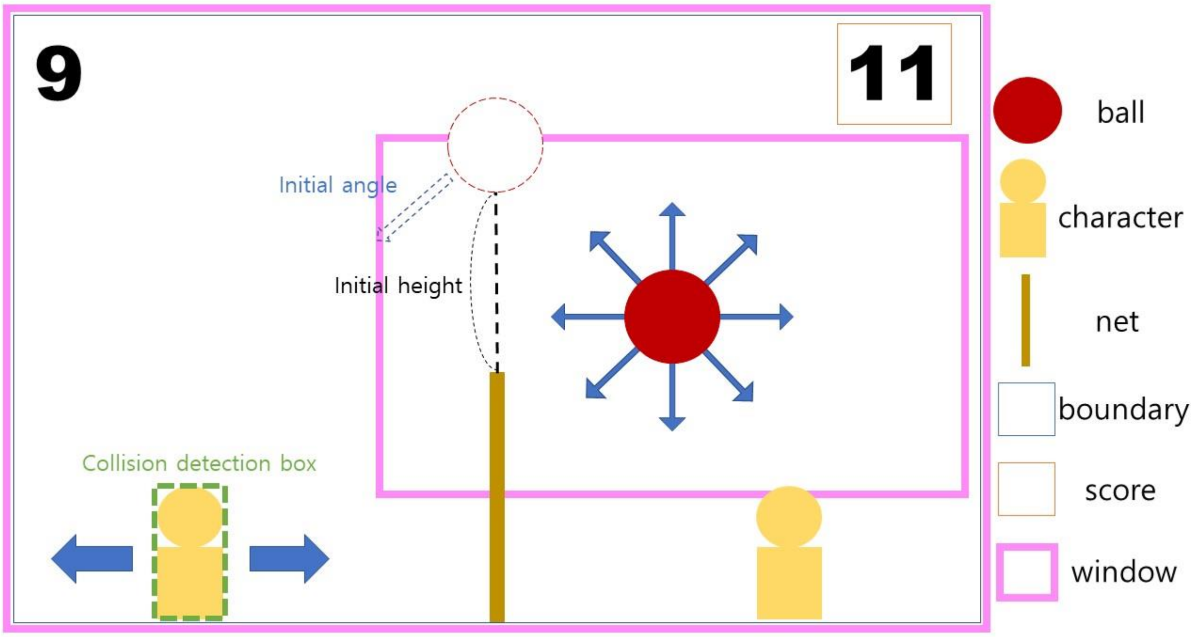
CSED451 Computer Graphics (Spring 2019)

Assignment #1

2D Drawing

Due date: March 15, 2019, Friday, 11:59pm

The goal of this assignment is to implement a simple 2D game using OpenGL functions. “Pikachu beach volleyball” is a 2D side-scrolling game. The game contains the representative character (Pikachu) of “Pokemon” that is popular worldwide. The game has two characters. When the ball touches the ground, the opponent gets a point and the game continues until the target score is reached. In this assignment, we implement a simple version of “Pikachu beach volleyball”. You can see playing scenes of the original game at the following link, https://www.youtube.com/watch?v=MLvPGQ2O7OQ



Game Prototype

Requirements

*All objects in the game may be represented by simple shapes, such as circles and triangles, as shown in the above game prototype.

- Ball
  - The ball collides with all objects except the score boxes and bounces in the direction determined by the incident and reflection angles. However, in this assignment, the acceleration toward the ground is not considered.
  - Unlike the original game, in this assignment, direct control of the ball is not allowed. So the direction, velocity, and height of the ball should be properly initialized at the

beginning of the game, and the ball should move at a constant speed.

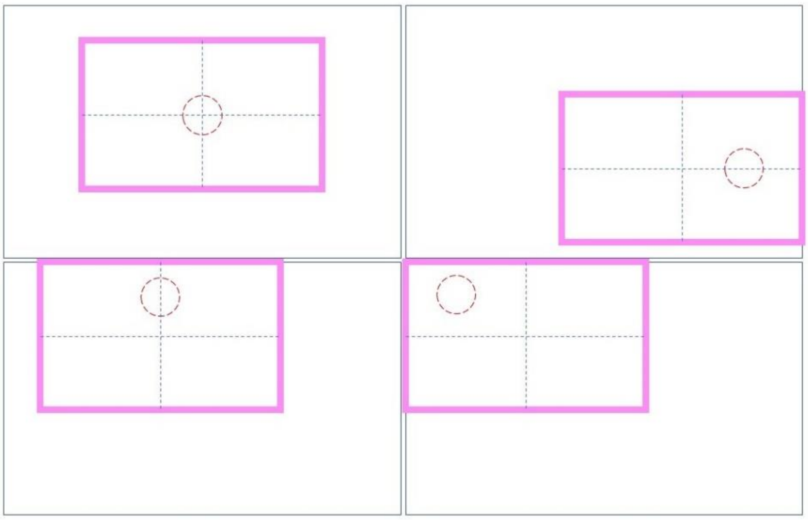
- In summary, the game process is similar to ping-pong, except that the collision target for the termination condition is the ground.

- Character
  - Character can move in both left and right directions by user's keyboard operation.
  - For convenience of implementation, in this assignment, collision check is implemented using a bounding box, and jump function is omitted.
  - The player's position is on the left part of the screen, and the character on the right moves automatically according to the position of the ball, making it possible for the player to obtain points through intermittent computer's mistakes (i.e., intentional difference between the ball and character's position).

- Net, Boundary
  - The top of the net does not need to be considered for collision detection.
  - All collisions are considered as perfect elastic collisions with a modulus of elasticity of 1 so that the velocity of the ball is maintained.

- Window (zoom-in / out)
  - At least two screen modes are required.
  - Full screen: Window covers the whole game space with no screen movement.
  - Partial screen: Window is centered at and moving with the ball. The ball should be at the center of the screen, but when the ball approaches the game space boundary, the window should be controlled not to contain outside of the game space while positioning the ball as close to the center as possible.

Position of clipped window



- End Condition
  - When the ball touches the ground, the opponent's score increases.
  - The game ends when a predetermined score has been reached.

- If you implement additional functions unspecified in this document, you can get extra points, up to 10% of the full score.