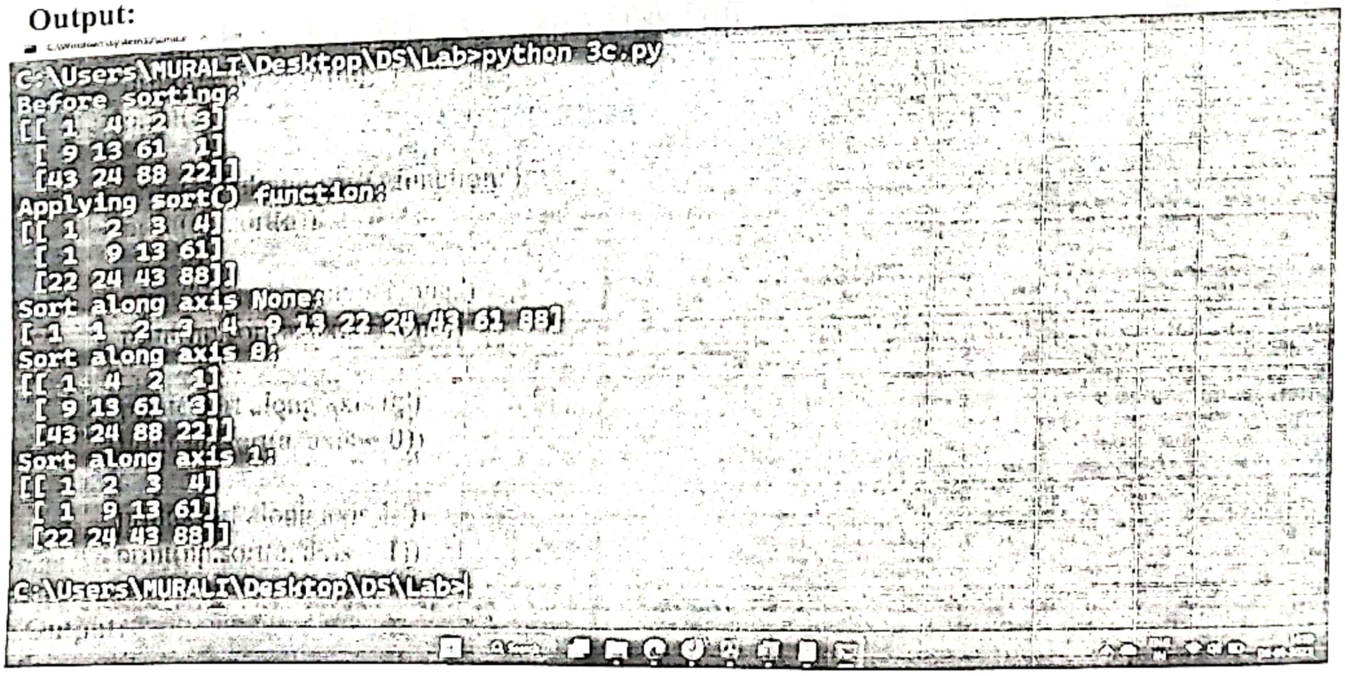
Parameter:

- a - Array to be sorted
- axis - The axis along which the array is to be sorted. If none, the array is flattened, sorting on the last axis
- kind - Default is quicksort
- order - If the array contains fields, the order of fields to be sorted

Example:

```
import numpy as np
a = np.array([[1,4,2,3],[9,13,61,1],[43,24,88,22]])
print('Before sorting:')
print(a)

print('Applying sort() function:')
print(np.sort(a))

print('Sort along axis None:')
print(np.sort(a, axis=None))

print('Sort along axis 0:')
print(np.sort(a, axis = 0))

print('Sort along axis 1:')
print(np.sort(a, axis = 1))
```

Output:



```
C:\Users\MURALI\Desktop\DS\Lab>python 3c.py
Before sorting:
[[ 1  4  2  3]
 [ 9 13 61  1]
 [43 24 88 22]]
Applying sort() function:
[[ 1  2  3  4]
 [ 1  9 13 61]
 [22 24 43 88]]
Sort along axis None:
[ 1  1  2  3  4  9 13 22 24 43 61 88]
Sort along axis 0:
[[ 1  4  2  1]
 [ 9 13 61  3]
 [43 24 88 22]]
Sort along axis 1:
[[ 1  2  3  4]
 [ 1  9 13 61]
 [22 24 43 88]]

C:\Users\MURALI\Desktop\DS\Lab>
```