实现矩阵运算

源码

使用 numpy 包实现矩阵的一些基本运算，代码如下：

```python
import numpy as np


#矩阵定义
matrix_a = np.array([[4, 2, 1, 3],
                     [0, 1, 3, 2],
                     [2, 0, 1, 4],
                     [1, 3, 2, 1]])

matrix_b = np.array([[1, 3, 2, 4],
                     [2, 1, 4, 3],
                     [3, 4, 1, 2],
                     [4, 2, 3, 1]])


print("原始矩阵A (4x4):")
print(matrix_a)
print("\n原始矩阵B (4x4):")
print(matrix_b)


#矩阵运算
add_result = matrix_a + matrix_b
print("\n矩阵加法结果 (A + B):")
print(add_result)


sub_result = matrix_a - matrix_b
print("\n矩阵减法结果 (A - B):")
print(sub_result)


s = 2
mult_result = s * matrix_a
print(f"\n矩阵数乘结果 (2 * A):")
print(mult_result)


mult_result = np.matmul(matrix_a, matrix_b)
print("\n矩阵乘积结果 (A × B):")
print(mult_result)


mult_result = np.multiply(matrix_a, matrix_b)
print("\n点乘结果 (A ⊙ B):")
print(mult_result)

```

```python
inv_a = np.linalg.inv(matrix_a)
print("\n矩阵A的逆:")
print(inv_a)


transpose_a = matrix_a.T
print("\n矩阵A的转置:")
print(transpose_a)


print("\n矩阵A切片:")

row_slice = matrix_a[1, :]
print("第2行:", row_slice)


col_slice = matrix_a[:, 2]
print("第3列:", col_slice)


submatrix1 = matrix_a[:2, :2]
print("左上角2x2子矩阵:")
print(submatrix1)


submatrix2 = matrix_a[2:, 2:]
print("右下角2x2子矩阵:")
print(submatrix2)


submatrix3 = matrix_a[1:3, 1:3]
print("中间2x2子矩阵:")
print(submatrix3)


det_a = np.linalg.det(matrix_a)
det_b = np.linalg.det(matrix_b)

print("\n行列式计算:")
print(f"矩阵A的行列式: {det_a:.2f}")
print(f"矩阵B的行列式: {det_b:.2f}")

```

执行

执行结果为:

```
(E:\conda_envs\AIMath) PS E:\conda_python\AIMath> python .\question1.py
原始矩阵A (4x4):
[[4 2 1 3]
 [0 1 3 2]
 [2 0 1 4]
 [1 3 2 1]]

原始矩阵B (4x4):
[[1 3 2 4]
 [2 1 4 3]
 [3 4 1 2]
 [4 2 3 1]]

矩阵加法结果 (A + B):
[[5 5 3 7]
 [2 2 7 5]
 [5 4 2 6]
 [5 5 5 2]]

矩阵减法结果 (A - B):
[[ 3 -1 -1 -1]
 [-2  0 -1 -1]
 [-1 -4  0  2]
 [-3  1 -1  0]]

矩阵数乘结果 (2 * A):
[[8 4 2 6]
 [0 2 6 4]
 [4 0 2 8]
 [2 6 4 2]]

矩阵乘积结果 (A × B):
[[23 24 26 27]
 [19 17 13 11]
 [21 18 17 14]
 [17 16 19 18]]

点乘结果 (A ⊙ B):
[[ 4  6  2 12]
 [ 0  1 12  6]
 [ 6  0  1  8]
 [ 4  6  6  1]]
```

```
矩阵A的逆:
[[ 0.62162162  0.2972973  -0.48648649 -0.51351351]
 [-0.32432432 -0.45945946  0.2972973   0.7027027 ]
 [ 0.37837838  0.7027027  -0.51351351 -0.48648649]
 [-0.40540541 -0.32432432  0.62162162  0.37837838]]

矩阵A的转置:
[[4 0 2 1]
 [2 1 0 3]
 [1 3 1 2]
 [3 2 4 1]]

矩阵A切片:
第2行: [0 1 3 2]
第3列: [1 3 1 2]
左上角2x2子矩阵:
[[4 2]
 [0 1]]
右下角2x2子矩阵:
[[1 4]
 [2 1]]
中间2x2子矩阵:
[[1 3]
 [0 1]]

行列式计算:
矩阵A的行列式: 37.00
矩阵B的行列式: 0.00
```