CSE 201 Advanced Programming (Monsoon Semester 2019)
Course Project
Plants Vs Zombies Game

IIIT-Delhi. 1st October 2019. Due by 11:59pm on 14th Oct 2019 (1st Deadline)

IMPORTANT Instructions:

1. **It's mandatory that you attend all the deadlines in this project as per the schedule. No request for rescheduling the demo will be entertained. In case of any unavoidable circumstances you have to take email approval from me well in advance.**
2. **You MUST have a PRIVATE git repository for your project and every group member should frequently check in their code in this repository.**
3. **No extensions will ever be provided. Any submission after the deadline will not be evaluated. If you see any ambiguity or inconsistency in a question, please seek a clarification from the teaching staff.**

Plagiarism: All submitted deliverables are expected to be the result of your individual effort. You should never misrepresent someone else's work as your own. In case any plagiarism case is detected, it will be dealt as per new plagiarism policy of IIITD that was also discussed in the lecture.

Create a JavaFX application for the game - Plants vs Zombies. The objective of the game is to defend the house from zombies using various plants as defence arsenal through different levels. If the zombies are able to reach the house, you fail the level and have to play the level again. It is important that you play the game once (*available on both Android and iOS*) before reading this document further.

Rules for the game play are mentioned below (play the game to know the rules in depth):

1) The game consists of different levels. In each level, there is a house with a lawn and zombies have to cross the lawn to reach the house. Refer to the gameplay video link for clearer understanding. The layout and background image of the game can be seen in the video at 9:10 instant in the video.
2) The player has to put plants in the lawn to prevent the zombies from reaching the house. Please refer to the list of plants given in the link for their abilities.

3) Once the zombies reach a particular plant, they start eating it which decreases the plant's health. *Note that the plants can still attack the zombie (based on the plant's ability) while it is being eaten.*
4) The player has to collect sun tokens as in-game currency to buy plants. This currency drops down on the lawn every 10 seconds *(refer to the gameplay video link given above for clarity on animation)*.
5) Every plant has a waiting time (*t* seconds). Once you buy the plant, you cannot purchase the same plant before this waiting time (*t*) elapses. **'*t*' should be at least 5 seconds**.
6) The house is defended by lawnmowers as a last resort in each row of the lawn. The lawnmower activates and kills all the zombies in that row once they are able to cross the lawn. The lawnmower can be used only once and is not under the player's control. Once the lawnmower is used, that row is defence-less if a zombie reaches the house.
7) The zombies differ in their defence and attack values. Some zombies have higher defence (health) and attack points than others.
8) Each level has higher difficulty compared to the previous level. This can be achieved by increasing the number of zombies and varying the defence and attack ability of the zombies.
9) At the end of each level, a new plant is unlocked which can be used in subsequent levels.
10) The sun-tokens expire at the end of level. The tokens earned in a level cannot be taken forward to the next level.
11) To save game progress, the game should store the following objects at the time of saving:
    a) Level
    b) Amount of sun tokens
    c) Position and health of plants and lawnmowers
    d) Position and health of zombies

    When the user loads an existing game, it should restore the state of the game.
12) The game should allow saving and loading multiple states.

Basic Requirements:

1) **Main page:**
    a) New game button
    b) Resume game button
    c) Exit game button
2) **Resume game button:** It should lead to a screen showing list of saved games.
3) **In-game options** menu to save progress, restart level and exit to main menu.
4) GUI should be designed using JavaFX and should be similar to the gameplay video referred above.
5) Minimum number of levels should be 5, all in day terrain.
6) Minimum number of types of plants available in the game should be 4. The plant types will be unlocked (made available to the player) as the game progresses.

7) There should be at least one plant type from each of these categories:

   a) Shooter: Plants that shoot and injure zombies eg: pea shooter, repeater, threepeater etc.
   b) Barrier: Plants that protect other plants eg: Wall-nut, Tall-nut etc.
   c) Sun token producing plants: Plants that produce sun-tokens eg: Sunflower, sun-shroom etc.
   d) Bomb plants: Plants that are explosive and kill zombies in neighboring cells eg: Cherry Bomb, potato mine etc.

8) Command line output will not considered part of the game. GUI should be the sole interface for interaction.

9) It is not necessary to have a fluid-like animation for plants and zombies exactly as shown in the game.

Bonus:
Although we have specified the basic requirements, if you are able to come up with some more interesting features then you would be "eligible" for bonus marks. Although this eligibility we will decide based on factors such as how many other groups have also come up with the same additional functionality.

Project Deliverables:

1. Deadline 1 (Due on 14th October) – Submit detailed UML class diagrams and use case diagrams for your project. Submit pictures of your diagrams on google classroom. We will use these pictures during demo of this deadline.
2. Deadline 2 (Due on 30th October) – Show static GUI of your project and also some animations components. Submit this code on google classroom just like lab deadlines.
3. Deadline 3 (Due on 17th November) – Submit complete project on google classroom. Demo after end semester exams.