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# EECS 12 Fall 2012
# Homework #6
# Golf
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from graphics import *
from time import sleep
from random import random
import math

# draws a red arrow and return it
def setNewDirection(bc, pm, win):
a = Line(pm, bc)
a.setOutline("Red")
a.setArrow("last")
a.setWidth(2)
a.draw(win)
return a

# checks if the rectangle has been hit, returns
# 0,1,2, or 3 depending on whether it has been
# hit, and if so, what side it has been hit from

# pb: a circle (the ball)
# rec: a rectangle (obstacle)
# dx: displacement of the ball in the x direction
# dy: displacement of the ball in the y direction

def checkRecHit(pb, rec, dx, dy):
#x,y coordinates of golfball's current center position
x_cur= Point.getX(pb.getCenter())
y_cur= Point.getY(pb.getCenter())
# radidus of the golfball
rad= pb.getRadius()
x_left= Point.getX(rec.getP1()) #rectangle's left x
x_right= Point.getX(rec.getP2())#rectangle's right x
y_up= Point.getY(rec.getP2())# rectangle's top y

#check with side of rectangle has been hit

d_top=dy+ y_cur-rad- y_up
d_left= dx+ x_cur + rad - x_left
d_right= dx+ x_cur - rad- x_right
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if d_top < 0 and d_right < 0 and d_left > 0 :
#ball hit objects
if y_cur >= y_up and (x_left <= x_cur <= x_right or -d_top <= min(d_left,-d_right)): # hit top
return 1
elif x_cur <= x_left: # hit left
return 2
else:
return 3# hit right
else:
return 0 # ball hit nothing and continue to travel

def main():
win = GraphWin("Golf", 1000, 700)
win.setCoords(0, 0, 100, 70)
win.configure(background="light blue")
# draw the background
gameWindow = Image(Point(50, 35), "golf_course.gif")
gameWindow.draw(win)

# draw the text message at the top
msg1 = Text(Point(50, 65.5), "")
msg1.setTextColor("DarkBlue")
msg1.setStyle("bold")
msg1.setSize(18)
msg1.draw(win)

# draw the text message for the shots
shotsTxt = Text(Point(15, 4.5), "Shots:")
shotsTxt.setTextColor("Purple")
shotsTxt.setStyle("bold")
shotsTxt.setSize(20)
shotsTxt.draw(win)

#draw the sun
sun=Circle( Point(55,50), 4)
sun.setOutline("orange")
sun.setFill("yellow")
sun.draw(win)
# draw the balls for the number of shots left
shots = 3
shots_img = []
for i in range(shots):
gb_img = Image(Point(23 + 5*i, 4.5), "golf_ball.gif")
gb_img.draw(win)
shots_img.append(gb_img)
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# draw the Hit button
button = Rectangle(Point(46, 2), Point(54, 7))
button.setFill("Pink")
button.draw(win)
buttonTxt = Text(Point(50, 4.5), "Hit")
buttonTxt.setStyle("bold")
buttonTxt.setSize(20)
buttonTxt.draw(win)

# draw the text message for the wind
windTxt = Text(Point(82.5, 58), "Wind")
windTxt.setFill("Black")
windTxt.setStyle("bold")
windTxt.setSize(20)
windTxt.draw(win)

# draw the text message in the center
msg2 = Text(Point(50, 50), "")
msg2.setTextColor("Red")
msg2.setStyle("bold")
msg2.setSize(36)
msg2.draw(win)

# draw the rectangles at the bottom (the ground)
rec_num=10
P1=[Point(9.9,8.35),Point(15,8.35),Point(23,8.35),Point(24.5,8.35),Point(35,8.35),Point(40,8.35)
,Point(50,8.35),Point(60,8.35),Point(63,8.35),Point(70,8.35)]
P2=[Point(15,12.5),Point(23,13.75),Point(24.5,12.25),Point(35,13.75),Point(40,15),Point(50,16.
5),Point(60,18.5),Point(63,16.5),Point(70,14),Point(89.9,12.5)]
# draw the rectangles using the list P1, P2 and append them to the list called "boxlist"
boxlist=[]
for i in range(len(P1)):
objects= Rectangle(P1[i], P2[i])
objects.setOutline("Brown")
objects.setFill("Brown")
objects.draw(win)
boxlist.append(objects)

# draw the tee
tee = Rectangle(Point(82.4,12.5),Point(82.6,13))
tee.setFill("White")
tee.draw(win)

# draw the hole
hole = Rectangle(Point(23,12.25),Point(24.5,13.75))
hole.setFill("Black")
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hole.draw(win)

bc = Point(82.5, 13.4) # ball's initial center point
rad = 0.4 # ball's radius
delay = 0.02 # pause in seconds between each update of the ball's motion
ratio1 = 5 # ratio used for the initial velocity set by the user
ratio2 = 0.04 # ratio used for the velocity change due to the wind
ratio3 = 0.1 # ratio used for the velocity change due to gravity

# check if there are any shots left (initially, shots = 3)
while shots > 0:
msg1.setText("Click anywhere below the ball to set\nthe direction and the initial velocity.")

# undraw the ball and the wind if it is not the first shot
if shots < 3:
golfball.undraw()
wind.undraw()

# draw the ball
golfball = Circle(bc, rad)
golfball.setFill("Red")
golfball.setOutline("yellow")
golfball.draw(win)
gbdrawn = True # flag to check if the golf ball has been drawn

# randomly set the wind strength and direction and display it
wind_force = 15*(random()-0.5)
wind = Line(Point(bc.x-(wind_force/2),55), Point(bc.x+(wind_force/2),55))
wind.setOutline("Black")
wind.setArrow("last")
wind.setWidth(20)
wind.draw(win)

#strength of wind shown
wind_strength= int(-(wind_force))
wind_num= Text(Point(82.5,52), wind_strength )
wind_num.setSize(14)
wind_num.setTextColor("Red")
wind_num.setStyle("bold")
wind_num.draw(win)

wind_unit= Text(Point(86,52),"m/s")
wind_unit.setSize(14)
wind_unit.setTextColor("Red")
wind_unit.setStyle("bold")
wind_unit.draw(win)
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m1=Point(0,14) # initialization of m1 for the while loop
# check if the click is below the ball
while m1.y > 13.5:
m1 = win.getMouse() # click to set the direction
d = setNewDirection(bc, m1, win) # draw the arrow
msg1.setText("Click on the Hit button to play or click anywhere below\nthe ball to change the
direction and the initial velocity.")
m2 = win.getMouse() # click to redraw the arrow for the direction or click on the Hit button
# check if the click is outside the Hit button
while not (46 < m2.x < 54 and 2 < m2.y < 7):
# check if the click is below the ball
if m2.y <= 13.5:
# redraw the arrow for the direction
d.undraw()
d = setNewDirection(bc, m2, win)
m1=m2.clone()
vx = ratio1 * (bc.x - m1.x)
vy = ratio1 * (bc.y - m1.y)
# calculate the velocity of the swing
velocity_num= int(math.sqrt((vx*vx)+(vy*vy)))
velocity_text= Text(Point (83.5, 15), (str(velocity_num) + ' ' + 'm/s'))
velocity_text.setTextColor("red")
velocity_text.setSize(14)
velocity_text.draw(win)
m2 = win.getMouse() # click to redraw the arrow for the direction or click on the Hit button
velocity_text.undraw()
d.undraw()
msg1.setText("Nice Shot! Waiting for the ball to come to a stop...")
# compute the initial velocities
vx = ratio1 * (bc.x - m1.x)
vy = ratio1 * (bc.y - m1.y)

# compute the initial displacements
dx = delay * vx
dy = delay * vy

# set the current position to the initial position of the ball
x_cur = bc.x
y_cur = bc.y

# loop to update the ball's position
for t in range(1000):
if x_cur + rad + dx > 90: # hits the right side of the frame
if gbdrawn:
golfball.undraw()
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gbdrawn = False
elif x_cur - rad + dx < 10: # hits the left side of the frame
if gbdrawn:
golfball.undraw()
gbdrawn = False
elif y_cur + rad + dy > 61.65: # hits the top of the frame
if gbdrawn:
golfball.undraw()
gbdrawn = False
else: # is in the frame
if not gbdrawn:
golfball.draw(win)
gbdrawn = True

# Check if the ball has come to a stop:
if abs(vx) < 0.001 and abs(vy) < 0.001:
if 23<x_cur<24.5 and 12.25<y_cur<13.75:
msg1.setText("Click anywhere to quit")
msg2.setText("CONGRATULATIONS!\n YOU WIN! YAY")
shots=0
break
hit=0
for i in range(len(boxlist)):
rec=boxlist[i]
hit= checkRecHit(golfball,rec, dx, dy)
if hit != 0:
break
# Check if any of the rectangles at the bottom have been hit and assign 0,1,2, or 3 to "hit"
depending on which side of one of those rectangles has been hit:
# Check the value of "hit" and update the values of "vx" and "vy" (velocities in the x and y
direction) accordingly:
if hit == 1 or (y_cur - rad) < 12.5:
vx= vx*0.4
vy= abs(vy*0.4)
elif hit==2:
vx= - abs((vx)* 0.4)
vy= 0.4* vy
elif hit==3:
vx= abs(vx*0.4)
vy= vy*0.4
elif hit==0:
vx= vx+ wind_force * ratio2
vy= vy-(9.8)*ratio3

dx = delay * vx # compute the displacement in the x direction
dy = delay * vy # compute the displacement in the y direction
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x_cur = x_cur + dx # update the current x position
y_cur = y_cur + dy # update the current y position

golfball.move(dx, dy) # move the ball

sleep(delay) # add some delay

#Check if the user has won the game update the messages, decrement "shots", and undraw a ball
from "shots_img":
if shots!=0:
shots=shots-1
shots_img[shots].undraw()
if shots >1:
if x_cur>24.5 and shots>0:
msg2.setText(" OH! So CLOSE! more luck with a \n stronger swing next time.")
elif x_cur<23:
msg2.setText(" OH! Swing it too hard maybe ! ")
msg1.setText("You have"+ ' '+ str(shots)+' '+ "more shots left ... CLick anywhere to conitinue.")
wind.undraw()
wind_num.undraw()
wind_unit.undraw()
elif shots == 1:
msg1.setText("You have 1 more shot left...Click anywhere to continue.")
wind.undraw()
wind_num.undraw()
wind_unit.undraw()
else:
msg1.setText("Click anywhere to quit")
msg2.setText("GAME OVER")

win.getMouse()
msg2.setText(" ")
win.close()

main()
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