IM3002 Term Project B - Design Document

Nabeeha Ali, Amy Truong

March 14, 2022

Objectives

For this term project, we decided that our goal is to procedurally model an application in Maya that produces a complex vegetation pattern. The application will feature an L-system based model of ~~vegetable~~ tree vines and fencing around an adjustable ground size, and stochastically generated vegetation on grassland. The group members of this project are Amy Truong and Nabeeha Ali. Since there are two members of this project, we have chosen two items from the provided list in order to double our scope. Amy will be responsible for creating the vegetation land featuring various types of plants and objects, while Nabeeha will be focusing on the development of the ~~vegetable~~ tree vines and fencing. Since project scopes are always changing, we have planned for ways to adjust our plans depending on if there is more or less time:

Scope Reduction:

- Decrease the number of items to feature on grassland
- ~~Remove the option to choose the dimensions of the vegetation plane~~
- ~~Decrease the number of vegetables to feature on L-system vine~~
- ~~Remove fencing L-system~~

Scope Expansion:

- Increase number of plant options
    - Add more plant types in the GUI
- ~~Add subtle animations to objects such as flowers moving up and down~~
- ~~Random cloud generator for scene~~
- ~~Add parameters to change axiom for vegetable vine~~

High-Level Modules

This project will be divided into four main modules, one for the GUI, one for the grassland, one for the vegetable vine, and one for the fencing.

1. GUI window
2. Generate grassland (plane)
    a. Generate tall grass
    b. Generate daisies
    c. Generate pumpkins
3. Generate ~~vegetable~~ tree vine

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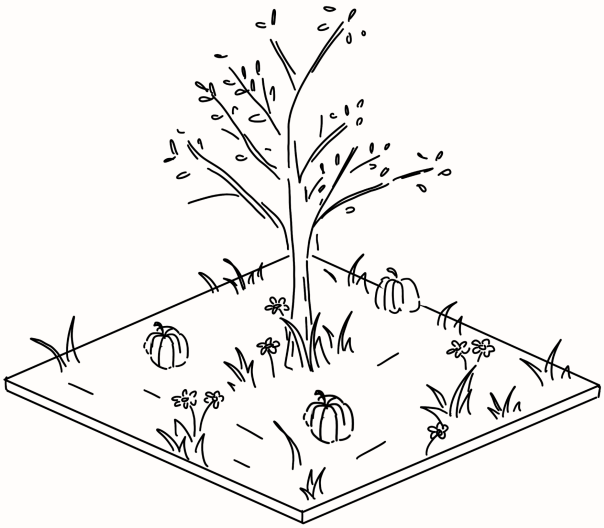
   a. Generate ~~pumpkins~~ two variations of leaves
   ~~b. Generate corn~~
   c. Develop rules for L-system (regular L-system)
4. Generate Fencing
   a. ~~Generate~~ Include fence
   ~~b. Develop rules for L-system (turtle graphic)~~

Mockup

The GUI will have a combination of buttons to generate elements of the scene as well as options to modify the parameters of the grasslands.

- **Grasslands:** For the grasslands, the GUI will have a slider for the user to adjust the size of the land, checkboxes to indicate what plants they want to generate, and a button to generate the vegetation plane
- ~~**Vegetable**~~ **Tree vines:** The GUI options for the vines will include a slider to determine the length of the vine for the tree ~~one button that will be repeatedly clicked on to generate and grow the vegetable vine.~~
- **Fencing ~~vines~~:** The GUI options for the fence ~~vines~~ will include one checkbox ~~button~~ that will determine whether fencing is added to the perimeter of the ground ~~be repeatedly clicked on to generate fencing around the grassland perimeter.~~
- A **button** to clear everything in the scene



We created a rough sketch to help visualize the layout of our final model. The tree will be placed in the middle by default and the user will have the option to select how they wish to decorate their garden. They can decorate by adding plants, adding a tree vine of various lengths ~~creating a vegetable vine~~, and~~/or~~ fence the surrounding area.

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Backlog

Task	Assignee	Progress
Create GUI window	Amy/Nabeeha	Completed on March 12
Add grassland parameters to GUI	Amy	Completed on March 12
Add ~~vegetable~~ tree vine and fencing generator buttons to GUI	Nabeeha	Completed on March 12
Poly model tree in the centre of the grassland	Amy/Nabeeha	In progress (Due March 25)
Poly model tall grass patch	Amy	In progress (Due Mar 19)
~~Poly model tree~~	Amy	Not started
Randomize position 3D models (done to one object, applied to all)	Amy	Completed on March 12
Define rules for ~~vegetable~~ tree vine L system	Nabeeha	In progress (Due April 1)
Define axiom and variables for ~~all~~ L system	Nabeeha	Completed on March 11
Poly model daisy	Amy	Not started (Due Apr 1)
Poly model ~~pumpkin~~ leaves on vines	Nabeeha	Not started (Due March 25)
Poly model sunflowers	Amy	Not started (Due Apr 1)
Generate random daisies	Amy	Completed on March 13

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Generate random sunflowers	Amy	Completed on March 13
Generate random tall grass patches	Amy	Completed on March 12
Poly model fence	Nabeeha	Not started (Due March 25)
~~Define rules for fencing L-system~~	~~Nabeeha~~	~~Removed~~
Connect fencing ~~L-system~~ to plane dimensions (to fit around perimeter)	Nabeeha	Completed on March 12
Keep ~~vegetable~~ tree vines within the area of the given vegetation plane	Nabeeha	In progress (Due April 1)
Create clear button for scene	Amy/Nabeeha	Not Started (Due March 25)

Summary of Changes:

- Overall, we are still on track to create our complex vegetation application, only minor changes have been made
- We will not be doing an L-system for the fencing around the plane perimeter since it does not make sense to do so
    - A checkbox would be a better implementation of this feature, which has been completed
- The L-system for vegetable vines is now switched to an L system for tree vines to make the resulting garden more visually pleasing
    - *Currently struggling with implementing the L-system through a slider UI
- Next steps focus more on polymodelling existing elements and optimizing our code to be as efficient as possible