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海龟绘图

阅读 455845

在1966年，Seymour Paper和Waly Feurzig发明了一种专门给儿童学习编程的语言——LOGO语言，它的特色就是通过编程指挥一个小海龟（turtle）在屏幕上绘图。

海龟绘图（Turtle Graphics）后来被移植到各种高级语言中，Python内置了turtle库，基本上100%复制了原始的Turtle Graphics的所有功能。

我们来看一个指挥小海龟绘制一个长方形的简单代码：

从turtle库的所有内容：

```
from turtle import *

# 设置画笔宽度:
width(6)

# 前进:
forward(100)
# 左转90度:
left(90)

# 绘制绿色:
pencolor('red')
forward(100)
right(90)

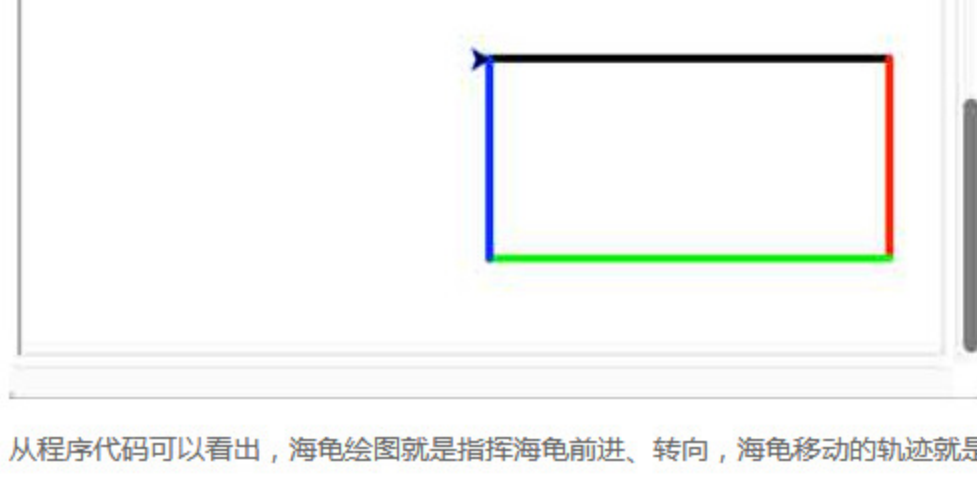
pencolor('green')
forward(100)
right(90)

pencolor('blue')
forward(100)
right(90)

done()
```

用Done()使得窗口等待被关闭，否则将立刻关闭窗口。

在命令行运行上述代码，会自动弹出一个绘图窗口，然后绘制出一个长方形：



从程序代码可以看出，海龟绘图就是指挥海龟前进、转向，海龟移动的轨迹就是绘制的线条。要绘制一个长方形，只需要让海龟前进、右转90度，反复4次。

调用width()函数可以设置画笔宽度，调用pencolor()函数可以设置颜色。更多操作请参考turtle库的说明。

绘图完成后，记得调用done()函数，让窗口进入消息循环，等待被关闭。否则，由于Python进程会立刻结束，将导致窗口被立刻关闭。

turtle库本身只是一个绘图库，但是配合Python代码，就可以绘制各种复杂的图形。例如，通过循环绘制5个五角星：

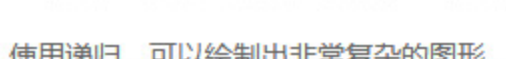
```
from turtle import *

def drawStar(x, y):
    pu()
    go(x, y)
    pd()
    # set heading: 0
    seth(0)
    for i in range(5):
        fd(60)
        rt(144)

for x in range(0, 250, 50):
    drawStar(x, 0)

done()
```

程序执行效果如下：



使用递归，可以绘制出非常复杂的图形。例如，下面的代码可以绘制一棵分型树：

```
from turtle import *

# 设置画笔颜色:
colormode(255)

lv = 0

lv = 14
l = 100
s = 45

width(3)

def drawTree(l, level):
    global r, g, b
    # save the current pen width
    w = width()

    # narrow the pen width
    widthw = 3.0 / 4.0
    # set color:
    r = r + 1
    g = g + 1
    b = b + 1
    pencolor(r % 200, g % 200, b % 200)

    l = 3.0 / 4.0 * l

    lt(60)
    fd(l)

    if level < lv:
        drawTree(l, level + 1)
    lt(120)
    rt(60 * s)
    fd(l)

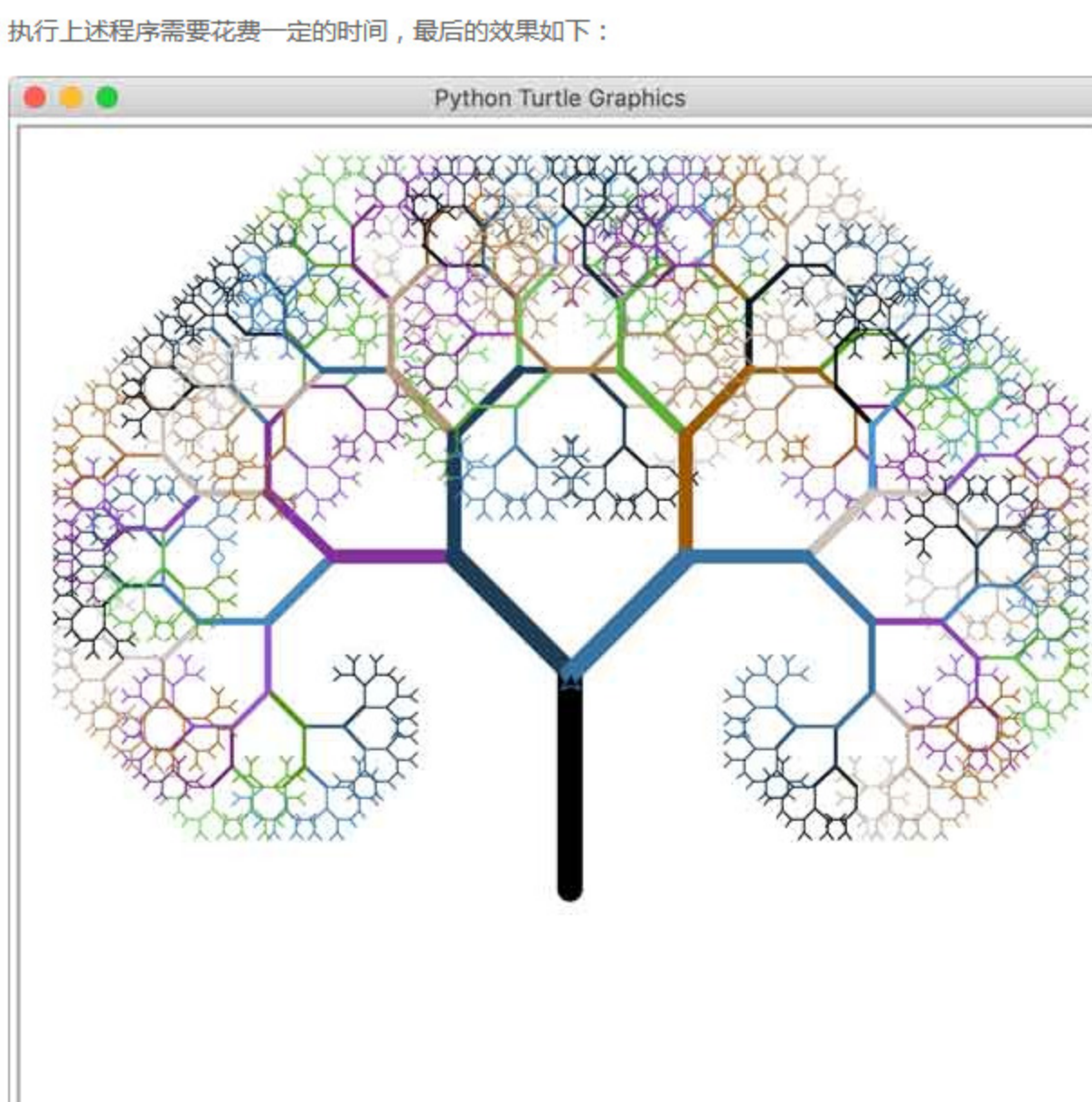
    if level < lv:
        drawTree(l, level + 1)
    lt(120)
    rt(60)

    # restore the previous pen width
    width(w)

speed('fastest')
drawTree(1, 0)

done()
```

执行上述程序需要花费一定的时间，最后的效果如下：



参考源码

rect.py

stars.py

tree.py

读后有收获可以请作者喝咖啡，读后有疑问请加群讨论：



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评论

- 新加的内容呀

南修一季

created at June 5, 2019 10:35 AM, Last updated at June 5, 2019 10:35 AM

上次看没有 只有我

查看全部讨论 回复
- 把例题改为面向对象式，这样VS code里面不会报错

最新回复

created at May 15, 2019 11:16 AM, Last updated at May 15, 2019 11:16 AM

```
#/usr/bin/env python3
# --coding utf-8
import turtle

def draw_tree(nlft, p_lenth, level):
    w_cur = self.width()

    self.width(w_cur * 3.0 / 4.0)
    # set color:
    self.colour_list[0] += 1
    self.colour_list[1] += 2
    self.colour_list[2] += 3
    self.pencolor((w % 200 for w in self.colour_list))

    p_lenth = 3.0 / 4.0 * p_lenth
    self.left(self.p_angle)
    self.forward(p_lenth)

    if level < self.p_size:
        draw_tree(nlft, p_lenth, level+1)
```

查看全部讨论 回复
- 试着画了一个分形三角形

ShengLoong

created at May 7, 2019 1:53 PM, Last updated at May 7, 2019 1:53 PM

```
# -- coding: gbk --
from turtle import *
def draw_tri(side, d):
    for i in range(3):
        fd(side)
        lt(120)
def draw_tri_inner(side, d1):
    side /= 2
    if side > 50:
        # 最小的三角形不能小于1个像素
        # 递归调用
        recursive_draw(side, d)
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