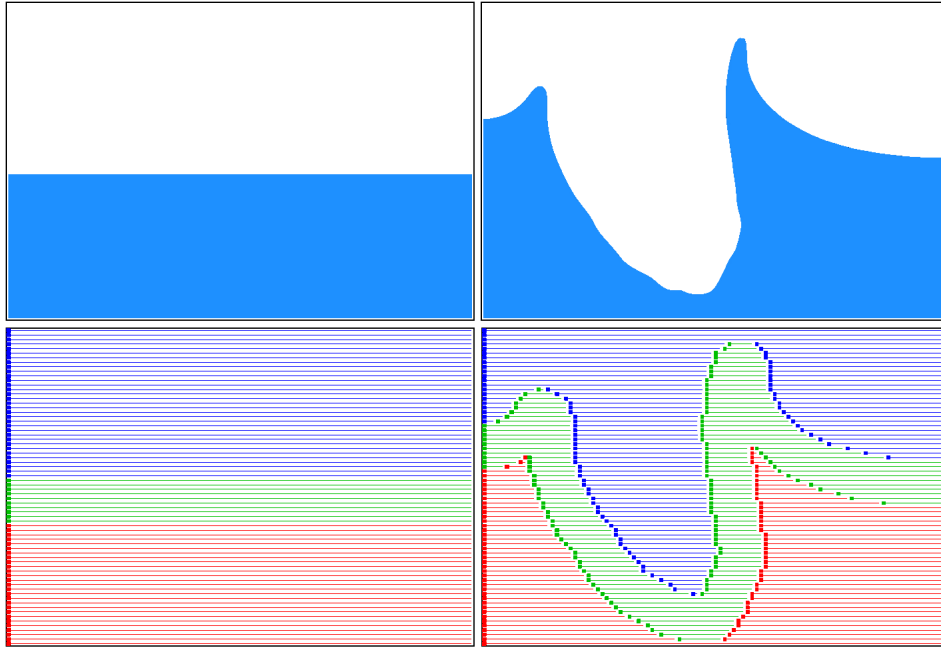# RLE Sparse Level Sets

Ben Houston, Mark Wiebe, Chris Batty

**Figure 1. Each run is represented by a square followed by a line segment. The blue, green and red colored runs correspond respectively to the +∞, defined, and -∞ run types.**



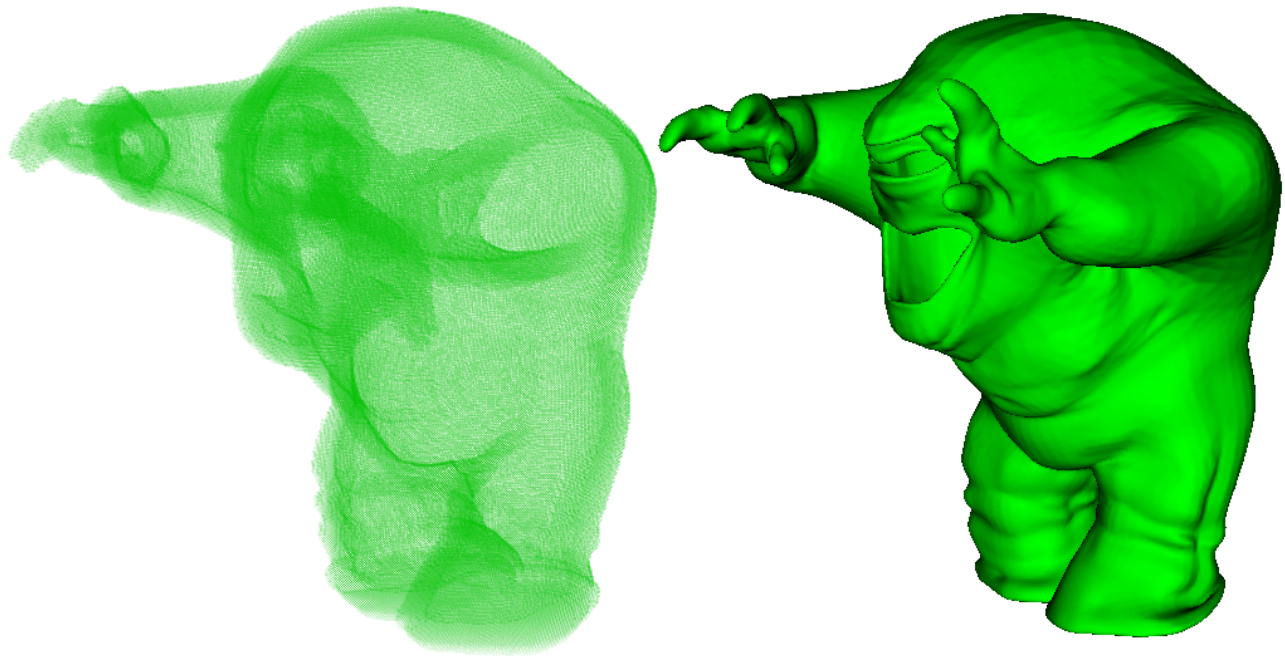**Figure 2. On the left is a visualization of defined runs corresponding to the isosurface depicted on the right. Conversion resolution was 477x364x344 voxels. The RLE sparse level set consists of 380,835 runs and 1,132,146 defined scalar values requiring in total 7.38 MBs of storage.**

# RLE Sparse Level Sets
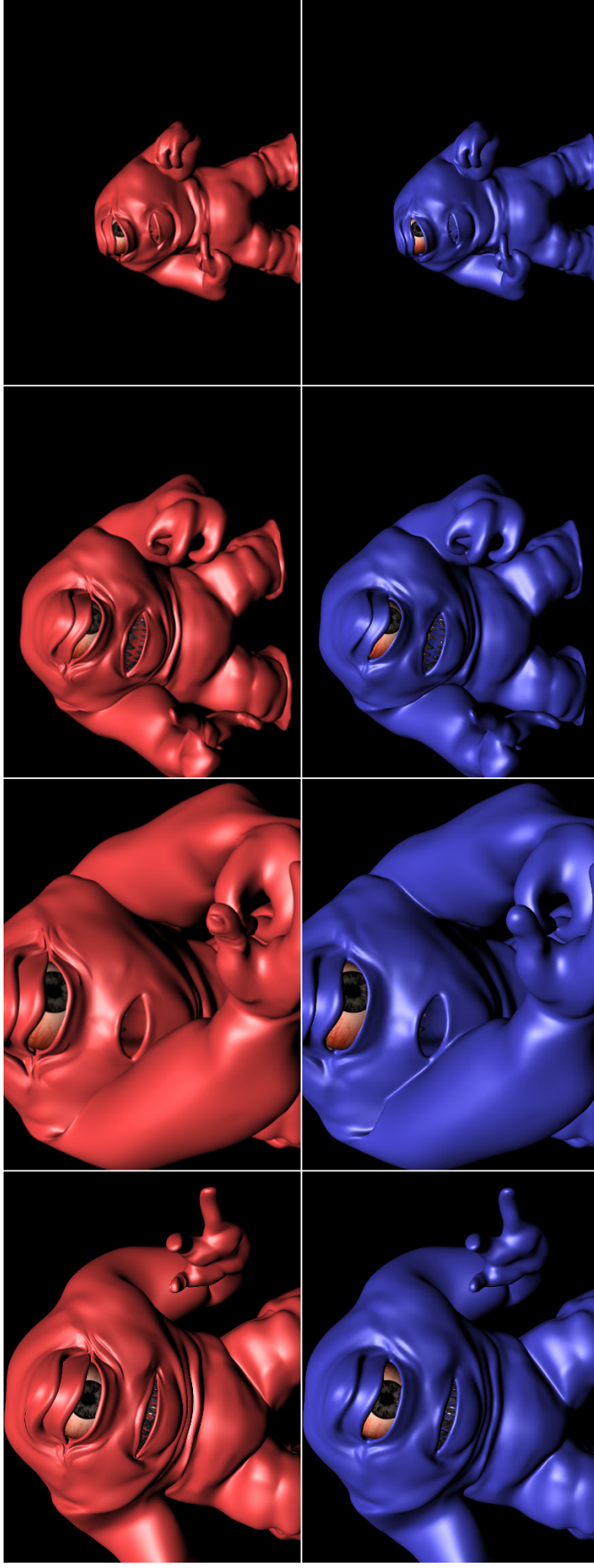
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**Figure 3.** A comparison between the original mesh (red on top) and the resulting RLS sparse level set (blue, bottom row.) In all four frames shown above there is extensive regions of self-intersections in the source mesh as well as many sharp ridges and crevasses. The conversion from the mesh, consisting of 69,120 faces and 69,153 vertices, to an RLE sparse level set was done at a resolution of 624x554x488 which was then down sampled to 312x277x244 to reduce temporal aliasing artifacts. The whole process of mesh to RLE level set conversion, down sampling and subsequent rendering took an average of 7 minutes per frame.

# RLE Sparse Level Sets

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The following four images illustrate the various steps that Ryan Grobins, an artist with Frantic Films, followed in the creation of an organic forest scene using the fast mesh to RLE level set converter and the fast level set CSG operations.
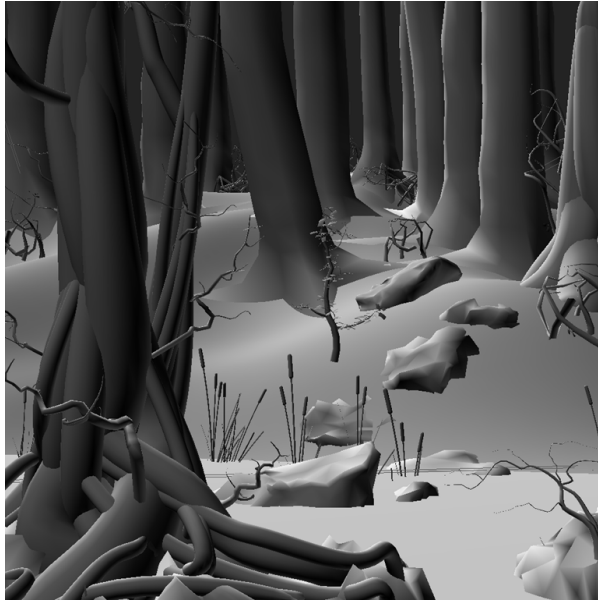


**Figure 4. The tree in the foreground is composed of over 20 individual meshes (generated courtesy of Laszlo Sebo).**



**Figure 5. The organic result after converting the individual meshes of the foreground tree into RLE level sets and blending them together.**



**Figure 6. The scene rendered with textures and grass elements.**



**Figure 7. Some post effects add the final touches.**