FOREST GROWTH MODEL

REPRESENTING GROWTH TRENDS OVER 400 YEARS

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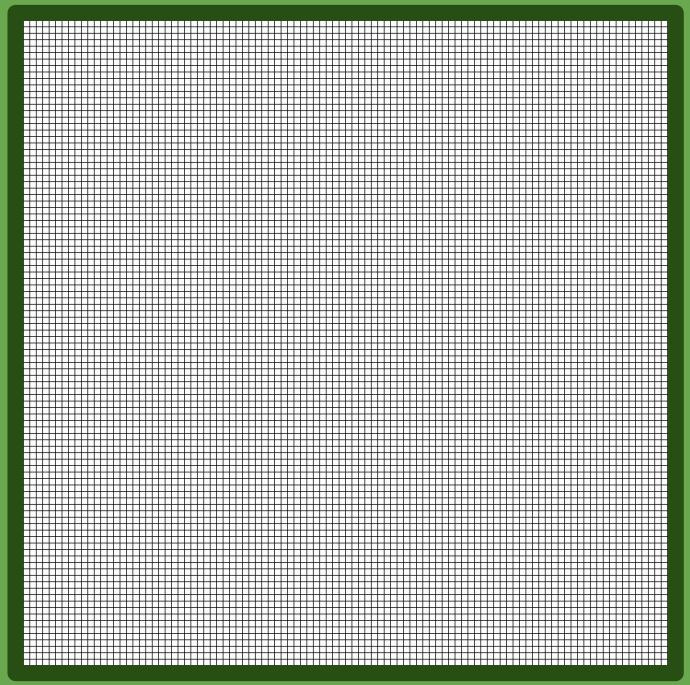
PROBLEM STATEMENT AND CONSIDERATIONS

The goal of this project is to create a simulation for trees planted in a 100 x 100 metre squared area and model the changes to the plot over the next 400 years

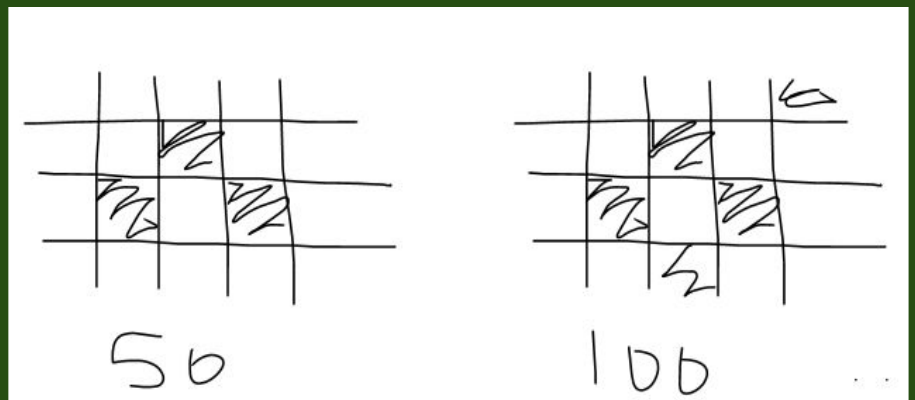
The model is based primarily on the lifespan, height and width of the plants with the seed distribution being dependant on the number of seeds produced and the radius of seed spread



100 x 100 m grid

INITIAL OUTPUT IDEA

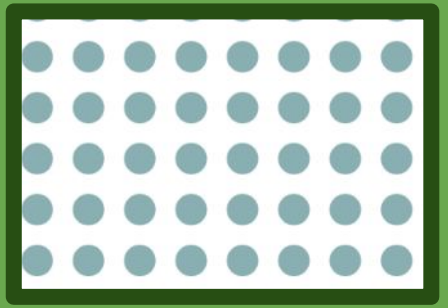
- Print (image or command print) grid of plants every 50 years until year 400
- Print a grid with shaded squares that represent that a plant resides in that space



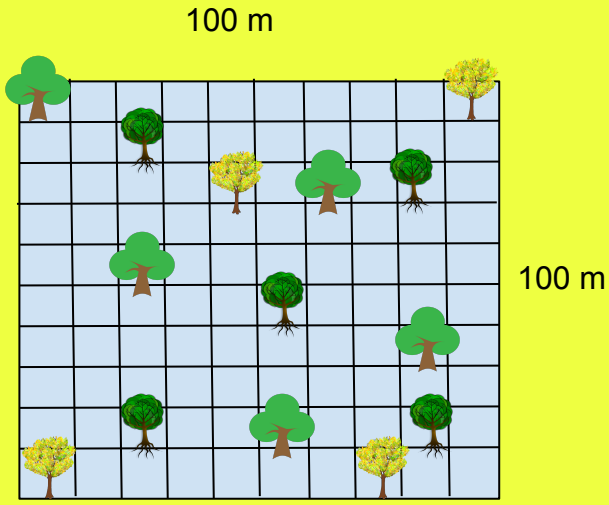
FINAL OUTPUT IDEA

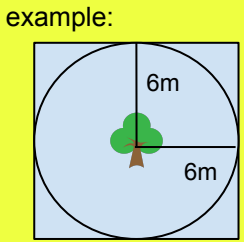
- Number the different trees
- Code prints coordinates in an excel spreadsheet with the tree number.
- We generate a scatterplot

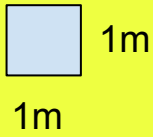
X	Y	Type
0	0	1
0	1	12
0	2	16
0	3	2
0	4	13
0	5	12



INITIAL CONDITIONS







Note: PLANTS AT YEAR 0 WERE PLACED SEQUENTIALLY 3M APART TO AVOID OVERCROWDING AND ENSURE EACH PLANT GETS ADEQUATE SUNLIGHT

Struct

Int ...//initialize variables
//set values for variables initialized
//create structure of each plant type that contains:

Parameters

- Life Span
  - End of Life
  - Current Life
- Shade Tolerance
  - Max shade
  - Current shade
- Sead Radius
- Height -> width (⅓ of height)
- Temperature (each year)
- Growth Rate
  - Highest rate
- Seed Production
  - Life to seed (Counter)
  - Max Value (age of tree) -> Compare to amount of seed produced

INITIALIZING VALUES

//initialize variables and type

Code Plan

```
struct plant {
    int age;
    int maxAge;
    float shade;
    ....
//state value of variables
//Linked lists with trees -> throw in data
```

//state value of variables

Code Plan:

```
struct plant x;
    x.age = 0;
    x.maxAge = newmaxAge;
    x.shade = 0.0;
    ......
etc.... //include variable x ahead of codes..
//change variable x later
```

CORE FUNCTIONS - PARAMETERS

// INITIALIZATION

Is year 0

- set initial year and current year to 0.

Trees not grown

- Set width to 0

//create a while loop for year less than 400

LIFE OF TREE

- If the max lifespan life of tree = current year
- Current year = 0

HEIGHT

//while loop if height is less than max height then...

- Height = height + growth rate
- Width = height/3
- // if statement (if the current year is the year of seed production)
- Return seed amount

GROWTH RATE

- Height = height + growth rate

SEED SPREAD

- Set parameters of the grid
- Random coordinates based on seed spread radius
- If tree in the space a seed fell, the seed couldn't grown (no space/sunlight)
- If 2 different seeds fell in a space, seed with higher growth rate grew (would grow faster, take resources)

PROBLEMS

- Accounting for shade using tree width (based off tree width = ⅓ height)
- Didn't get a model for every 50 years
- Didn't account for distance apart for seeds
- Very basic user interface (just requires path to mutable csv file)