Pygame

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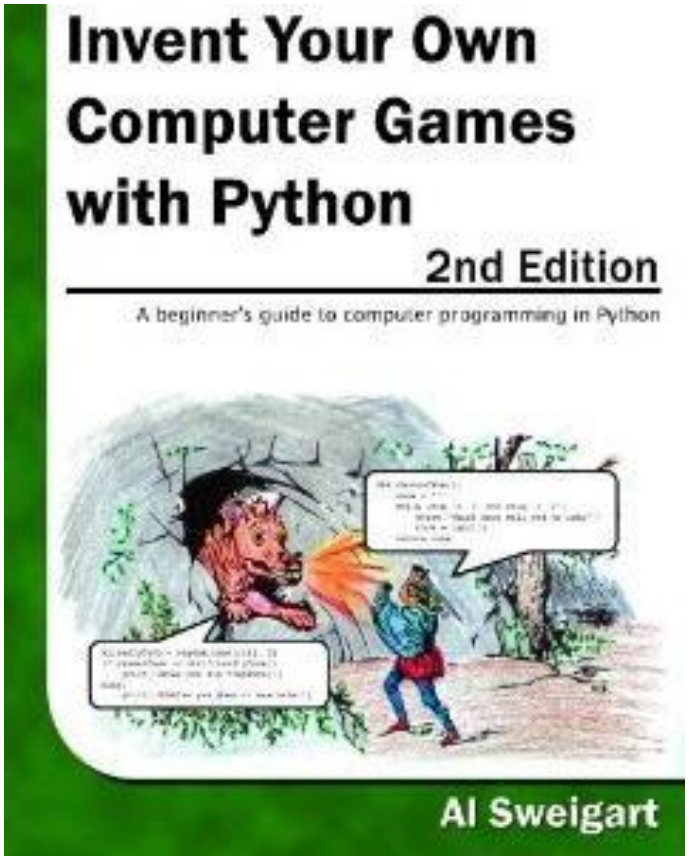
Bibliografia



http://inventwithpython.com/

Pygame Hello World

- Não temos entrada com input()
- Entrada pelo mouse e teclado via *eventos*
- Pygame usa *tuplas* ao invés de listas
- Tuplas são listas imutáveis, por isso seu processamento é mais eficiente
- Tuplas são listas com parentêses no lugar de colchetes
- Ex.: (255, 255, 255)

Pygame Hello World

```
import pygame, sys
from pygame.locals import *

# set up pygame
pygame.init()

# set up the window
windowSurface = pygame.display.set_mode((500, 400), 0, 32)
pygame.display.set_caption('Hello world!')

# set up the colors
BLACK = (0, 0, 0)
WHITE = (255, 255, 255)
RED = (255, 0, 0)
GREEN = (0, 255, 0)
BLUE = (0, 0, 255)

# set up fonts
basicFont = pygame.font.SysFont(None, 48)
```

Pygame Hello World

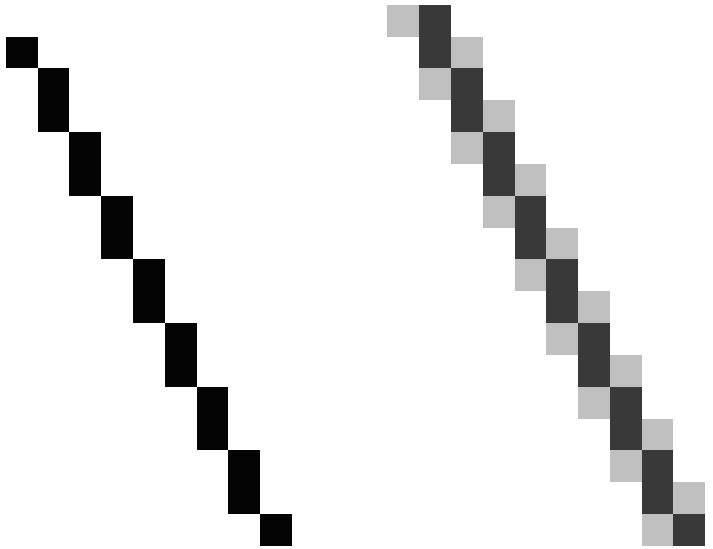
- pygame.locals inclui constantes como QUIT ou K_ESCAPE
- Utilizamos sys.exit() para sair “suavemente” do programa

Pygame Hello World

Anti-aliasing = True

```
# set up the text
text = basicFont.render('Hello world!', True, WHITE, BLUE)
textRect = text.get_rect()
textRect.centerx = windowSurface.get_rect().centerx
textRect.centery = windowSurface.get_rect().centery

# draw the white background onto the surface
windowSurface.fill(WHITE)

# draw a green polygon onto the surface
pygame.draw.polygon(windowSurface, GREEN, ((146, 0), (291, 106), (236, 277),

# draw some blue lines onto the surface
pygame.draw.line(windowSurface, BLUE, (60, 60), (120, 60), 4)
pygame.draw.line(windowSurface, BLUE, (120, 60), (60, 120))
pygame.draw.line(windowSurface, BLUE, (60, 120), (120, 120), 4)

# draw a blue circle onto the surface
pygame.draw.circle(windowSurface, BLUE, (300, 50), 20, 0)
```

Pygame Hello World



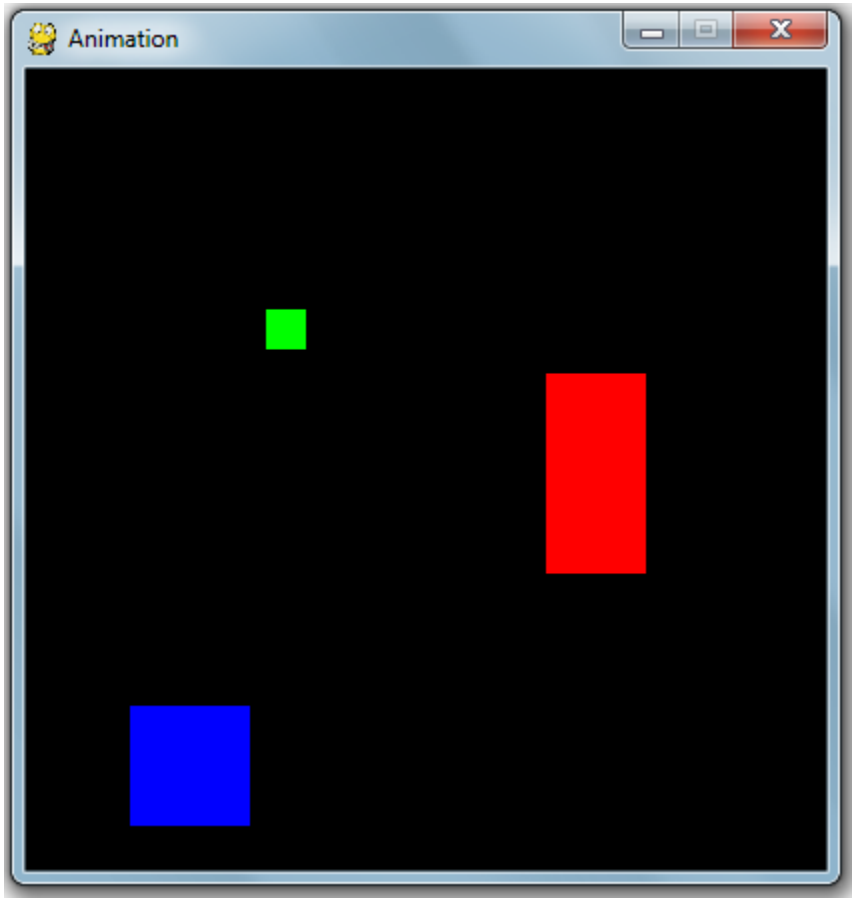
Pygame Hello World

```
# get a pixel array of the surface
pixArray = pygame.PixelArray(windowSurface)
pixArray[480][380] = BLACK
del pixArray

# draw the text onto the surface
windowSurface.blit(text, textRect)

# draw the window onto the screen
pygame.display.update()

# run the game loop
while True:
    for event in pygame.event.get():
        if event.type == QUIT:
            pygame.quit()
            sys.exit()
```

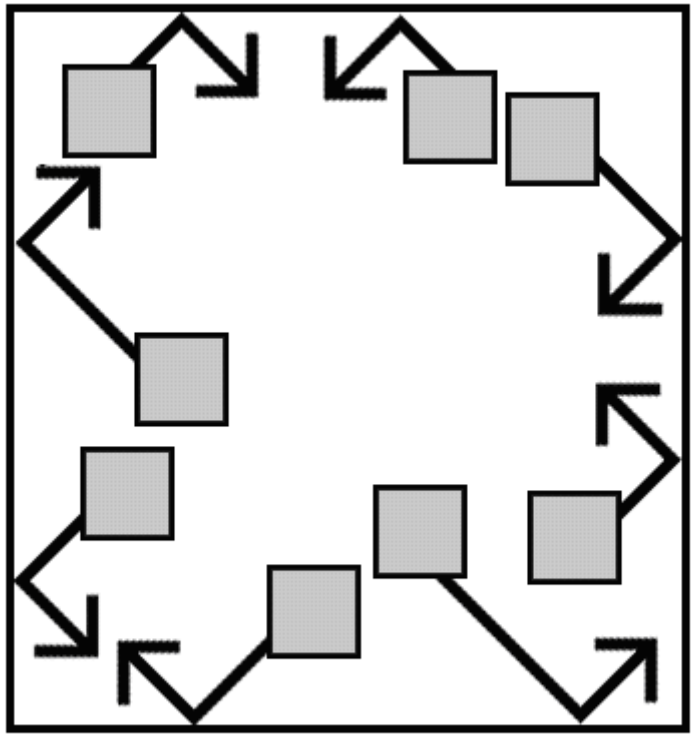
Pygame Hello World

- Se eu não apagar o pixArray ele ficará no estado *locked*
- Apago o pixArray para poder manusear o objeto Surface via método blit()
- O blit() apenas modifica a memória, mas para atualizar a tela devo dar display.update()
- Não esqueça de dar pygame.quit()

Pygame Animação



Pygame Animação



Pygame Animação

```
import pygame, sys, time
from pygame.locals import *

# set up pygame
pygame.init()

# set up the window
WINDOWWIDTH = 400
WINDOWHEIGHT = 400
windowSurface = pygame.display.set_mode(
                    (WINDOWWIDTH, WINDOWHEIGHT), 0, 32)
pygame.display.set_caption('Animation')

# set up direction variables
DOWNLEFT = 1
DOWNRIGHT = 3
UPLEFT = 7
UPRIGHT = 9

MOVESPEED = 4
```

Pygame Animação

```
# set up the block data structure
b1 = {'rect':pygame.Rect(300, 80, 50, 100), 'color':RED, 'dir':UPRIGHT}
b2 = {'rect':pygame.Rect(200, 200, 20, 20), 'color':GREEN, 'dir':UPLEFT}
b3 = {'rect':pygame.Rect(100, 150, 60, 60), 'color':BLUE, 'dir':DOWNLEFT}
blocks = [b1, b2, b3]
```

- Note que nos dicionários b1, b2 e b3 tenho objetos e direções embutidos
- Monto uma lista blocks com os três dicionários

Pygame Animação

```
while True:
    # check for the QUIT event
    for event in pygame.event.get():
        if event.type == QUIT:
            pygame.quit()
            sys.exit()

    # draw the black background onto the surface
    windowSurface.fill(BLACK)

    for b in blocks:
        # move the block data structure
        if b['dir'] == DOWNLEFT:
            b['rect'].left -= MOVESPEED
            b['rect'].top += MOVESPEED
        if b['dir'] == DOWNRIGHT:
            b['rect'].left += MOVESPEED
            b['rect'].top += MOVESPEED
```

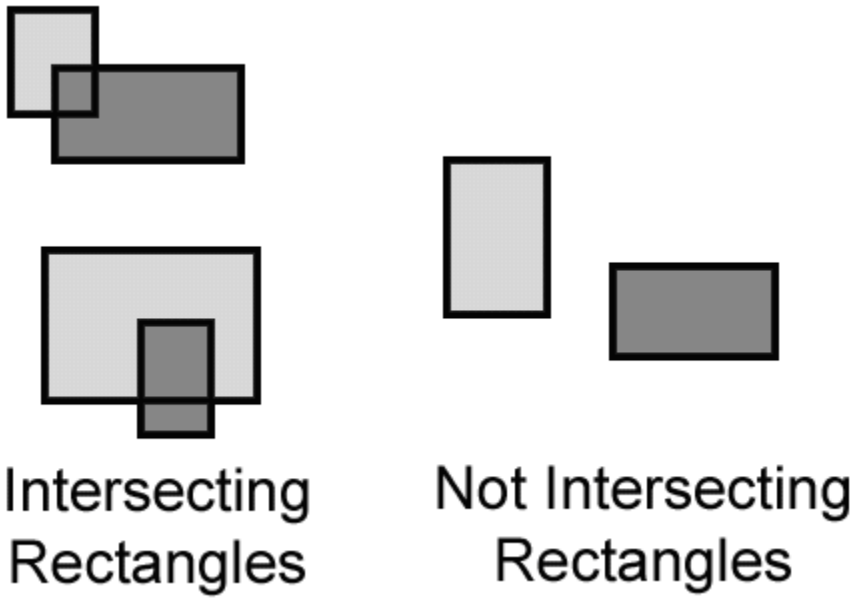
Pygame Animação

```
# check if the block has move out of the window
if b['rect'].top < 0:
    # block has moved past the top
    if b['dir'] == UPLEFT:
        b['dir'] = DOWNLEFT
    if b['dir'] == UPRIGHT:
        b['dir'] = DOWNRIGHT
if b['rect'].bottom > WINDOWHEIGHT:
    # block has moved past the bottom
    if b['dir'] == DOWNLEFT:
        b['dir'] = UPLEFT
    if b['dir'] == DOWNRIGHT:
        b['dir'] = UPRIGHT
if b['rect'].left < 0:
    # block has moved past the left side
    if b['dir'] == DOWNLEFT:
        b['dir'] = DOWNRIGHT
    if b['dir'] == UPLEFT:
        b['dir'] = UPRIGHT
```

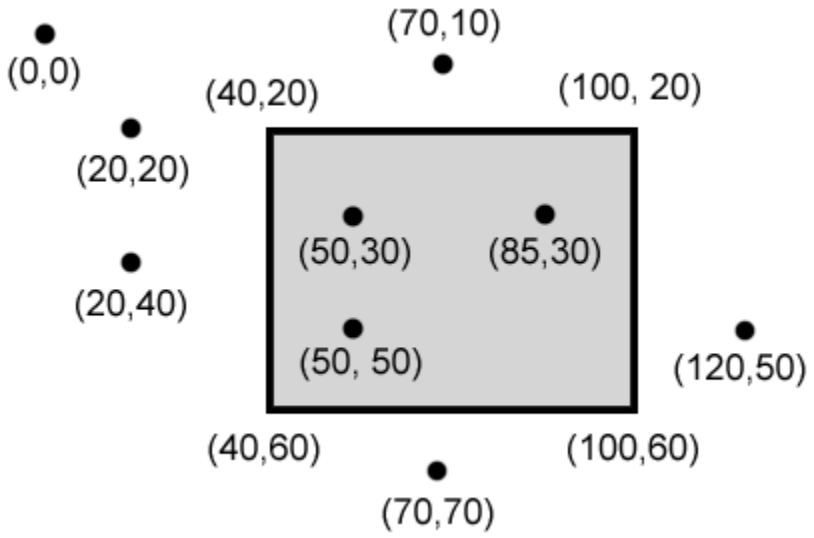
Pygame Animação

```
        if b['rect'].right > WINDOWWIDTH:
            # block has moved past the right side
            if b['dir'] == DOWNRIGHT:
                b['dir'] = DOWNLEFT
            if b['dir'] == UPRIGHT:
                b['dir'] = UPLEFT

        # draw the block onto the surface
        pygame.draw.rect(windowSurface, b['color'], b['rect'])

    # draw the window onto the screen
    pygame.display.update()
    time.sleep(0.02)
```

Pygame Collision Detection



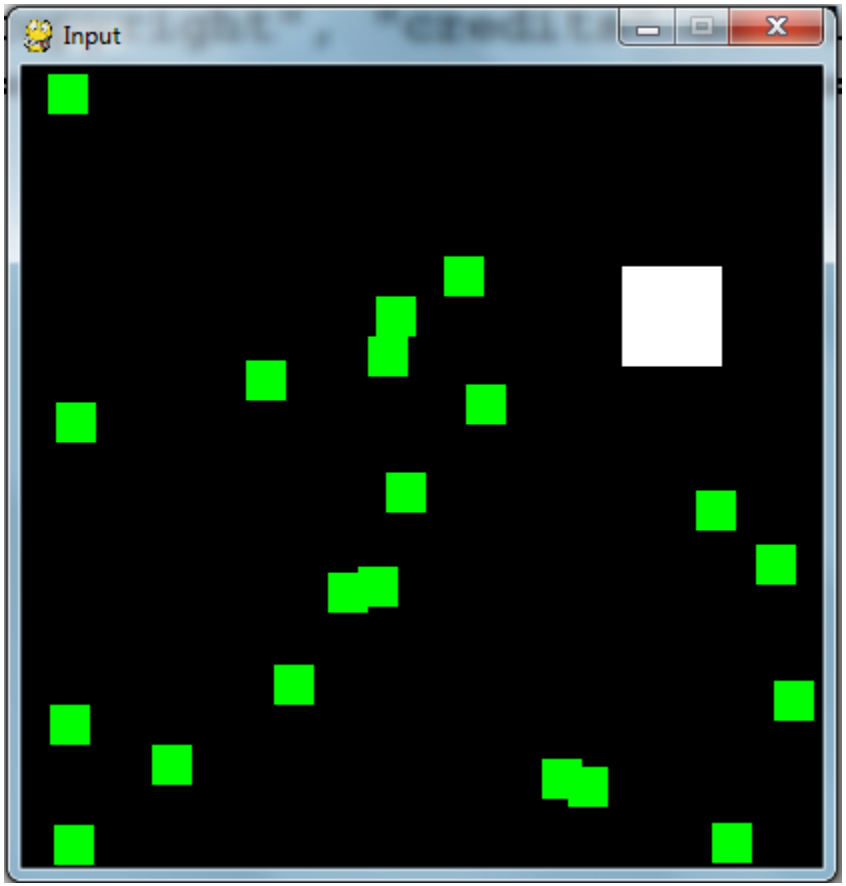
Pygame Collision Detection



Pygame Collision Detection

```
def doRectsOverlap(rect1, rect2):
    for a, b in [(rect1, rect2), (rect2, rect1)]:
        # Check if a's corners are inside b
        if ((isPointInsideRect(a.left, a.top, b)) or
            (isPointInsideRect(a.left, a.bottom, b)) or
            (isPointInsideRect(a.right, a.top, b)) or
            (isPointInsideRect(a.right, a.bottom, b))):
            return True

    return False

def isPointInsideRect(x, y, rect):
    if (x > rect.left) and (x < rect.right)
        and (y > rect.top) and (y < rect.bottom):
        return True
    else:
        return False
```

Pygame Input



Pygame Input

```
import pygame, sys, random
from pygame.locals import *

# set up pygame
pygame.init()
mainClock = pygame.time.Clock()

# set up the window
WINDOWWIDTH = 400
WINDOWHEIGHT = 400
windowSurface = pygame.display.set_mode((WINDOWWIDTH, WINDOWHEIGHT), 0, 32)
pygame.display.set_caption('Input')

# set up the colors
BLACK = (0, 0, 0)
GREEN = (0, 255, 0)
WHITE = (255, 255, 255)
```

Pygame Input

```
# set up the player and food data structure
foodCounter = 0
NEWFOOD = 40
FOODSIZE = 20
player = pygame.Rect(300, 100, 50, 50)
foods = []
for i in range(20):
    foods.append(pygame.Rect(
        random.randint(0, WINDOWWIDTH - FOODSIZE),
        random.randint(0, WINDOWHEIGHT - FOODSIZE),
        FOODSIZE, FOODSIZE))

# set up movement variables
moveLeft = False
moveRight = False
moveUp = False
moveDown = False

MOVESPEED = 6
```

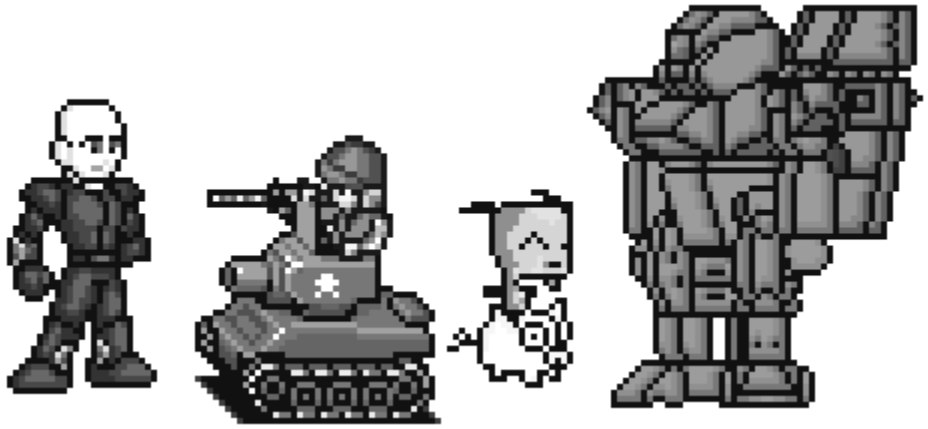
Pygame Input

```
while True:
    # check for events
    for event in pygame.event.get():
        if event.type == QUIT:
            pygame.quit()
            sys.exit()
        if event.type == KEYDOWN:
            # change the keyboard variables
            if event.key == K_LEFT or event.key == ord('a'):
                moveRight = False
                moveLeft = True
            if event.key == K_RIGHT or event.key == ord('d'):
                moveLeft = False
                moveRight = True
            if event.key == K_UP or event.key == ord('w'):
                moveDown = False
                moveUp = True
```

Pygame Input

```
# draw the player onto the surface
pygame.draw.rect(windowSurface, WHITE, player)

# check if the player has intersected with any food squares.
for food in foods[:]:
    if player.colliderect(food):
        foods.remove(food)

# draw the food
for i in range(len(foods)):
    pygame.draw.rect(windowSurface, GREEN, foods[i])

# draw the window onto the screen
pygame.display.update()
mainClock.tick(40)
```

Sounds and Sprites



Sounds and Sprites

Sounds and Sprites

```
# set up the block data structure
player = pygame.Rect(300, 100, 40, 40)
playerImage = pygame.image.load('player.png')
playerStretchedImage = pygame.transform.scale(playerImage, (40, 40))
foodImage = pygame.image.load('cherry.png')
foods = []
for i in range(20):
    foods.append(pygame.Rect(random.randint(0, WINDOWWIDTH - 20), ran
```

- Player.png aparece na escala desejada
- Gero randomicamente 20 cerejas iniciais

Sounds and Sprites

```
# set up music
pickUpSound = pygame.mixer.Sound('pickup.wav')
pygame.mixer.music.load('background.mid')
pygame.mixer.music.play(-1, 0.0)
musicPlaying = True
```

- Utilizo dois canais, um para a música de fundo e outro para cada cereja apanhada

Sounds and Sprites

```
        if event.key == ord('m'):
            if musicPlaying:
                pygame.mixer.music.stop()
            else:
                pygame.mixer.music.play(-1, 0.0)
            musicPlaying = not musicPlaying

    if event.type == MOUSEBUTTONUP:
        foods.append(pygame.Rect(event.pos[0] - 10,
                                 event.pos[1] - 10, 20, 20))
```

- Tecla ‘m’ pausa o fundo musical e o click do mouse planta uma cerejinha na posição clicada

Sounds and Sprites

```
foodCounter += 1
if foodCounter >= NEWFOOD:
    # add new food
    foodCounter = 0
    foods.append(pygame.Rect(random.randint(0, WINDOWWIDTH - 20),
                             random.randint(0, WINDOWHEIGHT - 20),
                             20, 20))
```

- As cerejas são geradas aleatoriamente a cada passagem no looping principal

Sounds and Sprites

```
# check if the block has intersected with any food squares.
for food in foods[:]:
    if player.colliderect(food):
        foods.remove(food)
        player = pygame.Rect(player.left, player.top, playe
        playerStretchedImage = pygame.transform.scale(playe
        if musicPlaying:
            pickUpSound.play()

# draw the food
for food in foods:
    windowSurface.blit(foodImage, food)
```

- Removo cerejas “comidas”, claro engordando!
- Todas as “blitadas” aparecem no update

Sounds and Sprites

- FPS == Frames Per Second
- Variável que controla o mainClock.tick()
- Os monstrinhos possuem um tamanho mínimo e máximo e sua velocidade é controlada

Sounds and Sprites

```
if baddieAddCounter == ADDNEWBADDIERATE:
    baddieAddCounter = 0
    baddieSize = random.randint(BADDIEMINSIZE, BADDIEMAXSIZE)
    newBaddie = {'rect': pygame.Rect(
        random.randint(0, WINDOWWIDTH-baddieSize),
        0 - baddieSize, baddieSize, baddieSize),
                'speed': random.randint(BADDIEMINSPEED,
                                        BADDIEMAXSPEED),
                'surface':pygame.transform.scale(
                    baddieImage, (baddieSize, baddieSize)),
                }
    baddies.append(newBaddie)
```