Meshing a Height Map

One of the 3D applications developed in Elbit aerospace is multi view reconstruction from aerial video of large areas. The 3D reconstruction pipeline includes estimating a heights map denoted by the term DSM - a Digital Surface Model. The DSM is then converted to a 2.5 mesh by first creating a dense mesh, where every pixel in the DSM is represented by a 3D point and triangles are created by the pixel’s neighborhood. The mesh contains a very large number of triangles (a direct result from the DSM’s resolution), and long and thin triangles along building walls.

At this stage we resample and simplify the dense mesh with uniform mesh resampling and “Quadratic Edge Collapse Decimation” algorithms to reduce the mesh size yet maintain high accuracy.

We would like to replace this 2-step process and to generate a simplified mesh directly from the DSM to serve two goals - to shorted run time and to reduce the amount of required memory.

Input: a DSM image

Output: a simplified mesh.

Figure 1: (a) DSM, (b) mesh generated by converting pixels and pixel’s neighborhood to points and triangles, (c) mesh after remeshing and simplification

Figure 2: a large DSM