第05讲 矩阵操作 扩展练习

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本文档所展示的测试结果，均运行于：Intel Core i7-7700K CPU 4.2GHz

1.【计算题】

已知 $A=[6,-3,2], B=[1,2,-4]^T$，**求**AB**和**BA**。**

- **Python实现**

```
import numpy as np
A = np.array([[6,-3,2]])
B = ____(1)____

print("AB=\n {}".format(np.dot(A,B)))
print("BA=\n {}".format(____(2)____))
```

答案及解析

```
(1) np.array([[1],[2],[-4]])
(2) np.dot(B,A)
```

```
import numpy as np
A = np.array([[6,-3,2]])
B = np.array([[1],[2],[-4]])

print("AB=\n {}".format(np.dot(A,B)))
print("BA=\n {}".format(np.dot(B,A)))
```

```
AB=
 [[-8]]
BA=
 [[  6  -3   2]
 [ 12  -6   4]
 [-24  12  -8]]
```

2.【计算题】

求矩阵 $S=\begin{bmatrix}2 & -1 & -6 & 0\\ 1 & -1 & 2 & -4\end{bmatrix}\begin{bmatrix}1 & 2\\ 0 & -1\\ -1 & -3\\ 4 & 2\end{bmatrix}$ **的乘积。**

- **Python实现**

```
import numpy as np
A = ____(1)____
B = np.array([[1,2],[0,-1],[-1,-3],[4,2]])

S = ____(2)____
print("A×B=\n {}".format(S))
```

答案及解析

```
(1) np.array([[2,-1,-6,0],[1,-1,2,-4]])
(2) np.dot(A,B)
```

```
import numpy as np
A = np.array([[2,-1,-6,0],[1,-1,2,-4]])
B = np.array([[1,2],[0,-1],[-1,-3],[4,2]])

S = np.dot(A,B)
print("A×B=\n {}".format(S))
```

```
A×B=
 [[ -2  -7]
 [-17 -11]]
```

3.【计算题】

设$A=\begin{bmatrix}1 & -2 & 1\\ 4 & 1 & 0\\ 3 & -2 & 2\end{bmatrix}$，$B=\begin{bmatrix}3 & 4 & 1\\ 3 & -1 & 2\\ 1 & 2 & 4\end{bmatrix}$，**求**$M=2A^2+5AB-4BA+6B^2+(AB)^T$。

- **Python实现**

```
import numpy as np
A = np.array([[1,2,1,0],[2,1,0,1],[3,-2,2,1],[1,2,4,3]])
B = np.array([[3,4,1,-2],[2,1,2,2],[2,-2,2,1],[1,2,-4,3]])

M = 2*np.dot(A,A)-5*np.dot(A,B)+4*np.dot(B,A)____(1)____
print("Result = \n {}".format(M))
```

答案及解析

```
(1) -6*np.dot(B,B)+(np.dot(A,B).T)
```

```
import numpy as np
A = np.array([[1,2,1,0],[2,1,0,1],[3,-2,2,1],[1,2,4,3]])
B = np.array([[3,4,1,-2],[2,1,2,2],[2,-2,2,1],[1,2,-4,3]])

M = 2*np.dot(A,A)+5*np.dot(A,B)-4*np.dot(B,A)+6*np.dot(B,B)+(np.dot(A,B).T)
print("Result = \n {}".format(M))
```

```
Result =
 [[124  77 189  25]
 [ 95 114 -36  17]
 [ 91  68 -36 -48]
 [161  73 -68 134]]
```

4.【计算题】

矩阵的加法：设存在矩阵$A=\begin{bmatrix}-1.2 & 3.4 & -5.6\\ 7.8 & -9.1 & 0.7\end{bmatrix}$**，和向量**$u=[30,50]^T$**。试求** $(4A+2b)-(2A-3b)$**。**

- **Python实现**

```
import numpy as np
A = np.array([[-1.2,3.4,-5.6],[7.8,-9.1,0.7]])
u = ____(1)____

print(____(2)____)
```

答案及解析

```
(1) np.array([[30,50]]).T
(2) (4*A+2*u)-(2*A-3*u)
```

```
import numpy as np
A = np.array([[-1.2,3.4,-5.6],[7.8,-9.1,0.7]])
u = np.array([[30,50]]).T

print((4*A+2*u)-(2*A-3*u))
```

```
[[147.6 156.8 138.8]
 [265.6 231.8 251.4]]
```