Planet Universe!: A Space Game

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Project Goal

To create a game where players can infinitely explore and collect generated planets.

Overview

- Uses **procedural generation**, the generation of data pseudo-randomly by using computer algorithms, to create the stars and nebulae.
  - It’s how games like Minecraft have infinite worlds without the developer coding for each individual block.
- The screen is broken down into “tiles.” Each tile comes together in a “layer” which are stacked to create the “universe.”
- The separate tiles can be seen in fig 4.

Stars

- Generation: When each tile is created, randomly place four given star images (fig 1) onto the tile.
- When different tiles come together to form a layer, each layer is randomly placed at different distances to create a depth effect.
- Because everything is placed randomly, no two generations will be the same! (fig 5, 6)

Fig 1. Enlarged star images.

Nebulae

- Nebulae (and eventually planets) created with **noise.**
- Gradient noise works by picking a pseudo-random gradient at each grid point and combing nearby values when between grid points.
  - Figure 2 shows 1D gradient noise with the gradients shown in red.

Fig 2. From Gustavson, Stefan. *Simplex noise demystified.* Linköping University. Research Report (2005).

- In 2D, gradient noise uses triangular grids and circular gradients instead of lines.
- Multiple layers of noise at different scales can be used to create fractal patterns.

Fig 3. Main screen.

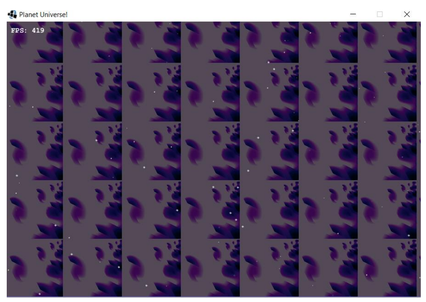

Fig 4. WIP nebula layer.

Fig 5. One generation example.

Fig 6. Second generation example.

- To create the nebulae, the noise value is used determine the color and transparency taken from the color palette below.

- Currently, the nebula layer is a work in progress as seen in fig 4. To fix this, my next step would be to clarify how the nebula function and tiles interact with each other.

Future Directions

- Finish the nebulae
- Create planets (with faces!)
- Add camera movement
- Add collection and scoring mechanics

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