Advanced Programming in Python (AI 853)

Assignment 05 (a)

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Assignment 05(a)

BROADCASTING WITH EXAMPLES

CASE 1:

CODE:

E:\NUST\Semester 1\Advanced Programming in Python\Python codes\broadcasting.py

broadcasting.py

```
# -*- coding: utf-8 -*-
"""
Created on Tue Dec  6 12:42:15 2022

@author: billu
"""

# 2d(4x3) broadcasting 1d(1x1)

import numpy as np
from numpy import random

A = random.randint(10,size=[4,3])
print ("Shape of A= ",A.shape)
print (A)
B = random.randint(10,size=[1])
print ("Shape of B= ",B.shape)
print(B)

C = A*B

print("Shape of C= ",C.shape)
print (C)
```

RESULT:

Console 1/A

```
Shape of A=  (4, 3)
[[9 7 3]
 [1 0 2]
 [3 7 7]
 [8 3 3]]
Shape of B=  (1,)
[6]
Shape of C=  (4, 3)
[[54 42 18]
 [ 6  0 12]
 [18 42 42]
 [48 18 18]]

In [7]:
```

CASE 2:

CODE:

broadcasting.py*

```
1  # -*- coding: utf-8 -*-
2  """
3  Created on Tue Dec  6 12:42:15 2022
4
5  @author: billu
6  """
7
8  # 2d(4x3) broadcasting 1d(3x1)
9
10 import numpy as np
11 from numpy import random
12
13 A = random.randint(10,size=[4,3])
14 print ("Shape of A= ",A.shape)
15 print (A)
16 B = random.randint(10,size=[4,1])
17 print ("Shape of B= ",B.shape)
18 print(B)
19
20 C = A*B
21
22 print("Shape of C= ",C.shape)
23 print (C)
```

RESULT:

```
In [11]: runcell(0, 'E:/NUST/Semester 1/Advanced Programming in Python/
Python codes/broadcasting.py')
Shape of A=  (4, 3)
[[6 8 1]
 [9 4 3]
 [5 5 0]
 [7 1 8]]
Shape of B=  (4, 1)
[[4]
 [7]
 [7]
 [9]]
Shape of C=  (4, 3)
[[24 32  4]
 [63 28 21]
 [35 35  0]
 [63  9 72]]
```

CASE 3:

CODE:

E:\NUST\Semester 1\Advanced Programming in Python\Python codes\broadcasting.py

broadcasting.py*

```
# -*- coding: utf-8 -*-
"""
Created on Tue Dec  6 12:42:15 2022

@author: billu
"""

# 3d(3x1x2) broadcasting 2d(3x2)

import numpy as np
from numpy import random

A = random.randint(10,size=[3,1,2])
print ("Shape of A= ",A.shape)
print (A)
B = random.randint(10,size=[3,2])
print ("Shape of B= ",B.shape)
print(B)

C = A*B

print("Shape of C= ",C.shape)
print (C)
```

RESULT:

Console 1/A

```
In [12]: runcell(0, 'E:/NUST/Semester 1/Advanced Programming in Python/
Python codes/broadcasting.py')
Shape of A=  (3, 1, 2)
[[[1 4]]

 [[3 8]]

 [[8 9]]]
Shape of B=  (3, 2)
[[7 7]
 [5 6]
 [9 5]]
Shape of C=  (3, 3, 2)
[[[ 7 28]
  [ 5 24]
  [ 9 20]]

 [[21 56]
  [15 48]
  [27 40]]

 [[56 63]
  [40 54]
  [72 45]]]

In [13]:
```

IPython Console History

FAILURE CASES OF BROADCASTING

CASE 1:

CODE:

broadcasting.py*

```
# -*- coding: utf-8 -*-
"""
Created on Tue Dec  6 12:42:15 2022

@author: billu
"""

# Failure case of 2d(4x3) broadcasting 1d(3,1)

import numpy as np
from numpy import random

A = random.randint(10,size=[4,3])
print ("Shape of A= ",A.shape)
print (A)
B = random.randint(10,size=[3,1])
print ("Shape of B= ",B.shape)
print(B)

C = A*B

print("Shape of C= ",C.shape)
print (C)
```

RESULT:

Console 1/A

```
In [13]: runcell(0, 'E:/NUST/Semester 1/Advanced Programming in Python/
Python codes/broadcasting.py')
Shape of A=  (4, 3)
[[8 1 1]
 [5 0 3]
 [7 7 0]
 [0 3 0]]
Shape of B=  (3, 1)
[[4]
 [3]
 [5]]
Traceback (most recent call last):

  File "C:\Users\billu\.conda\envs\spyder-cf\lib\site-
packages\spyder_kernels\py3compat.py", line 356, in compat_exec
    exec(code, globals, locals)

  File "e:\nust\semester 1\advanced programming in python\python
codes\broadcasting.py", line 20, in <module>
    C = A*B

ValueError: operands could not be broadcast together with shapes (4,3) (3,1)


In [14]:
```

IPython Console | History

CASE 2:

CODE:

E:\NUST\Semester 1\Advanced Programming in Python\Python codes\broadcasting.py

broadcasting.py*

```
1  # -*- coding: utf-8 -*-
2  """
3  Created on Tue Dec  6 12:42:15 2022
4
5  @author: billu
6  """
7
8  # Failure case of 3d(5x3x5) broadcasting 2d(1,3)
9
10 import numpy as np
11 from numpy import random
12
13 A = random.randint(10,size=[5,3,5])
14 print ("Shape of A= ",A.shape)
15 print (A)
16 B = random.randint(10,size=[1,3])
17 print ("Shape of B= ",B.shape)
18 print(B)
19
20 C = A*B
21
22 print("Shape of C= ",C.shape)
23 print (C)
```

RESULT:

IPython Console

Console 1/A

```
  [3 4 2 8 6]
  [4 2 5 8 9]]

 [[2 7 1 7 6]
  [3 8 2 5 1]
  [4 4 4 8 5]]]
Shape of B=  (1, 3)
[[8 8 8]]
Traceback (most recent call last):

  File "C:\Users\billu\.conda\envs\spyder-cf\lib\site-packages\spyder_kernels\py3compat.py", line 356, in
compat_exec
    exec(code, globals, locals)

  File "e:\nust\semester 1\advanced programming in python\python codes\broadcasting.py", line 20, in
<module>
    C = A*B

ValueError: operands could not be broadcast together with shapes (5,3,5) (1,3)


In [16]:
```