paintBoard.py

**from** PyQt5.QtWidgets **import** QWidget  
**import** sys, random, time, glob, os  
**from** PyQt5.QtCore **import** Qt, QSize, QTimer  
**from** PyQt5.QtWidgets **import** (QWidget, QHBoxLayout, QGridLayout, QLabel, QFrame)  
  
**class** PaintBoard(QWidget):  
  
 **def** \_\_init\_\_(self, Parent=**None**):  
 super().\_\_init\_\_(Parent)  
 self.\_\_InitData() *# 先初始化数据，再初始化界面* self.\_\_InitView()  
  
 **def** \_\_InitData(self): *# 初始化数据* self.\_\_size = QSize(480, 460) *# 设置界面大小* self.cell = dict() *# 储存全部像素点组件* self.cells = list() *# 储存全部像素点* self.arr = [(0, 0)] *# 用于选择坐标  
 # 各生物初始值* self.\_\_\_GrassNum = 10  
 self.\_\_\_MacrophyteNum = 5  
 self.\_\_\_RabbitNum = 1  
 self.\_\_\_SnakeNum = 1  
 self.\_\_\_TigerNum = 1  
 *# 存储对象* self.grassList = list()  
 self.macrophyteList = list()  
 self.rabbitList = list()  
 self.snakeList = list()  
 self.tigerList = list()  
  
 **def** \_\_InitView(self): *# 初始化界面* self.timer = QTimer() *# 建立计时器  
 #设置界面的尺寸为\_\_size* self.setFixedSize(self.\_\_size) *# 限制窗口大小* self.Floor = QHBoxLayout()  
 self.Form = QFrame()  
 *# self.Form.setFrameShape(QFrame.Panel|QFrame.Plain)  
 # self.Form.setFixedSize(465,445)* self.Form.setFixedSize(465, 445)  
 self.grid = QGridLayout()  
 self.grid.setSpacing(1)  
 self.Form.setLayout(self.grid)  
 self.Floor.addWidget(self.Form)  
 **for** row **in** range(10): *# 设置方格，每个方格代表一个生物* **for** col **in** range(10):  
 self.cell[(row, col)] = QLabel(self)  
 self.cell[(row, col)].setStyleSheet(  
 **'QLabel{background-color:white;border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**) *# border-image:url(img/grass.png);  
 # self.cell[(row,col)].setFixedSize(20,20)* self.grid.addWidget(self.cell[(row, col)], row, col)  
 self.cells.append((row, col))  
 self.setLayout(self.Floor)  
  
 *# 清空界面* **def** Clear(self):  
 self.timer.stop()  
 **for** row **in** range(10):  
 **for** col **in** range(10):  
 self.cell[(row, col)].setStyleSheet(  
 **'QLabel{background-color:white;border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
  
 *# 改变数量* **def** GrassNumChange(self, GrassNum=10):  
 self.\_\_\_GrassNum = GrassNum  
  
 **def** MacrophyteNumChange(self, MacrophyteNum=5):  
 self.\_\_\_MacrophyteNum = MacrophyteNum  
  
 **def** RabbitNumChange(self, RabbitNum=1):  
 self.\_\_\_RabbitNum = RabbitNum  
  
 **def** SnakeNumChange(self, SnakeNum=1):  
 self.\_\_\_SnakeNum = SnakeNum  
  
 **def** TigerNumChange(self, TigerNum=1):  
 self.\_\_\_TigerNum = TigerNum  
  
 *# 生成画面* **def** Print(self):  
 *#小草* i = 0  
 **while** i < self.\_\_\_GrassNum:  
 grass = [1, 0, 0, 10] *# 存储小草信息* tempdict = self.cells.copy()  
 arr = random.choice(tempdict)  
 grass[1] = arr[0]  
 grass[2] = arr[1]  
 self.grassList.append(grass) *#新对象加入到list中* self.cells.remove(arr)  
 self.cell[arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/grass.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 *# 大型植物* i = 0  
 **while** i < self.\_\_\_MacrophyteNum:  
 macrophyte = [2, 0, 0, 20] *# 存储大型植物信息* tempdict = self.cells.copy()  
 arr = random.choice(tempdict)  
 macrophyte[1] = arr[0]  
 macrophyte[2] = arr[1]  
 self.macrophyteList.append(macrophyte)  
 self.cells.remove(arr)  
 self.cell[arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/macrophyte.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 *# 兔子* i = 0  
 **while** i < self.\_\_\_RabbitNum:  
 rabbit = [3, 0, 0, 30] *# 存储兔子信息* tempdict = self.cells.copy()  
 arr = random.choice(tempdict)  
 rabbit[1] = arr[0]  
 rabbit[2] = arr[1]  
 self.rabbitList.append(rabbit)  
 self.cells.remove(arr)  
 self.cell[arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/rabbit.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 *# 蛇* i = 0  
 **while** i < self.\_\_\_SnakeNum:  
 snake = [4, 0, 0, 40] *# 存储蛇信息* tempdict = self.cells.copy()  
 arr = random.choice(tempdict)  
 snake[1] = arr[0]  
 snake[2] = arr[1]  
 self.snakeList.append(snake)  
 self.cells.remove(arr)  
 self.cell[arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/snake.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 *# 老虎* i = 0  
 **while** i < self.\_\_\_TigerNum:  
 tiger = [5, 0, 0, 50] *# 存储老虎信息* tempdict = self.cells.copy()  
 arr = random.choice(tempdict)  
 tiger[1] = arr[0]  
 tiger[2] = arr[1]  
 self.tigerList.append(tiger)  
 self.cells.remove(arr)  
 self.cell[arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/tiger.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 self.timer.start()  
 self.link()  
  
 *# 连接* **def** link(self):  
 self.timer.start(1000) *# 设置计时间隔并启动,间隔为1s=1000,2s=2000* **if** len(self.cells) == 0: *# 满屏暂停* self.timer.stop()  
 **else**:  
 self.timer.timeout.connect(self.Refresh) *# 计时结束更新画面  
  
 # 更新界面* **def** Refresh(self):  
 *# 生长和繁殖* self.grassGrowth() *# 小草* self.macrophyteGrowth() *# 大型植物* self.rabbitGrowth() *# 兔子* self.snakeGrowth() *# 蛇* self.tigerGrowth() *# 老虎  
 # 动物移动和捕食* self.rabbitMove() *# 兔子移动* self.snakeMove() *# 蛇移动* self.tigerMove() *# 老虎移动* print(**"该秒钟兔子的数量:%s"** % self.\_\_\_RabbitNum)  
  
  
 *# 生长和繁殖* **def** grassGrowth(self):  
 i = 0  
 **while** i < self.\_\_\_GrassNum:  
 self.grass = [0, 0, 0, 0]  
 self.grass = self.grassList.pop(0) *#list要先pop再append* **if** self.grass[3] < 25: *#繁殖下限* self.grass[3] = self.grass[3] + 2 *#增加自身物质* self.grassList.append(self.grass)  
 **else**: *# 繁殖* self.grass[3] = self.grass[3] - 8 *#繁殖减少自身物质* self.grassList.append(self.grass)  
 self.grass = [1, 0, 0, 10] *#繁殖后的新对象* tempdict = self.cells.copy()  
 self.arr = random.choice(tempdict)  
 self.grass[1] = self.arr[0]  
 self.grass[2] = self.arr[1]  
 self.grassList.append(self.grass)  
 self.\_\_\_GrassNum = self.\_\_\_GrassNum + 1 *#整体数量+1* self.cells.remove(self.arr)  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/grass.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 **def** macrophyteGrowth(self):  
 i = 0  
 **while** i < self.\_\_\_MacrophyteNum:  
 self.macrophyte = [0, 0, 0, 0]  
 self.macrophyte = self.macrophyteList.pop(0)  
 **if** self.macrophyte[3] < 80:  
 self.macrophyte[3] = self.macrophyte[3] + 4  
 self.macrophyteList.append(self.macrophyte)  
 **else**: *# 繁殖* self.macrophyte[3] = self.macrophyte[3] - 16  
 self.macrophyteList.append(self.macrophyte)  
 self.macrophyte = [2, 0, 0, 20] *# 存储大型植物信息* tempdict = self.cells.copy()  
 self.arr = random.choice(tempdict)  
 self.macrophyte[1] = self.arr[0]  
 self.macrophyte[2] = self.arr[1]  
 self.macrophyteList.append(self.macrophyte)  
 self.\_\_\_MacrophyteNum = self.\_\_\_MacrophyteNum + 1  
 self.cells.remove(self.arr)  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/macrophyte.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 i = i + 1  
  
 **def** rabbitGrowth(self):  
 i = 0  
 **while** i < self.\_\_\_RabbitNum:  
 self.rabbit = [0, 0, 0, 0]  
 self.rabbit = self.rabbitList.pop(0)  
 **if** self.rabbit[3] < 120:  
 self.rabbit[3] = self.rabbit[3] + 6  
 self.rabbitList.append(self.rabbit)  
 **else**: *# 繁殖* self.rabbit[3] = self.rabbit[3] - 24  
 self.rabbitList.append(self.rabbit)  
 newrabbit = [3, 0, 0, 30]  
 newrabbit[1] = self.rabbit[1]  
 newrabbit[2] = self.rabbit[2]  
 self.rabbitList.append(newrabbit)  
 self.\_\_\_RabbitNum = self.\_\_\_RabbitNum + 1  
 i = i + 1  
  
 **def** snakeGrowth(self):  
 i = 0  
 **while** i < self.\_\_\_SnakeNum:  
 self.snake = [0, 0, 0, 0]  
 self.snake = self.snakeList.pop(0)  
 **if** self.snake[3] < 160:  
 self.snake[3] = self.snake[3] + 8  
 self.snakeList.append(self.snake)  
 **else**: *# 繁殖* self.snake[3] = self.snake[3] - 32  
 self.snakeList.append(self.snake)  
 newsnake = [4, 0, 0, 40] *# 存储蛇信息* newsnake[1] = self.snake[1]  
 newsnake[2] = self.snake[2]  
 self.snakeList.append(newsnake)  
 self.\_\_\_SnakeNum = self.\_\_\_SnakeNum + 1  
 i = i + 1  
  
 **def** tigerGrowth(self):  
 i = 0  
 **while** i < self.\_\_\_TigerNum:  
 self.tiger = [0, 0, 0, 0]  
 self.tiger = self.tigerList.pop(0)  
 **if** self.tiger[3] < 200:  
 self.tiger[3] = self.tiger[3] + 10  
 self.tigerList.append(self.tiger)  
 **else**: *# 繁殖* self.tiger[3] = self.tiger[3] - 40  
 self.tigerList.append(self.tiger)  
 newtiger = [5, 0, 0, 50] *# 存储小草信息* newtiger[1] = self.tiger[1]  
 newtiger[2] = self.tiger[2]  
 self.tigerList.append(newtiger)  
 self.\_\_\_TigerNum = self.\_\_\_TigerNum + 1  
  
 i = i + 1  
  
 *# 移动和捕食* **def** rabbitMove(self):  
 i = 0  
 **while** i < self.\_\_\_RabbitNum:  
 self.rabbit = [0, 0, 0, 0] *#获取该兔子对象的信息* self.rabbit = self.rabbitList.pop(0)  
 self.arr = (self.rabbit[1], self.rabbit[2])  
 self.cells.append(self.arr) *#先从list和界面中删掉* self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.moveChoose() *#选择移动方向* flag = 0 *# 0-没碰撞，1-被吃，2-吃其他* j = 0  
 **while** j < self.\_\_\_GrassNum:  
 self.grass = [0, 0, 0, 0]  
 self.grass = self.grassList.pop(0)  
 grassarr = (self.grass[1], self.grass[2])  
 **if** self.arr[0] == grassarr[0] **and** self.arr[1] == grassarr[1]: *#吃草* self.rabbit[3] += self.grass[3] / 2 *#获取草的物质* flag = 2  
 **else**:  
 self.grassList.append(self.grass)  
 j = j + 1  
 self.\_\_\_GrassNum = len(self.grassList) *#修改相应数量* j = 0  
 **while** j < self.\_\_\_MacrophyteNum:  
 self.macrophyte = [0, 0, 0, 0]  
 self.macrophyte = self.macrophyteList.pop(0)  
 macrophytearr = (self.macrophyte[1], self.macrophyte[2])  
 **if** self.arr[0] == macrophytearr[0] **and** self.arr[1] == macrophytearr[1]: *# 吃大型植物* self.rabbit[3] += self.macrophyte[3] / 2  
 flag = 2  
 **else**:  
 self.macrophyteList.append(self.macrophyte)  
 j = j + 1  
 self.\_\_\_MacrophyteNum = len(self.macrophyteList)  
  
 j = 0  
 **while** j < self.\_\_\_SnakeNum:  
 self.snake = [0, 0, 0, 0]  
 self.snake = self.snakeList.pop(0)  
 snakearr = (self.snake[1], self.snake[2])  
 **if** self.arr[0] == snakearr[0] **and** self.arr[1] == snakearr[1]: *#被蛇吃* self.snake[3] = self.snake[3] + self.rabbit[3] / 2  
 flag = 1  
 self.snakeList.append(self.snake)  
 **else**:  
 self.snakeList.append(self.snake)  
 j = j + 1  
 self.\_\_\_SnakeNum = len(self.snakeList)  
  
 j = 0  
 **while** j < self.\_\_\_TigerNum:  
 self.tiger = [0, 0, 0, 0]  
 self.tiger = self.tigerList.pop(0)  
 tigerarr = (self.tiger[1], self.tiger[2])  
 **if** self.arr[0] == tigerarr[0] **and** self.arr[1] == tigerarr[1]: *# 被老虎吃* self.tiger[3] = self.tiger[3] + self.rabbit[3] / 2  
 flag = 1  
 self.tigerList.append(self.tiger)  
 **else**:  
 self.tigerList.append(self.tiger)  
 j = j + 1  
 self.\_\_\_TigerNum = len(self.tigerList)  
  
 *#根据flag判断有没有被吃或者吃掉其他* **if** flag == 0 **or** flag == 2:  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/rabbit.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.rabbit[1] = self.arr[0]  
 self.rabbit[2] = self.arr[1]  
 self.rabbitList.append(self.rabbit)  
 **if** (self.arr **in** self.cells):  
 self.cells.remove(self.arr)  
 i = i + 1  
 self.\_\_\_RabbitNum = len(self.rabbitList)  
 *#print("rabbit:%s" % self.\_\_\_RabbitNum)* **def** snakeMove(self):  
 i = 0  
 **while** i < self.\_\_\_SnakeNum:  
 self.snake = [0, 0, 0, 0]  
 self.snake = self.snakeList.pop(0)  
 self.arr = (self.snake[1], self.snake[2])  
 self.cells.append(self.arr)  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.moveChoose()  
 flag = 0 *# 0-没碰撞，1-被吃，2-吃其他* j = 0  
 **while** j < self.\_\_\_GrassNum:  
 self.grass = [0, 0, 0, 0]  
 self.grass = self.grassList.pop(0)  
 grassarr = (self.grass[1], self.grass[2])  
 **if** self.arr[0] == grassarr[0] **and** self.arr[1] == grassarr[1]: *#吃草* self.snake[3] += self.grass[3] / 2  
 flag = 2  
 **else**:  
 self.grassList.append(self.grass)  
 j = j + 1  
 self.\_\_\_GrassNum = len(self.grassList)  
  
 j = 0  
 **while** j < self.\_\_\_MacrophyteNum:  
 self.macrophyte = [0, 0, 0, 0]  
 self.macrophyte = self.macrophyteList.pop(0)  
 macrophytearr = (self.macrophyte[1], self.macrophyte[2])  
 **if** self.arr[0] == macrophytearr[0] **and** self.arr[1] == macrophytearr[1]: *#吃大型植物* self.snake[3] += self.macrophyte[3] / 2  
 flag = 2  
 **else**:  
 self.macrophyteList.append(self.macrophyte)  
 j = j + 1  
 self.\_\_\_MacrophyteNum = len(self.macrophyteList)  
  
 j = 0  
 **while** j < self.\_\_\_RabbitNum:  
 self.rabbit = [0, 0, 0, 0]  
 self.rabbit = self.rabbitList.pop(0)  
 rabbitarr = (self.rabbit[1], self.rabbit[2])  
 **if** self.arr[0] == rabbitarr[0] **and** self.arr[1] == rabbitarr[1]: *#吃兔子* self.snake[3] += self.rabbit[3] / 2  
 flag = 2  
 **else**:  
 self.rabbitList.append(self.rabbit)  
 j = j + 1  
 self.\_\_\_RabbitNum = len(self.rabbitList)  
  
 j = 0  
 **while** j < self.\_\_\_TigerNum:  
 self.tiger = [0, 0, 0, 0]  
 self.tiger = self.tigerList.pop(0)  
 tigerarr = (self.tiger[1], self.tiger[2])  
 **if** self.arr[0] == tigerarr[0] **and** self.arr[1] == tigerarr[1]: *# 被老虎吃* self.tiger[3] = self.tiger[3] + self.snake[3] / 2  
 flag = 1  
 self.tigerList.append(self.tiger)  
 **else**:  
 self.tigerList.append(self.tiger)  
 j = j + 1  
 self.\_\_\_TigerNum = len(self.tigerList)  
  
 *#根据flag判断有没有被吃或者吃掉其他* **if** flag == 0 **or** flag == 2:  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/snake.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.snake[1] = self.arr[0]  
 self.snake[2] = self.arr[1]  
 self.snakeList.append(self.snake)  
 **if** (self.arr **in** self.cells):  
 self.cells.remove(self.arr)  
 i = i + 1  
 self.\_\_\_SnakeNum = len(self.snakeList)  
 *#print("snake:%s" % self.\_\_\_SnakeNum)* **def** tigerMove(self):  
 i = 0  
 **while** i < self.\_\_\_TigerNum:  
 self.tiger = [0, 0, 0, 0]  
 self.tiger = self.tigerList.pop(0)  
 self.arr = (self.tiger[1], self.tiger[2])  
 self.cells.append(self.arr)  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.moveChoose()  
 flag = 0 *# 0-没碰撞，1-被吃，2-吃植物* j = 0  
 **while** j < self.\_\_\_GrassNum:  
 self.grass = [0, 0, 0, 0]  
 self.grass = self.grassList.pop(0)  
 grassarr = (self.grass[1], self.grass[2])  
 **if** self.arr[0] == grassarr[0] **and** self.arr[1] == grassarr[1]: *#吃草* self.tiger[3] += self.grass[3] / 2  
 flag = 2  
 **else**:  
 self.grassList.append(self.grass)  
 j = j + 1  
 self.\_\_\_GrassNum = len(self.grassList)  
 j = 0  
 **while** j < self.\_\_\_MacrophyteNum:  
 self.macrophyte = [0, 0, 0, 0]  
 self.macrophyte = self.macrophyteList.pop(0)  
 macrophytearr = (self.macrophyte[1], self.macrophyte[2])  
 **if** self.arr[0] == macrophytearr[0] **and** self.arr[1] == macrophytearr[1]: *#吃大型植物* self.tiger[3] += self.macrophyte[3] / 2  
 flag = 2  
 **else**:  
 self.macrophyteList.append(self.macrophyte)  
 j = j + 1  
 self.\_\_\_MacrophyteNum = len(self.macrophyteList)  
 j = 0  
 **while** j < self.\_\_\_RabbitNum:  
 self.rabbit = [0, 0, 0, 0]  
 self.rabbit = self.rabbitList.pop(0)  
 rabbitarr = (self.rabbit[1], self.rabbit[2])  
 **if** self.arr[0] == rabbitarr[0] **and** self.arr[1] == rabbitarr[1]: *#吃兔子* self.tiger[3] += self.rabbit[3] / 2  
 flag = 2  
 **else**:  
 self.rabbitList.append(self.rabbit)  
 j = j + 1  
 self.\_\_\_RabbitNum = len(self.rabbitList)  
  
 j = 0  
 **while** j < self.\_\_\_SnakeNum:  
 self.snake = [0, 0, 0, 0]  
 self.snake = self.snakeList.pop(0)  
 snakearr = (self.snake[1], self.snake[2])  
 **if** self.arr[0] == snakearr[0] **and** self.arr[1] == snakearr[1]: *#吃蛇* self.tiger[3] += self.snake[3] / 2  
 flag = 2  
 **else**:  
 self.snakeList.append(self.snake)  
 j = j + 1  
 self.\_\_\_SnakeNum = len(self.snakeList)  
  
 *#根据flag判断有没有被吃或者吃掉其他* **if** flag == 0 **or** flag == 2:  
 self.cell[self.arr].setStyleSheet(  
 **'QLabel{background-color:white;border-image:url(img/tiger.png);border-width:1px;border-style:solid;border-color:LightSteelBlue;}'**)  
 self.tiger[1] = self.arr[0]  
 self.tiger[2] = self.arr[1]  
 self.tigerList.append(self.tiger)  
 **if** (self.arr **in** self.cells):  
 self.cells.remove(self.arr)  
 i = i + 1  
 self.\_\_\_TigerNum = len(self.tigerList)  
 *#print("tiger:%s" % self.\_\_\_TigerNum)  
  
 #选择移动方向* **def** moveChoose(self):  
 i = random.randint(1, 8)  
 **if** self.arr[0] == 0:*#在最左* i = random.choice([1, 2, 3, 5, 6])  
 **if** self.arr[0] == 9:*#在最右* i = random.choice([1, 2, 4, 7, 8])  
 **if** self.arr[1] == 0:*#在最上* i = random.choice([1, 3, 4, 5, 7])  
 **if** self.arr[1] == 9:*#在最下* i = random.choice([2, 3, 4, 6, 8])  
 **if** self.arr[0] == 0 **and** self.arr[1] == 0:*#在左上* i = random.choice([1, 3, 5])  
 **if** self.arr[0] == 0 **and** self.arr[1] == 9:*#在左下* i = random.choice([2, 3, 6])  
 **if** self.arr[0] == 9 **and** self.arr[1] == 0:*#在右上* i = random.choice([1, 4, 7])  
 **if** self.arr[0] == 9 **and** self.arr[1] == 9:*#在右下* i = random.choice([2, 4, 8])  
 **if** i == 1:*#向下* self.arr = (self.arr[0], self.arr[1] + 1)  
 **if** i == 2:*#向上* self.arr = (self.arr[0], self.arr[1] - 1)  
 **if** i == 3:*#向右* self.arr = (self.arr[0] + 1, self.arr[1])  
 **if** i == 4:*#向左* self.arr = (self.arr[0] - 1, self.arr[1])  
 **if** i == 5:*#右下* self.arr = (self.arr[0] + 1, self.arr[1] + 1)  
 **if** i == 6:*#右上* self.arr = (self.arr[0] + 1, self.arr[1] - 1)  
 **if** i == 7:*#左下* self.arr = (self.arr[0] - 1, self.arr[1] + 1)  
 **if** i == 8:*#左上* self.arr = (self.arr[0] - 1, self.arr[1] - 1)