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Новицкий Ярослав ИУ5-35Б

Парадигмы и конструкции языков программирования

ОТЧЁТ ПО
Домашнему заданию

Москва
2023

Постановка задачи.

Написать полнофункциональную игру "Flappy Bird" с использованием библиотеки Pygame, обеспечивающую интерактивное управление птицей, генерацию препятствий и подсчет счета игрока.

Текст программы.

```
import pygame
import random

pygame.init()

clock = pygame.time.Clock()
fps = 60

screen_width = 864
screen_height = 936

screen = pygame.display.set_mode((screen_width, screen_height))
pygame.display.set_caption('Flappy Bird')

#define font
font = pygame.font.SysFont('Bauhaus 93', 60)

#define colours
white = (255, 255, 255)

#define game variables
ground_scroll = 0
scroll_speed = 4
flying = False
game_over = False
pipe_gap = 150
pipe_frequency = 1500 #milliseconds
last_pipe = -pipe_frequency
score = 0
pause_time = 0
stop_time = 0
pass_pipe = False


#load images
bg = pygame.image.load('img/bg.png')
ground_img = pygame.image.load('img/ground.png')
button_img = pygame.image.load('img/restart.png')
game_over_img = pygame.image.load('img/game_over2.png')


def draw_text(text, font, text_col, x, y):
    img = font.render(text, True, text_col)
    screen.blit(img, (x, y))


def reset_game():
    pipe_group.empty()
    flappy.rect.x = 100
    flappy.rect.y = int(screen_height / 2)
    score = 0
    return score
```

```
class Bird(pygame.sprite.Sprite):
    def __init__(self, x, y):
        pygame.sprite.Sprite.__init__(self)
        self.images = []
        self.index = 0
        self.counter = 0
        for num in range(1, 4):
            img = pygame.image.load(f'img/bird{num}.png')
            self.images.append(img)
        self.image = self.images[self.index]
        self.rect = self.image.get_rect()
        self.rect.center = [x, y]
        self.vel = 0
        self.clicked = False

    def update(self):

        if flying == True:
            #gravity
            self.vel += 0.5
            if self.vel > 8:
                self.vel = 8
            if self.rect.bottom < 768:
                self.rect.y += int(self.vel)

        if game_over == False:
            #jump
            if pygame.mouse.get_pressed()[0] == 1 and self.clicked == False:
                self.clicked = True
                self.vel = -10
            if pygame.mouse.get_pressed()[0] == 0:
                self.clicked = False

            #handle the animation
            self.counter += 1

            if self.counter > 5:
                self.counter = 0
                self.index += 1
                if self.index >= len(self.images):
                    self.index = 0
            self.image = self.images[self.index]

            #rotate the bird
            self.image = pygame.transform.rotate(self.images[self.index], self.vel
* -2)
        else:
            self.image = pygame.transform.rotate(self.images[self.index], -90)



class Pipe(pygame.sprite.Sprite):
    def __init__(self, x, y, position):
        pygame.sprite.Sprite.__init__(self)
        self.image = pygame.image.load('img/pipe.png')
        self.rect = self.image.get_rect()
        #position 1 is from the top, -1 is from the bottom
        if position == 1:
```

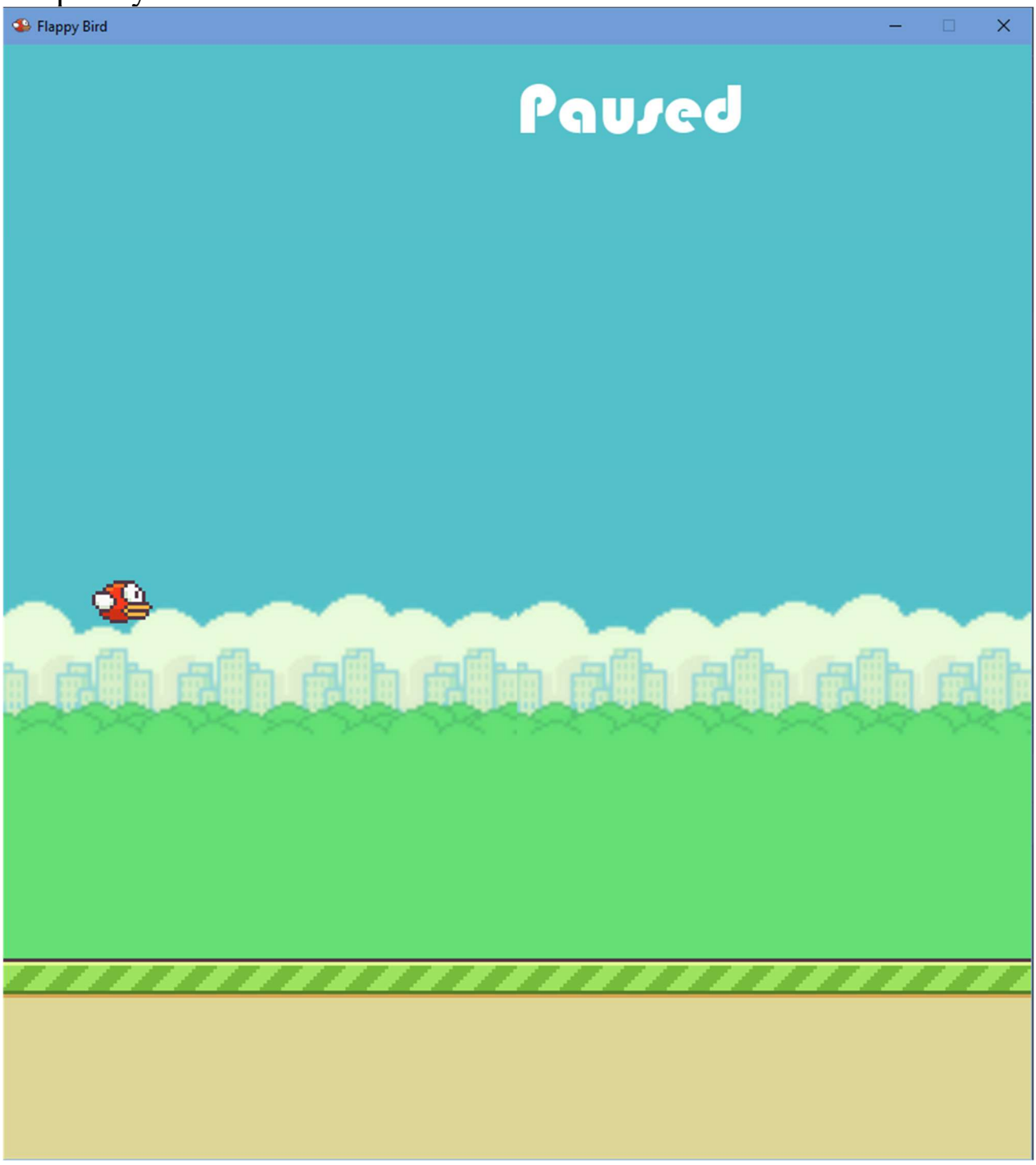
```
            self.image = pygame.transform.flip(self.image, False, True)
            self.rect.bottomleft = [x, y - int(pipe_gap / 2)]
        if position == -1:
            self.rect.topleft = [x, y + int(pipe_gap / 2)]

    def update(self):
        self.rect.x -= scroll_speed
        if self.rect.right < 0:
            self.kill()


class Button():
    def __init__(self, x, y, image):
        self.image = image
        self.rect = self.image.get_rect()
        self.rect.topleft = (x, y)

    def draw(self):

        action = False

        #get mouse position
        pos = pygame.mouse.get_pos()

        #check if mouse is over the button
        if self.rect.collidepoint(pos):
            if pygame.mouse.get_pressed()[0] == 1:
                action = True

        #draw button
        screen.blit(self.image, (self.rect.x, self.rect.y))

        return action

bird_group = pygame.sprite.Group()
pipe_group = pygame.sprite.Group()

flappy = Bird(100, int(screen_height / 2))

bird_group.add(flappy)

#create restart button instance
button = Button(screen_width // 2 - 50, screen_height // 2 - 100, button_img)

run = True
while run:

    clock.tick(fps)

    #draw background
    screen.blit(bg, (0,0))

    bird_group.draw(screen)
    bird_group.update()
    pipe_group.draw(screen)

    #draw the ground
    screen.blit(ground_img, (ground_scroll, 768))

    #check the score
    if len(pipe_group) > 0:
```

```
        if bird_group.sprites()[0].rect.left > pipe_group.sprites()[0].rect.left\
           and bird_group.sprites()[0].rect.right <
pipe_group.sprites()[0].rect.right\
           and pass_pipe == False:
           pass_pipe = True
        if pass_pipe == True:
           if bird_group.sprites()[0].rect.left >
pipe_group.sprites()[0].rect.right:
              score += 1
              pass_pipe = False

    if flying == True or game_over == True:
       draw_text(str(score), font, white, int(screen_width / 2), 20)

    #look for collision
    if pygame.sprite.groupcollide(bird_group, pipe_group, False, False) or
flappy.rect.top < 0:
       game_over = True

    #check if bird has hit the ground
    if flappy.rect.bottom >= 768:
       game_over = True
       flying = False


    if game_over == False and flying == True:

       #generate new pipes

       time_now = pygame.time.get_ticks() - pause_time
       print(time_now)
       print(last_pipe)
       if time_now - last_pipe > pipe_frequency:
          pipe_height = random.randint(-100, 100)
          btm_pipe = Pipe(screen_width, int(screen_height / 2) + pipe_height, -
1)
          top_pipe = Pipe(screen_width, int(screen_height / 2) + pipe_height, 1)
          pipe_group.add(btm_pipe)
          pipe_group.add(top_pipe)
          last_pipe = time_now


       #draw and scroll the ground
       ground_scroll -= scroll_speed
       if abs(ground_scroll) > 35:
          ground_scroll = 0

       pipe_group.update()


    #check for game over and reset
    if game_over == True:
       screen.blit(game_over_img, (screen_width // 2 - 217, screen_height // 2 -
270))
       if button.draw() == True :
          game_over = False
          score = reset_game()
          last_pipe = -pipe_frequency
          score = 0
          pause_time = 0
          stop_time = 0
```

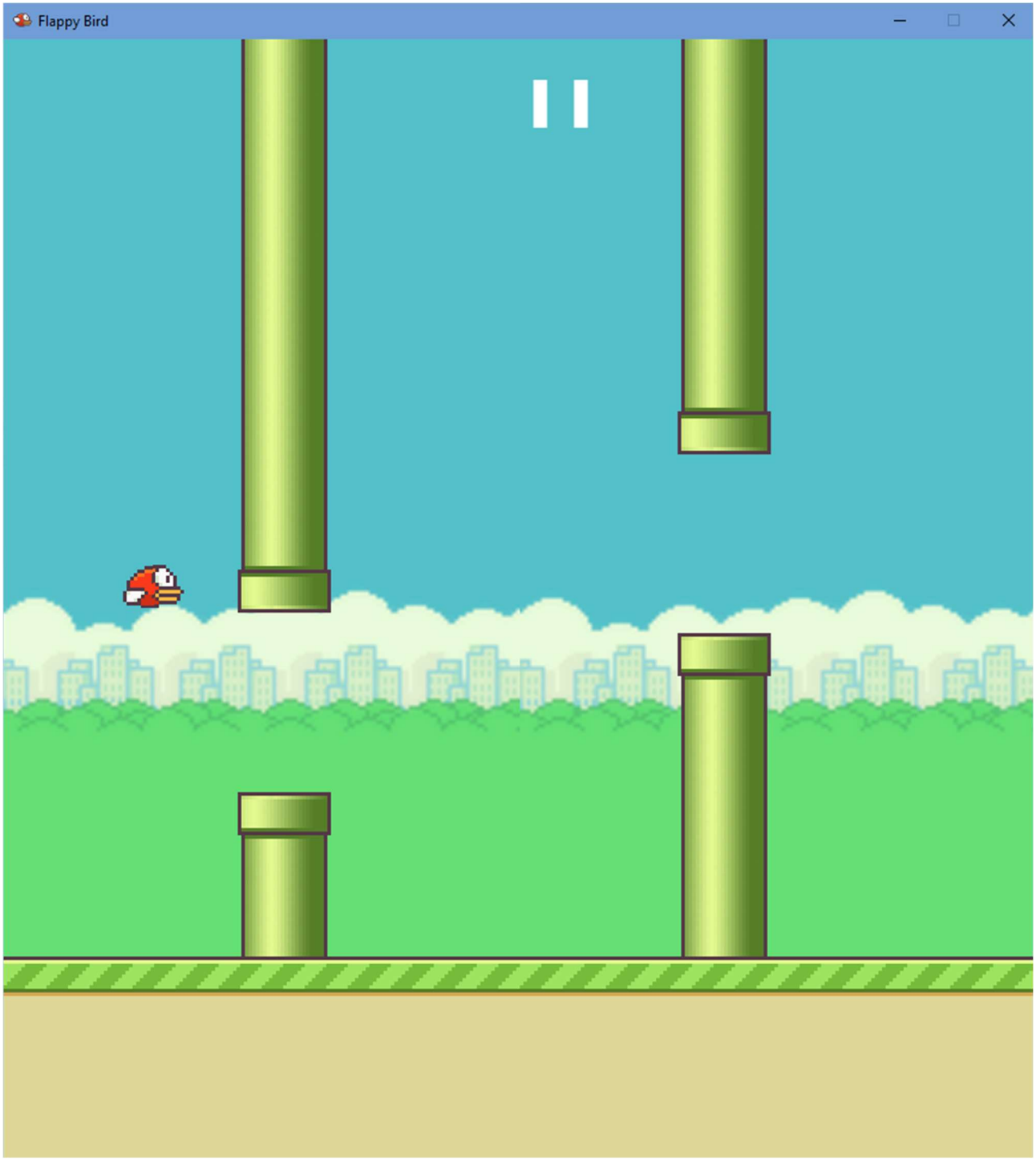
```
    if flying == False and game_over == False:
       draw_text('Paused', font, white, int(screen_width / 2), 20)


    for event in pygame.event.get():
       if event.type == pygame.QUIT:
          run = False
       if event.type == pygame.MOUSEBUTTONDOWN and flying == False and game_over
== False:
          flying = True
          pause_time += pygame.time.get_ticks() - stop_time
       if event.type == pygame.KEYDOWN and event.key == pygame.K_SPACE and fly-
ing == True and game_over == False:
          flying = False
          stop_time = pygame.time.get_ticks()


    pygame.display.update()

pygame.quit()
```

Экранные формы:

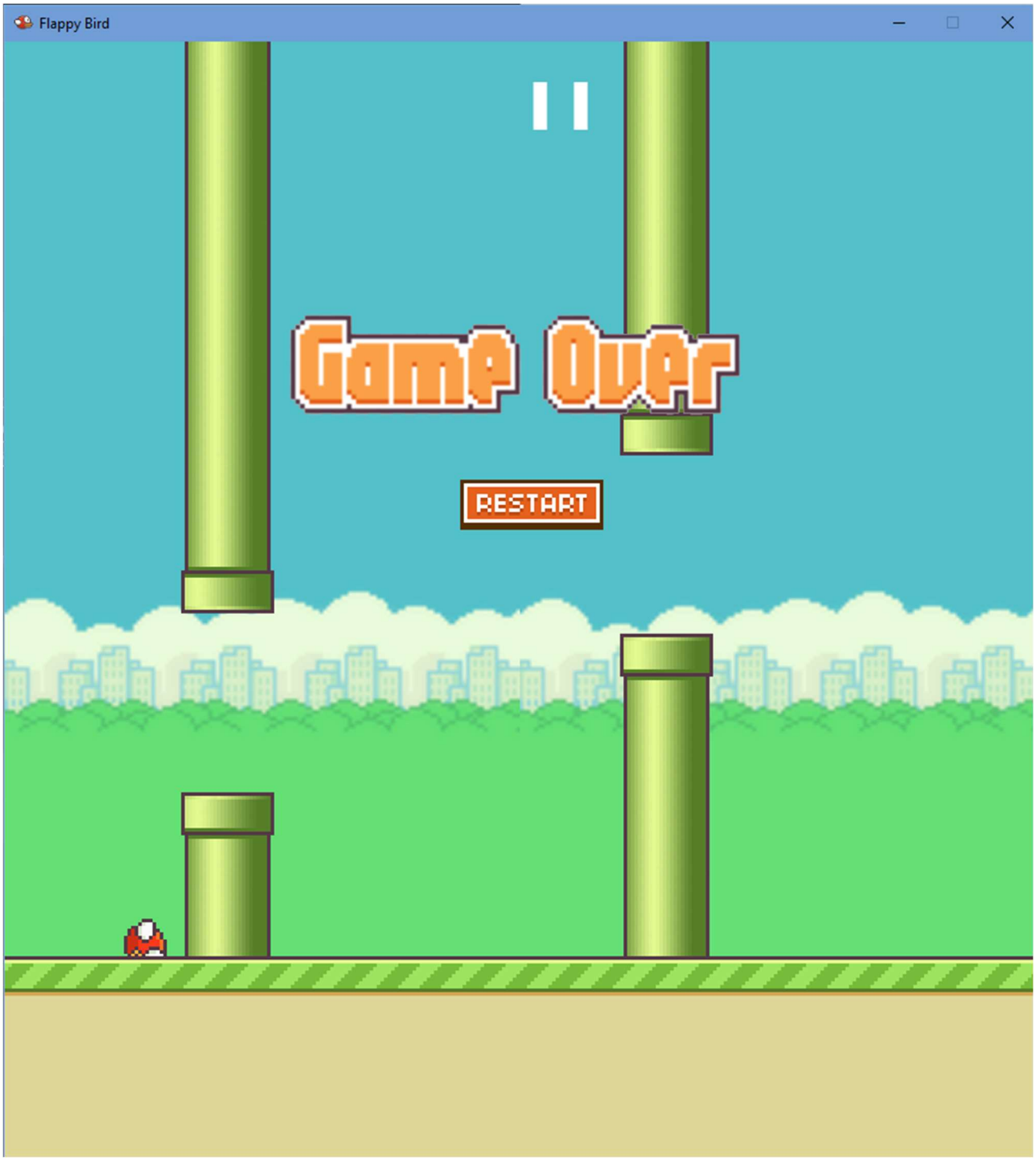
Старт/пауза

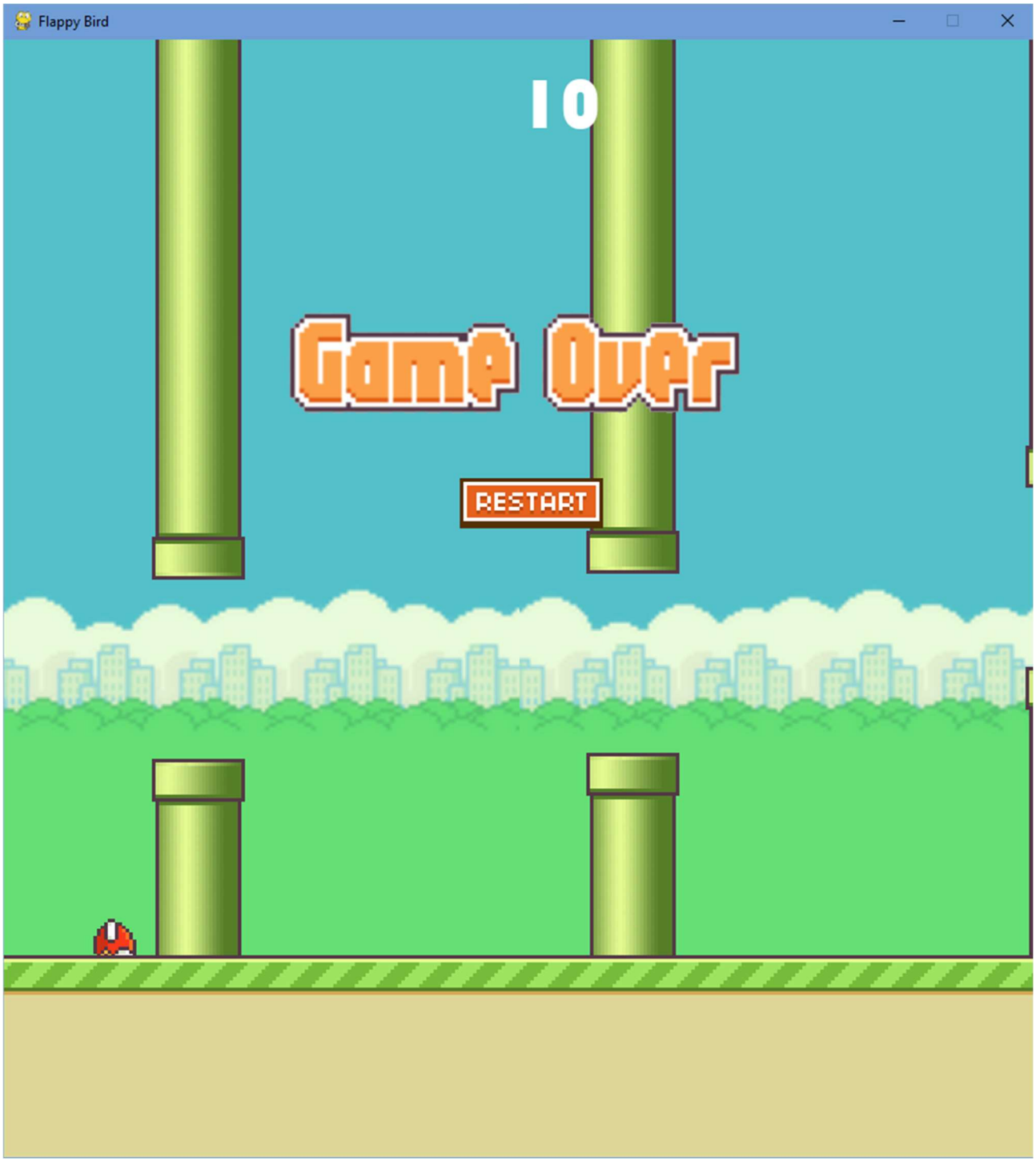


Полёт



Окончание игры




Flappy Bird
10
Game Over
RESTART