Project #2

[DATE]

CHE 492/592-[SECTION#] – Computer Methods in Chemical Engineering – Dr. Jason Bara

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1. Objective

Our objective is to make a snake game where we will be having a 30 by 30 playing field. The starting point of the snake will be fixed at point (15,15). The target will randomly change its position after every bite by snake. When snake will strike with its body and the wall of the playing field, the game will over. We are having a counter initialized at the start of the game that will measure the score for the game. When the game will over, it will display its value.

2. Method

The snake game has been divided into function. Each function is performing a specified operation. The main function is snake and all the remaining functions are inside this snake function. Every function is calling after an interval to perform its operation. We have following functions inside this game:

- `snake() : main function`
- `gameSetup()`
- `keypress(~,evt)`
- `StartGame(evt.Key)`
- `playing(mov)`
- `checkBody()`
- `gameEnded()`
- `ScoreCounter()`
- `stopGame()`

First of all, before calling game setup function, we initialize different variables that are necessary for the game to start. In `gameSetup()` function, the flag value will be used to make the correct playing field. The while loop is used to perform iterations until we reach the desired playing field that is where the snake position and its target position can't be at the same place. The `randi function` is used to give random coordinates for the target. So, we will always get the new position of the target. If both target and snake at the same position, the flag is initialized to 1 to perform another iteration of while loop to give another positions. The game will finally starts after calling of `StartGame()` function.

The `playing(mov)` function has while loop as well as switch case to switch to the specific case after pressing an arrow key. The `ScoreCounter()` function is increasing the size of the snake

and updating the value of the `scoreCounter` after each bite of the snake. The `gameEnded()` function is calling the `stopGame()` function that will ended every function and the game score will be displayed.

3. Results

Every function is performing its operation well. The start game figure are as follows:

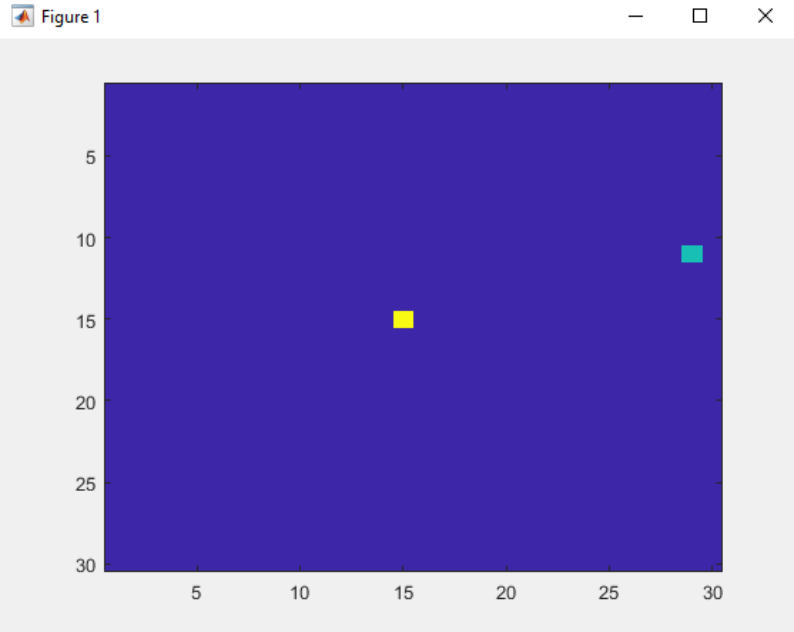

Figure 1: Start of Snake Game

After the game is over, the game over message as well as the game score will be displayed.

```
Game over
Your Score is:
     6
```

Figure 2: Game Score after the game is over

4. Discussion

The game will start right after you press any arrow key. The snake will start moving in the specific direction of arrow. The game will only stop when the snake collides with the playing field wall or with itself. There is no option to pause the game. Finally, after the game will over the game will be displayed in the command window of the Matlab that will show the number of bytes by the snake to the target.

Appendix A

A.1: Full Script of Snake Game

```
%The snake game has been divided into function. Each function is
performing
%a specified operation. The main function is snake and all the
remaining
%functions are inside this snake function. Every function is
calling after
%an interval to perform its operation.
function snake ()%main function starts from here

%defining the area of game that is 30 by 30
lenx = 30;
leny = 30;
grid = zeros(lenx,leny); %making an array 30 by 30 of all zeros

%defining the starting point of game at (15,15) that is the
center of
%playing field
startx = 15;
starty = 15;
grid(startx,starty) = 1; %giving these points the value of 1.
%Based on the value assigned, the colour will be assigned when
we use
%imagesec function of a matlab

%flags to be used in this game
%score counter has been initialized with zero to count the score
scoreCounter=0;
scoreFlag = 0;
game_end = 0;

%this function with setup the playing field
 function gameSetup()
        flag = 1;
%the flag value will be used to make the correct playing field.
The while
%loop is used to perform iterations untill wwe reach the desired
playing
%field thats is where the snake postion and its target position
cant be at
%the same place.
        while (flag)
    %randi function is used to give random coordinates for the
target. So,
```

```
    %we will always get the new positiion of the target
                foodx = randi(lenx);
                foody = randi(leny);
                flag = 0;
                for i = 1:snake_size
                    %if else loop is used to check wheather the
target
                    %position will be at different position than
the snake.
                    if (foodx==snakeX(i))&&(foody==snakeY(i))
                        flag=1;
%if both target and snake at the same position, the flag is
initialized to
%1 to  perform another iteration of while loop to give another
positions.
                    end
                end
                if (foodx==startx && foody ==starty)
                    flag=1;
                end
        end
        %assigning the specified value to the target using grid.
        grid(foodx,foody) = 0.5;
 end


snake_size = 1;%the snake size has been defined to be 1
%making an array of snake size using zero function. We will
assign
%different value to these points using grid
snakeX = zeros(snake_size);
snakeY = zeros(snake_size);
snakeX(1) = startx;
snakeY(1) = starty;

%the location of the target
foodx = randi(lenx);
foody = randi(leny);

%after initializing all the necessary variables, i am calling
gamesetup
%function to setup the playing field
gameSetup()


fig = figure;
%making a figure to display results
```

```
set(fig,'menubar','none');
set(fig,'CurrentObject',imagesc(grid));
set(fig,'KeyPressFcn',@keyPress);


    %this function is for any keypress
    function keyPress (~,evt)
        %the while loop will perform iterations untill we lost
the game
        while(~game_end)
            pause(0.1);
            StartGame(evt.Key);%this function contains all the
important functions of the game
        end
    end

    %the game has been finally started from here
    function StartGame(mov)
        playing(mov);%it is calling the first function to play
the game

        if ~game_end
            checkBody();
            if ~game_end
                %we are updating the flags if we are still in
the game
                scoreFlag = 0;

                grid(snakeX(1),snakeY(1)) = 0;

                %this ifelse loop is increasing the size of
snake
                if (snake_size~=1)
                    for i = 1:snake_size-1
                        snakeX(i) = snakeX(i+1);
                        snakeY(i) = snakeY(i+1);
                    end
                end

                snakeX(snake_size) = startx;
                snakeY(snake_size) = starty;
%calling ScoreCounter function to update the score value
                ScoreCounter()
%giving specified value of 1 to the body of snake
                grid(startx,starty) = 1;
                set(fig,'CurrentObject',imagesc(grid));
            end
```

```
        end
    end

 %increasing the bosdy of snake after each bite of target
    function checkBody()
        if (snake_size~=1)
            for i=1:snake_size-scoreFlag
                if (startx==snakeX(i))&&(starty==snakeY(i))
                    gameEnded();
                    break;
                end
            end
        end

    end


  %updating the score counter value after the bite of a target
    function ScoreCounter()
        %the consitions of if loop is saying that the snake has
been
        %reached the target
        if (startx==foodx)&&(starty==foody)
            snake_size = snake_size + 1;
            snakeX(snake_size) = startx;
            snakeY(snake_size) = starty;
            gameSetup();%the game setup function is called to
update the playing field
            scoreFlag = 1;
            scoreCounter = scoreCounter+1;%score counter has
been updated
        end
    end



%this function will move the snake in the direction of arrow we
press
    function playing(mov)
        flag = 1;
        %while loop and switch case is used to perform a
specified
        %operation
        while flag
            switch(mov)
                %when downarrow will be pressed
                case 'downarrow'
```

```
                    if (startx==lenx)
                        gameEnded();
                        break;
                    end
                    startx=startx+1;
                %when uparrow will be pressed
                case 'uparrow'
                    if (startx==1)
                        gameEnded();
                        break;
                    end
                    startx=startx-1;
                %when rightarrow will be pressed
                case 'rightarrow'
                    if (starty==leny)
                        gameEnded();
                        break;
                    end
                    starty=starty+1;
                %when left arrow will be pressed
                case 'leftarrow'
                    if (starty==1)
                        gameEnded();
                        break;
                    end
                    starty=starty-1;
            end
        flag = 0;
        end
    end


  %this function will be used to stop the game. After this
function called,
  %it will perform nothing
    function stopGame(~,~)
    end

    %this function will be callled when the game ended
    function gameEnded()
       set(fig,'KeyPressFcn',@stopGame);
       grid(:,:) = 0.2;
       set(fig,'CurrentObject',imagesc(grid));
       pause(1);
%we are displaying that our game has been ended and score of
game.
```

```
        disp('Game over');
        disp('Your Score is: ');
        disp(scoreCounter);
        game_end = 1;

    end

end%main function has been ended
```