

剑指Offer（十九）：顺时针打印矩阵

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一、前言

本系列文章为《剑指Offer》刷题笔记。

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二、题目

输入一个矩阵，按照从外向里以顺时针的顺序依次打印出每一个数字，例如，如果输入如下矩阵：

```
1  2  3  4
5  6  7  8
9 10 11 12
13 14 15 16
```

则依次打印出数组：1, 2, 3, 4, 8, 12, 16, 15, 14, 13, 9, 5, 6, 7, 11, 10。

1、思路

将结果存入vector数组，从左到右，再从上到下，再从右到左，最后从下到上遍历。

2、代码

C++:

```
1 class Solution {
2 public:
3     vector<int> printMatrix(vector<vector<int>> matrix) {
4         int rows = matrix.size(); //行数
5         int cols = matrix[0].size(); //列数
6         vector<int> result;
7
8         if(rows == 0 && cols == 0){
9             return result;
10        }
11        int left = 0, right = cols - 1, top = 0, bottom = rows - 1;
12
13        while(left <= right && top <= bottom){
14            //从左到右
15            for(int i = left; i <= right; ++i){
16                result.push_back(matrix[top][i]);
17            }
18            //从上到下
19            for(int i = top + 1; i <= bottom; ++i){
20                result.push_back(matrix[i][right]);
21            }
22            //从右到左
23            if(top != bottom){
24                for(int i = right - 1; i >= left; --i){
25                    result.push_back(matrix[bottom][i]);
26                }
27            }
28            //从下到上
29            if(left < right){
30                for(int i = bottom; i >= top + 1; --i){
31                    result.push_back(matrix[i][left]);
32                }
33            }
34            left++;
35            right--;
36            top++;
37            bottom--;
38        }
39        return result;
40    }
41 }
```

```
26         }
27     }
28     //从下到上
29     if(left != right){
30         for(int i = bottom - 1; i > top; --i){
31             result.push_back(matrix[i][left]);
32         }
33     }
34     left++, top++, right--, bottom--;
35 }
36 return result;
37 }
38 };
```

Python2.7:

Pytho

```
1 # -*- coding:utf-8 -*-
2 class Solution:
3     # matrix类型为二维列表，需要返回列表
4     def printMatrix(self, matrix):
5         # write code here
6         rows = len(matrix)
7         cols = len(matrix[0])
8         result = []
9         if rows == 0 and cols == 0:
10             return result
11         left, right, top, bottom = 0, cols - 1, 0, rows - 1
12         while left <= right and top <= bottom:
13             for i in range(left, right+1):
14                 result.append(matrix[top][i])
15             for i in range(top+1, bottom+1):
16                 result.append(matrix[i][right])
17             if top != bottom:
18                 for i in range(left, right)[::-1]:
19                     result.append(matrix[bottom][i])
20             if left != right:
21                 for i in range(top+1, bottom)[::-1]:
22                     result.append(matrix[i][left])
23             left += 1
24             top += 1
25             right -= 1
26             bottom -= 1
27         return result
```

题目变型：

给定一个数字2，打印矩阵：

1	2
4	3

给定一个数字3，打印矩阵：

1	2	3
8	9	4
7	6	5

给定一个数字4，打印矩阵：

1	2	3	4
12	13	14	5
11	16	15	6
10	9	8	7

Python:

Pytho

```
1 # -*- coding:utf-8 -*-
2
3 def matrix(target):
4     num = target * target
5     left, right, top, bottom = 0, target-1, 0, target-1
6     res = [ [0 for col in range(target)] for row in range(target)]
7     each = 1
8     while left <= right and top <= bottom and each <= num:
9         for i in range(left, right+1):
10             res[top][i] = each
11             each += 1
12         for i in range(top+1, bottom+1):
13             res[i][right] = each
14             each += 1
15         if top != bottom:
16             for i in range(left, right)[::-1]:
17                 res[bottom][i] = each
18                 each += 1
19         if left != right and each <= num:
20             for i in range(top+1, bottom)[::-1]:
21                 res[i][left] = each
22                 each += 1
23         top += 1
24         left += 1
25         bottom -= 1
26         right -= 1
```

```
27     for i in range(len(res)):
28         print("\t".join('%s' %id for id in res[i]))
29
30 if __name__ == '__main__':
31     matrix(4)
```



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