

Intro to Visual Computing

Lab 2

Horia Radu - k55592hr

1. Why do you need a limit to the number of points?
 - a. So that we have a point in which the Lorenz Attractor will stop, and it won't go on forever, overloading our memory.
2. What happens when this limit is reached?
 - a. When the limit is reached, I implemented a reset feature that will make the Lorenz Attractor start over again.
In case a reset feature would not have been implemented, the spheres would keep on moving infinitely, but the lines will stop.
3. Why would you draw the head of the attractor as a larger point?
 - a. So that it is easier to follow and it is not confused with the line.
See the end of the line clearer.
4. What happens to the "old" data when the screen is refreshed?
 - a. The "old" data will be lost, and the rendering, calculations and animation will start again.
Basically the whole programme and page will be refreshed.
5. Why can't two attractors have the same starting point?
 - a. Because then they will both be going the same way, overlapping one another.
6. How long is the buffer that stores point's co-ordinates?
 - a. The buffer is three times the length of the maximum number of points assigned, basically a 3-D array with a length of the maximum points, to be able to hold values

for x, y and z.

7. What are the arguments to SphereGeometry?
 - a. The arguments of SphereGeometry define the size of the sphere; the radius, width and height.
It has 4 more arguments: phiStart, phiLength, thetaStart and thetaLength, but those I did not use and have default values set.
8. What have you done if (when) the number of points to be drawn exceeds the capacity of the point buffer?
 - a. When the number of points to be drawn exceeds the capacity, the animation enters into a reset feature I implemented which resets the sphere and the lines and makes the Lorenz Attractor start again.
9. Which variables must be reset? To what value?
 - a. The x, y, z coordinates, the Lorenz line (lines) and the point counter (pointCounter). x, y and z are assigned a random value to begin with, the lines are emptied and the point counter is assigned to 0.
10. What is the effect of changing sigma?
 - a. Changing sigma will change the x coordinates on each iteration of the movement.
It will modify the exponent for dx and its ratio at each iteration.
It will affect the distance on the x axis for the attractors.
Mainly, changing it too much will have a chaotic effect on the attractor, but what I have noticed is that for some smaller values, it makes the sphere form smaller circles and sometimes goes in the middle and forms very small circles, giving the impression that it is not moving.
Then, for higher values some kind of opposite happens, the circles get larger, thus making the emptiness in the middle bigger.
For very large values, the attractor will be ruined.

11. What is the effect of changing ρ ?
- a. Changing ρ will change the y coordinates on each iteration of the movement.
It will modify the exponent for dy and its ratio at each iteration.
It will affect the distance on the y axis for the attractors.
When we increase ρ , the initial circles will be drawn farther from the origin, and when we decrease ρ , the initial circles will be drawn closer to the origin.

12. What is the effect of changing β ?
- a. Changing β will change the z coordinates on each iteration of the movement.
It will modify the exponent for dz and its ratio at each iteration.
It will affect the distance on the z axis for the attractors.
By changing the value of β , you will either increase or decrease the distance between each circle in the attractor.

10, 11, 12 - Overall, the values should be left in a thought out manner, for whatever output we want. Changing them could result in chaotic results and making them too high will ruin the attractor as a whole. They are all variables of the 3 D axis.

13. What is the effect of increasing the timestep dt ?
- a. By increasing the timestep, we increase the “speed” of the sphere and lines. We increase the length of each line drawn, making each step of the line bigger.
Technically, by increasing the timestep we increase the length of a line in each frame, and the distance the sphere travels.
From a camera point of view, the circles will be less smooth and have fewer lines, making them look rougher.

14. What do you need to modify to increase the number of attractors?
 - a. We need to modify how many times the “for” loop is run for: the initialization of the sphere and lines and the updateLorenz function (Change “num_Lorenz” variable in the code).