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from microbit import *
import music
import radio
import random

def sq(a,b,c):  # 计算以a,b,c为顶点的三角形的有向面积
    return a[0]*(b[1]-c[1]) + a[1]*(c[0]-b[0]) + b[0]*c[1] - b[1]*c[0]

def f(a,b,c,p):  # 判断以a,b,c为顶点的三角形内部是否存在对方的点
    return sq(p,b,c)*sq(a,b,c) >= 0 and sq(a,p,c)*sq(a,b,c) >= 0 and sq(a,b,p)*sq(a,b,c) >= 0

rst = [Image('00000:00000:00900:00000:00000'),Image('00000:00900:00000:00900:00000'),Image(
'00000:00900:00900:00900:00000'),Image('00000:09090:00000:09090:00000'),\
       Image('00000:09090:09090:09090:00000'),Image('00000:09090:09090:09090:09090')]  # 不同点数骰子的像素图

praise = [Image('09000:09900:09990:09990:09990'),Image('00000:99999:99990:99900:00000'),Image(
'09000:09900:09990:09990:09990'),Image('00000:99999:99990:99900:00000'),\
          Image('09000:09900:09990:09990:09990'),Image('00000:99999:99990:99900:00000')]  # 点赞图案的像素图

d = display
p = d.show
ps = d.scroll

while True:
    score = [0, 0]  # 双方的分数
    np = 0  # 判断是否由当前玩家落子
    i = Image('00000:'*5)
    s = i.set_pixel
    x = y = 2
    sp = []  # 我方点集
    ep = []  # 对方点集
    tp = []  # 总点集
    mod = 0  # 模式数
    ps("1 or 2")
    while True:
        p(Image.ARROW_S)  # 指示引脚2
        sleep(500)
        if pin2.is_touched():  # 按引脚2进入双人模式
            mod = 2
            ps('2')
            music.play(music.POWER_UP)
            break
        p(Image.ARROW_SW)  # 指示引脚1
        sleep(500)
        if pin1.is_touched():  # 按引脚1进入单人模式
            mod = 1
            ps('1')
            music.play(music.POWER_UP)
            break
        if pin0.is_touched():  # 按引脚0不进入游戏
            p(Image('00009:09090:00000:09990:90009'))
            music.play(music.POWER_DOWN)
            sleep(2000)
    d.clear()
    if mod == 2:  # 双人模式
        ps('SHAKE')
        while True:  # 通过摇骰子决定先后手
            p(rst,delay=100,wait=True)
            if accelerometer.is_gesture('shake'):
                r = random.randint(0,5)  # 生成随机数
                p(rst[r])
                sleep(1000)
                r = str(r)
                radio.on()  # 开启无线电
                for o in range(20):  # 问对方发送带有随机数的信号
                    sleep(100)
                    radio.send(r)
                while True:
                    radio.send(r)
                    rec = radio.receive()  # 接受信号
                    if rec != None:
                        break
                radio.off()  # 关闭无线电
                if r > rec:  # 先手
                    p(Image('00900:99999:00900:09090:90009'))
                    music.play(music.JUMP_UP)
                    sleep(2000)
                    np = 1
                    break
                elif r < rec:  # 后手
                    p(Image('00900:00900:09990:90909:00900'))
                    music.play(music.JUMP_DOWN)
                    sleep(2000)
                    np = 0
                    break
                else:
                    p(Image('00000:09990:00000:09990:00000'))

        d.clear()
    while True:
        if score[0] * score[1] == 0:  # 进入回合条件 双方至少有一方尚未得分
            if np % 2:  # 我方玩家落子
                pd = 0
                if not (x,y) in tp:
                    s(x,y,9)
                if button_b.was_pressed():
                    if not (x,y) in tp:
                        s(x,y,0)
                    x = (x + 1) % 5
                    if not (x,y) in tp:
                        s(x,y,9)
                if button_a.was_pressed():
                    if not (x,y) in tp:
                        s(x,y,0)
                    y = (y + 1) % 5
                    if not (x,y) in tp:
                        s(x,y,9)
                if pin_logo.is_touched():
                    if not (x,y) in tp:
                        pd = 1
                        np += 1
                        sp.append((x,y))
                        tp.append((x,y))
                if pin0.is_touched():  # 电脑辅助判断落子
                    if not (x,y) in tp:
                        s(x,y,0)
                    if np == 1:
                        x = 1
                        y = 4
                    elif np == 3:
                        if (4,4) not in tp:
                            x = y = 4
                        else:
                            x = 4
                            y = 0
                    else:
                        esc = 0
                        mxy = [-1,-1]
                        for x in range(5):
                            for y in range(5):
                                c = (x,y)
                                if (x,y) in tp:
                                    continue
                                else:  # 判断在何点处可使面积取最大值
                                    for a in sp:
                                        for b in sp:
                                            if True in list(f(a,b,c,p) for p in ep) or not ep:
                                                continue
                                            else:
                                                ns = abs(sq(a,b,c))
                                                if ns > esc:
                                                    esc = ns
                                                    mxy = [x,y]
                        if mxy[0] != -1:
                            x = mxy[0]
                            y = mxy[1]
                        else:
                            while True:
                                x = random.randint(0,4)
                                y = random.randint(0,4)
                                if (x,y) not in tp:
                                    break
                    s(x,y,9)
                    sp.append((x,y))
                    tp.append((x,y))
                    np += 1
                    pd = 1
                    sleep(500)
                p(1)
                if pd:  # 若我方落子 则判断场上局面及得分
                    c = (x,y)
                    for a in sp:
                        for b in sp:
                            if True in list(f(a,b,c,p) for p in ep) or not ep:
                                continue
                            else:
                                score[0] = max(score[0], abs(sq(a,b,c)))
                    if mod == 2:  # （双人模式） 发送我方落子信号
                        radio.on()
                        for o in range(10):
                            sleep(100)
                            radio.send_bytes(bytearray([x,y]))
                        radio.off()
            else:
                if mod == 2:  # 接受对方落子信号
                    radio.on()
                    while True:
                        rec = radio.receive_bytes()
                        if rec != None:
                            break
                    radio.off()
                    otp = tuple(rec)
                    x, y = otp[0], otp[1]
                    s(x,y,5)
                    ep.append((x,y))
                    tp.append((x,y))
                    np += 1
                elif mod == 1:  # （单人模式） 电脑判断落子
                    if np == 0:
                        x = 1
                        y = 0
                        s(x,y,5)
                        ep.append((x,y))
                        tp.append((x,y))
                        np += 1
                    elif np == 2:
                        if (4,4) not in tp:
                            x = y = 4
                            s(x,y,5)
                            ep.append((x,y))
                            tp.append((x,y))
                            np += 1
                        else:
                            x = 2
                            y = 4
                            s(x,y,5)
                            ep.append((x,y))
                            tp.append((x,y))
                            np += 1
                    else:
                        esc = 0
                        mxy = [-1,-1]
                        for x in range(5):
                            for y in range(5):
                                c = (x,y)
                                if (x,y) in tp:
                                    continue
                                else:
                                    for a in ep:
                                        for b in ep:
                                            if True in list(f(a,b,c,p) for p in sp) or not sp:
                                                continue
                                            else:
                                                ns = abs(sq(a,b,c))
                                                if ns > esc:
                                                    esc = ns
                                                    mxy = [x,y]
                        if mxy[0] != -1:
                            x = mxy[0]
                            y = mxy[1]
                            s(x,y,5)
                            ep.append((x,y))
                            tp.append((x,y))
                            np += 1
                        else:
                            while True:
                                x = random.randint(0,4)
                                y = random.randint(0,4)
                                if (x,y) not in tp:
                                    s(x,y,5)
                                    ep.append((x,y))
                                    tp.append((x,y))
                                    np += 1
                                    break

                p(1)
                c = (x,y)
                for a in ep:
                    for b in ep:
                        if True in list(f(a,b,c,p) for p in sp) or not sp:
                            continue
                        else:
                            score[1] = max(score[1], abs(sq(a,b,c)))
        else:
            break
    sleep(500)
    ps(score[0])
    ps(score[1])
    if score[0] > score[1]:  # 判断二者得分并输出最终结果
        p(Image.HAPPY)
        sleep(500)
        ps('AC')
        p(praise,wait=False,delay=500)
        music.play(music.RINGTONE)
    elif score[0] < score[1]:
        p(Image.SAD)
        sleep(500)
        ps('WA')
        p(Image.SAD)
        music.play(music.WAWAWAWAWA)
    else:
        p(Image.ASLEEP)
        music.play(music.DADADADUM)
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