

CS635 Final Project Demos (and breakfast!) April 27th, 10am LWSN 3151A

Please come join us for final project demos this Friday April 27th at 10am in LWSN 3151A (conference room in the graphics-lab area).

Breakfast snacks, coffee, and juice will be provided!

Each talk will take 22 minutes with 3 minutes to switch from one talk to the other, for a total of 75 minutes of exciting demos!

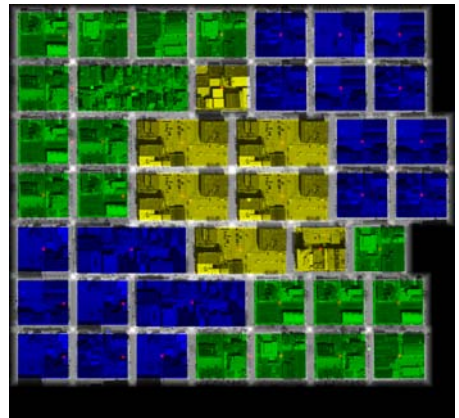
Demo #1: Non-Photorealistic Rendering of Reconstructed Surface Normals

Most datasets regarding models contain geometry, however surface normals can be reconstructed without knowing geometry. Knowing only per pixel surface normal information presents a unique side to the illumination problem. This project explores different illumination models to these datasets. Conventional shading techniques such as Lambertian and Toon shading can be applied. Contour shading can be completed with image space algorithms. Combining these fundamental shading techniques into composite shaders provide interesting shading effects and highlight various features of the model. Additionally, this project investigates ways to complete reconstruction of surface normals. The occlusion problem is present in self-shadowed regions of the model where there is insufficient data to reconstruct per pixel surface normals. Reconstructing these normals is paramount to creating a complete set of surface normals to define the model.



Demo #2: Interactive City Planning

Whether planning a new city or contemplating the growth of an existing one, it is important to be able to anticipate the city's needs. In order to do this, we must be able to simulate what a potential city will look like. In this project I attempted to produce potential cities based on aerial photographs of existing ones. I considered the problem of using city blocks as tiles of three different types: industrial, commercial, and residential. After a one-time data acquisition, the tiles were dynamically placed in groups based on size. I allowed a user to place and move "hotspots" for these different tile types and produced a tiling which would lay out a city based on the placement of these "hotspots". Individual tile placement was chosen by an algorithm which smartly and iteratively chose a tile based on size and type. The resulting city plans preserve the existing layout of the city while still being flexible enough to appear new. While there were many assumptions made to simplify this project, I have provided a stepping stone to expand the simulation of city growth and planning to any existing city layout.



Demo #3: Rendering Sparse Point Sets

When rendering a sparse set of data points, generally one of two methods is employed: a triangulation of the points is used to generate a mesh, or point-based techniques are used to generate splats. Triangulation of 3D point sets is a difficult problem. Many algorithms attempt to fully reconstruct a triangle mesh from a set of points, but are not always successful. With a completely point-based technique, it is difficult to interpolate detailed textures to create convincing images. This project presents a hybrid rendering technique that uses both triangulation and point-based rendering techniques. Various strategies are used to determine whether an area should be presented as triangles or points. By combining the strategies to suit a user's needs, the final rendering can be free of triangulation artifacts, but have more detail than a simple point based technique.