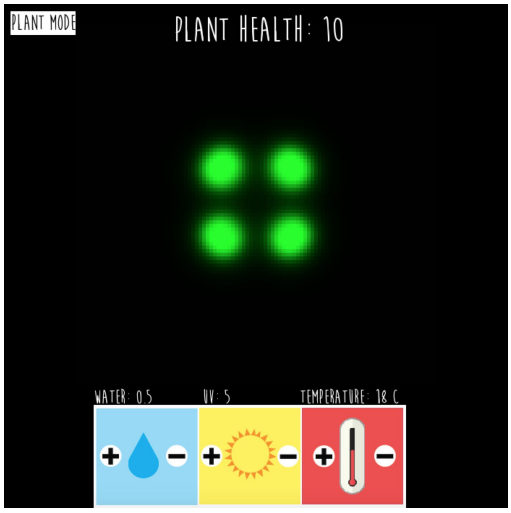
README: Bloom Documentation Fall 2017
By Sandra Sajeev

Video: https://youtu.be/Alz1tfO17aE

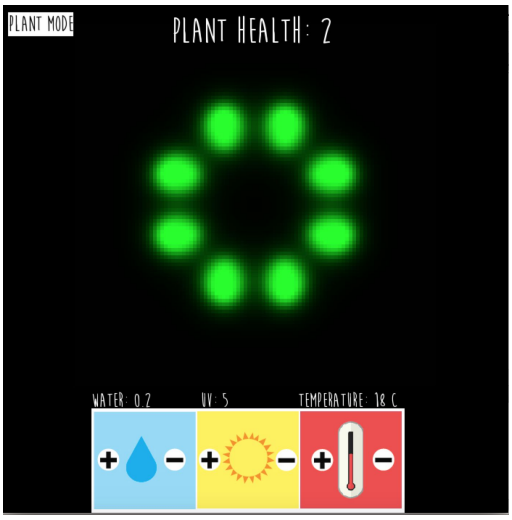
Bloom is a 3D simulation for plant growth. It gives the user the option to change environmental factors such water, UV levels, and temperature and see the resulting changes in both a 3D plant representation and a 2D cell representation.

Implementation: This project was implemented in Python 3 and pygame. OpenGL was used for the 3D graphics. All the graphics in this application were developed by the owner in Maya and Photoshop. In addition the sklearn machine learning library was used to predict how the plant will react to different environmental conditions. The Random Forest Regressor Algorithm was used for this purpose as there were different attributes given that lead to one result. Scipy and numpy were used to implement the reaction diffusion reaction of cell growth.

This is the initial screen that the user get to when they open the application. The flower can be moved and rotates with mouse drags. The corner panel indicates the plant health and includes a button to go into the 2D cell representation



This mode allows the user to change environmental factors that affect the plant. This uses a reaction diffusion algorithm to simulate cell Growth and the user can press The spacebar to reset the cell Division



This picture demonstrates what happens to the plant after some of the factors have been changed. In this case the water level had been reduced to 0.2 and UV became 5. This data was then used by the machine learning model to predict the overall plant health. The effect is seen on the screen because cell division becomes much slower.

When the user switches modes back into the 3D representation, the flower is much smaller now and the colors indicate the flower is dying. Users can repeat this process to continue understanding how different environmental conditions will affect this flower.

Future Releases: A future release of this project will likely be implemented in Unity or p5.js as it is easier to work with 3D graphics with these environment. In addition these environments will allow the application to be more accessible to the general public. The cell division can also be implemented in 3D if using these environments. Another avenue of improvement would be improving the design of the 3D models. In addition, the machine learning model can be improved by finding and incorporating other environmental factors into the data.

References:

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