



Python Lab #3:

Turtle Runaway

Sunglok Choi, Assistant Professor, Ph.D.
Computer Science and Engineering Department, SeoulTech
sunglok@seoultech.ac.kr | <https://mint-lab.github.io/>

Overview

- **Prerequisite**

- Anacodna (Individual Edition)

- **Practice) *Turtle Runaway***

- The given skeleton code
 - Requirements
 - Practice with the skeleton code
 - Step #1) Add a timer
 - Step #2) Add your more intelligent turtle
 - Step #3) Add your concept of score

- **Assignment**

- Mission: Complete the game, *Turtle Runaway*

OSS Game Company



Practice) *Turtle Runaway*

- The given skeleton code (file: turtle_runaway_skeleton.py; 1/4)

```
# This example is not working in Spyder directly (F5 or Run)
# Please type '!python turtle_runaway.py' on IPython console in your Spyder.
import turtle, random

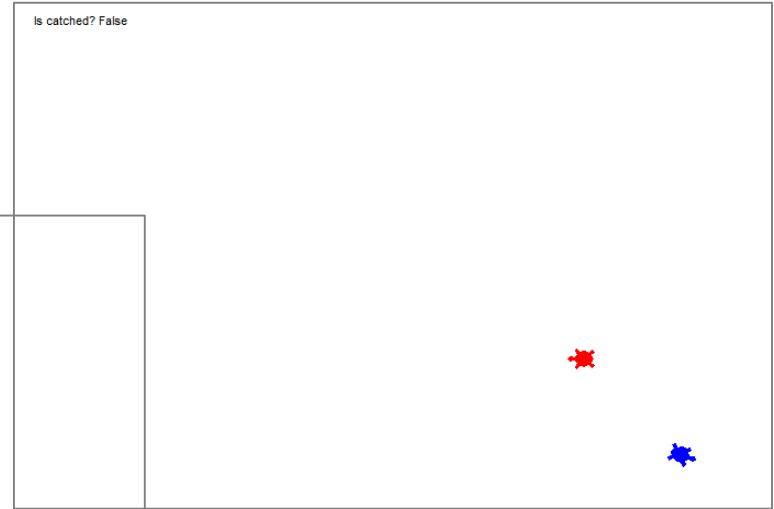
class RunawayGame:
    def __init__(self, canvas, runner, chaser, catch_radius=50):
        self.canvas = canvas
        self.runner = runner
        self.chaser = chaser
        self.catch_radius2 = catch_radius**2

        # Initialize 'runner' and 'chaser'
        self.runner.shape('turtle')
        self.runner.color('blue')
        self.runner.penup()

        self.chaser.shape('turtle')
        self.chaser.color('red')
        self.chaser.penup()

        # Instantiate an another turtle for drawing
        self.drawer = turtle.RawTurtle(canvas)
        self.drawer.hideturtle()
        self.drawer.penup()

    def is_caught(self):
        p = self.runner.pos()
        q = self.chaser.pos()
        dx, dy = p[0] - q[0], p[1] - q[1]
        return dx**2 + dy**2 < self.catch_radius2
```



Practice) *Turtle Runaway*

- The given skeleton code (file: turtle_runaway_skeleton.py; 2/4)

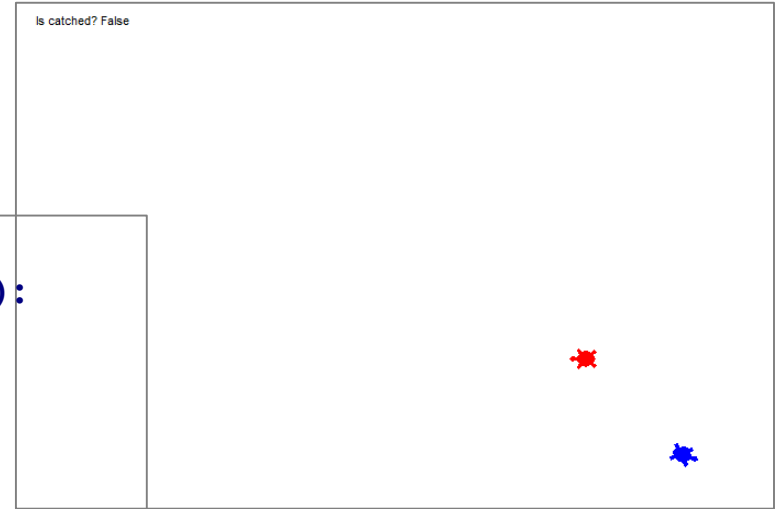
```
class RunawayGame:
    def __init__(self, canvas, runner, chaser, catch_radius=50, init_dist=400):
        # ...
    def is_catched(self):
        # ...
    def start(self, init_dist=400, ai_timer_msec=100):
        self.runner.setpos((-init_dist / 2, 0))
        self.runner.setheading(0)
        self.chaser.setpos((+init_dist / 2, 0))
        self.chaser.setheading(180)

        self.ai_timer_msec = ai_timer_msec
        self.canvas.ontimer(self.step, self.ai_timer_msec)

    def step(self):
        self.runner.run_ai(self.chaser.pos(), self.chaser.heading())
        self.chaser.run_ai(self.runner.pos(), self.chaser.heading())

        # TODO: You can do something here.
        is_catched = self.is_catched()
        self.drawer.undo()
        self.drawer.penup()
        self.drawer.setpos(-300, 300)
        self.drawer.write(f'Is caught? {is_catched}')

        self.canvas.ontimer(self.step, self.ai_timer_msec)
```



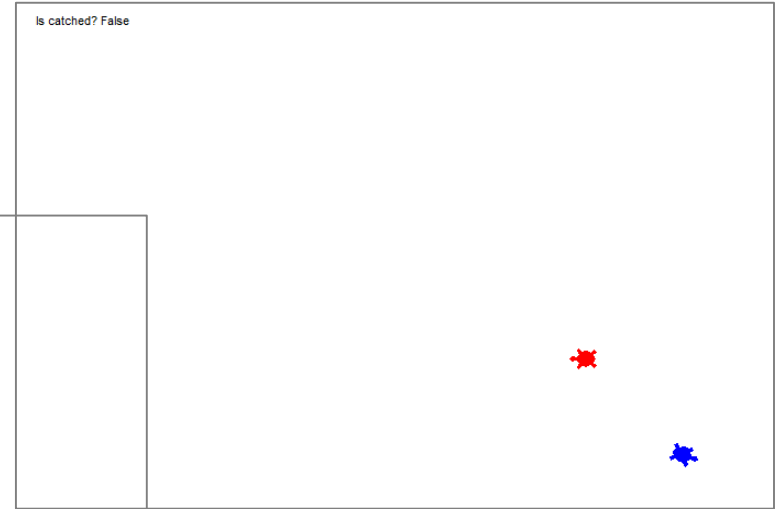
Practice) *Turtle Runaway*

- The given skeleton code (file: turtle_runaway_skeleton.py; 3/4)

```
class ManualMover(turtle.RawTurtle):
    def __init__(self, canvas, step_move=10, step_turn=10):
        super().__init__(canvas)
        self.step_move = step_move
        self.step_turn = step_turn

        # Register event handlers
        canvas.onkeypress(lambda: self.forward(self.step_move), 'Up')
        canvas.onkeypress(lambda: self.backward(self.step_move), 'Down')
        canvas.onkeypress(lambda: self.left(self.step_turn), 'Left')
        canvas.onkeypress(lambda: self.right(self.step_turn), 'Right')
        canvas.listen()

    def run_ai(self, opp_pos, opp_heading):
        pass
```



Practice) *Turtle Runaway*

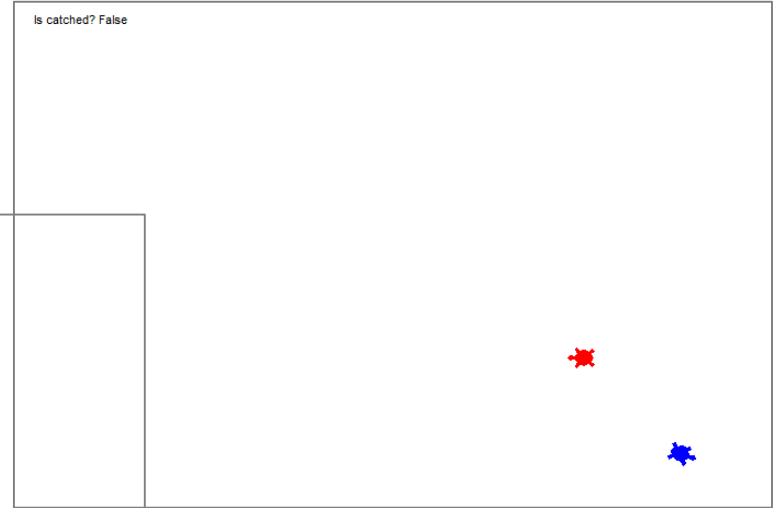
- The given skeleton code (file: turtle_runaway_skeleton.py; 4/4)

```
class RandomMover(turtle.RawTurtle):
    def __init__(self, canvas, step_move=10, step_turn=10):
        super().__init__(canvas)
        self.step_move = step_move
        self.step_turn = step_turn

    def run_ai(self, opp_pos, opp_heading):
        mode = random.randint(0, 2)
        if mode == 0:
            self.forward(self.step_move)
        elif mode == 1:
            self.left(self.step_turn)
        elif mode == 2:
            self.right(self.step_turn)

if __name__ == '__main__':
    canvas = turtle.Screen()
    runner = RandomMover(canvas)
    chaser = ManualMover(canvas)

    game = RunawayGame(canvas, runner, chaser)
    game.start()
    canvas.mainloop()
```



Practice) *Turtle Runaway*

- Requirements
 - **Mandatory**
 - **Add a timer (5 points):** You can freely choose an up/down timer for your purpose.
 - **Add your intelligent Turtle (8 points):** You can assign a role, *runner* or *chaser* or both.
 - **Add your concept of score (7 points):** You can define the score by yourself.
 - Optional
 - Change the window title to *Turtle Runaway*
 - Add background or game arena
 - Add a concept of stages
 - Add opening, closing, and ending
 - Fix a bug (e.g. switching colors)
 - Anyway, you can do whatever you want to make the game fun.

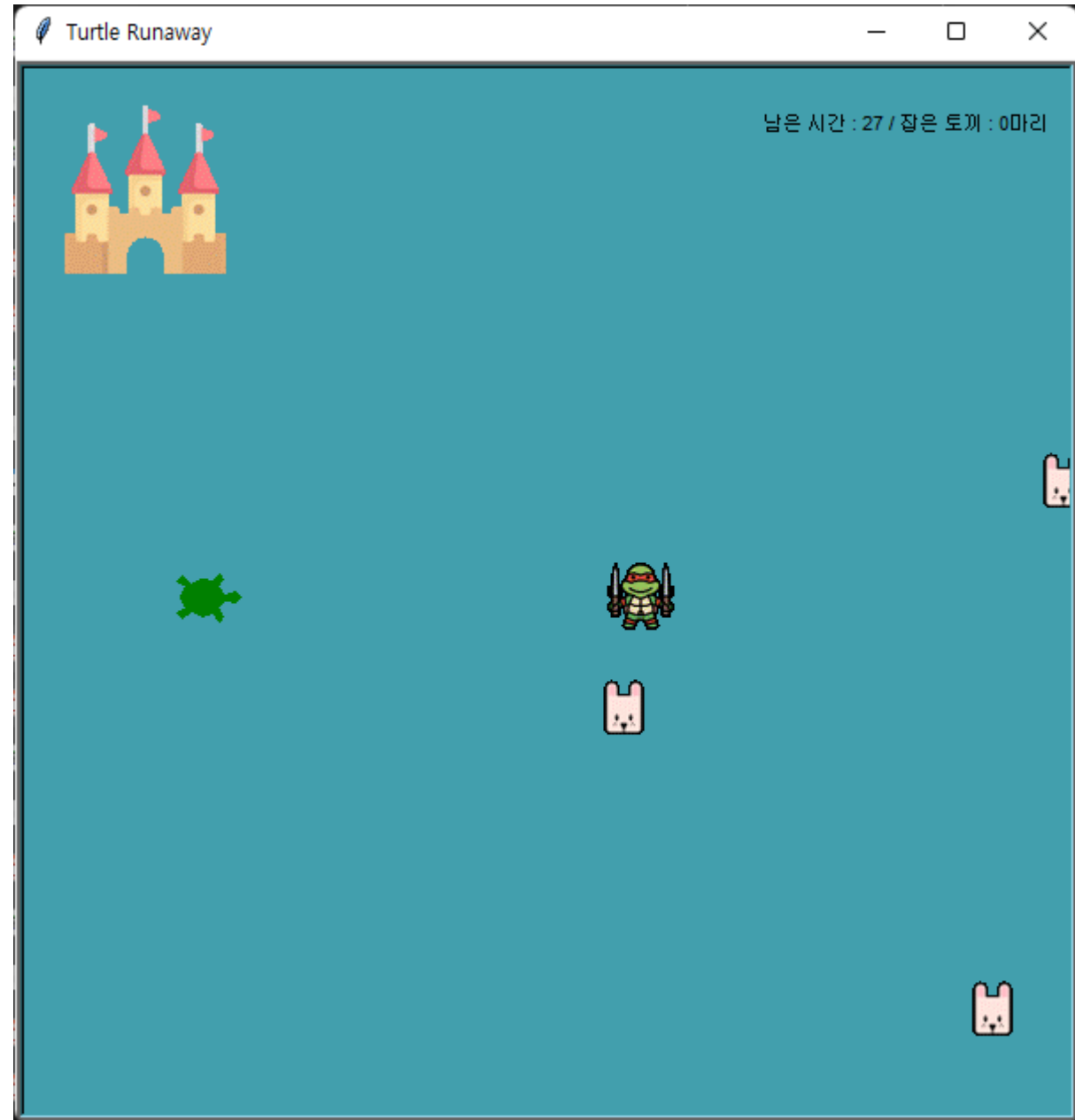
🏆 2021 Best Work (by 정의진)

```
import turtle, random, time

class RunawayGame:
    def __init__(self, ...):
        ...
        self.chaser.shape("bad_turtle.gif")
        ...

if __name__ == "__main__":
    canvas = turtle.Screen()
    canvas.setup(600, 600)
    canvas.title("Turtle Runaway")
    canvas.bgcolor("#429FAD")
    canvas.addshape("rabbit.gif")
    canvas.addshape("castle.gif")
    canvas.addshape("bad_turtle.gif")
    runner = ManualMover(canvas)
    chaser = ChaseMover(canvas)

    game = RunawayGame(canvas, runner, chaser)
    game.start()
    canvas.mainloop()
```



Assignment

- Mission
 - Complete the given skeleton code (`turtle_runaway_skeleton.py`)
 - Submit your code (`turtle_runaway.py`) and its explanation (`turtle_runaway.md`) with a screenshot (`turtle_runaway.png`)

- Condition
 - Please follow the above filename convention.
 - You **can** start from scratch (without using the given skeleton code).
 - You **can** freely change the given skeleton code if necessary.

- Submission
 - Deadline: **October 05, 2022 23:59** (**firm deadline**; no extension)
 - Where: e-Class > Assignments
 - Score: Max 20 points