Effects Production Tools: Houdini

Lucien Hugueniot*
National Centre for Computer Animation

Abstract

My goal for this project was to make an organic growth animation. I created two effects, a particle growth system using attracting and destructive particles and a coral growth system using a DOP network to manipulate a point cloud.

1 Original geometry

The stalk of the flower was generated using a nurbs curve to which I appended a sweep node. The result of this was a volume that followed the nurbs curve. The scatter nodes created a point cloud within the boundaries of the volume, I also used a volume Vop to create variations in density of the point cloud to make it less uniform. Any geometric primitive could be used as an input to the point cloud, for example in the third shot of my animation video clip I used a human model provided with the base model of houdini. The coral/flower used a sphere as a boundary for the growth limit and as the simulation progressed the boundary scaled upwards. Some of the primitives found on the original sphere are deleted and the points found on the surface are rearranged in a coral like pattern. (figure 2)

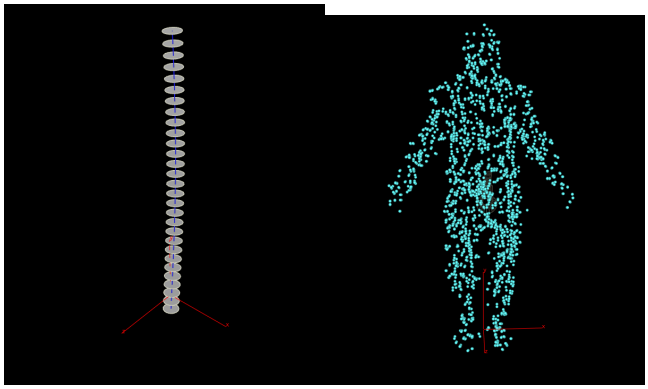

Figure 1: *Any object can be used to generate the point cloud.*

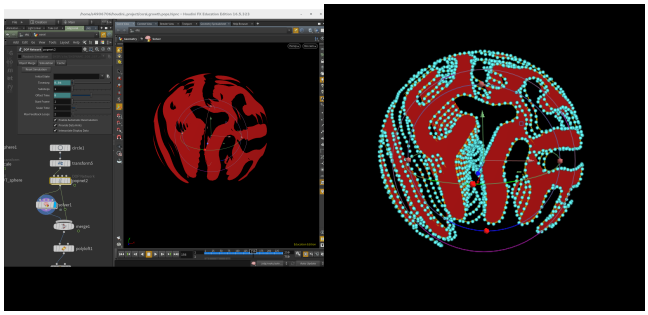

Figure 2: *The surface of the sphere is modified using a pop solver.*

*e-mail:s4906706@bournemouth.ac.uk

2 Point branch growth mechanics

The point behavior was determined by a set of attribute wrangles. The points were split in two groups, the attractors group and the destructor group. The initial geometry is filled with attractor points, a couple of destructor points are placed closed to the attractor points and they proliferate. The destructor points detect all the attractor points within a certain radius and branch off in the attractor points direction if it is close enough, the detection radius is determined by the ”Rad” parameter in the POPsolver. Once the destructor branch gets close enough the attractor point is destroyed (this is determined by the ”killrad” parameter) and the destructor branch takes it’s place. As long as the attractor points are not too sparse the destructor points should mold to the object.

3 Coral growth mechanics

The coral growth starts off with a simple sphere, using a DOP network the point positions are modified based on a wind noise sop, a point interact sop and a pop drag sop. This creates the wavy pattern seen in image 1 of figure 2. Once the sphere’s surface primitives are modified, the sphere is copied and scaled up every 12 frames thanks to the solver appended to the popnet. This creates the effect seen in image 2 of figure 2. Finally a polyloft sop is appended to the solver which joins the layers together uniformly and gives the final polygon model. A polyextrude is used to give the object some substance and the color is determined by the curvature of any set of points in the geometry. The geometry is finally smoothened out by a a laplacian smooth sop made from an attribute wrangle sop. The laplacian smooth sop takes a points position and checks how many neighbors it has and modifies its normal based on its weight ”weight =1/neghbourcount”.

4 Issues encountered

The main issues i encountered where to do with the scaling of the geometry. In both cases this was determined by the frame count, after a while the geometries would get so complex the machines I used would have difficulty generating the correct geometry. It was only through tweaking the parameters that determined the object’s shape that I managed to fine tune the geometry rendering process.

5 Intended outcome

I would have liked to have given more variation when it came to the coral effect, especially when it came to the shape of the coral. I only managed to get the coral to grow in a spherical manner and I would have wanted to make more interesting shapes using the coral growth. Perhaps if I had used a noise function that would extend the edges based on the proximity to the center of the model. For the point branch system I would have liked to have actual geometry grow out of the branches as opposed to only vertexes.

6 Conclusion

Although I am quite happy with how my simulation turned out I think there is a lot more potential and room for improvement. This

assignment allowed me to get a firm grasp of Houdini and the new skills I have learnt will certainly be of use to me in the future.

[Adam Runions, Brendan Lane, and Przemyslaw Prusinkiewicz 2007] [Entagma 2016] [cor]

References

ADAM RUNIONS, BRENDAN LANE, AND PRZEMYSLAW PRUSINKIEWICZ, 2007. Modeling trees with a space colonization algorithm. http://algorithmicbotany.org/papers/colonization.egwnp2007.large.pdf.

ENTAGMA, 2016. Entagma on vimeo. https://vimeo.com/entagma.