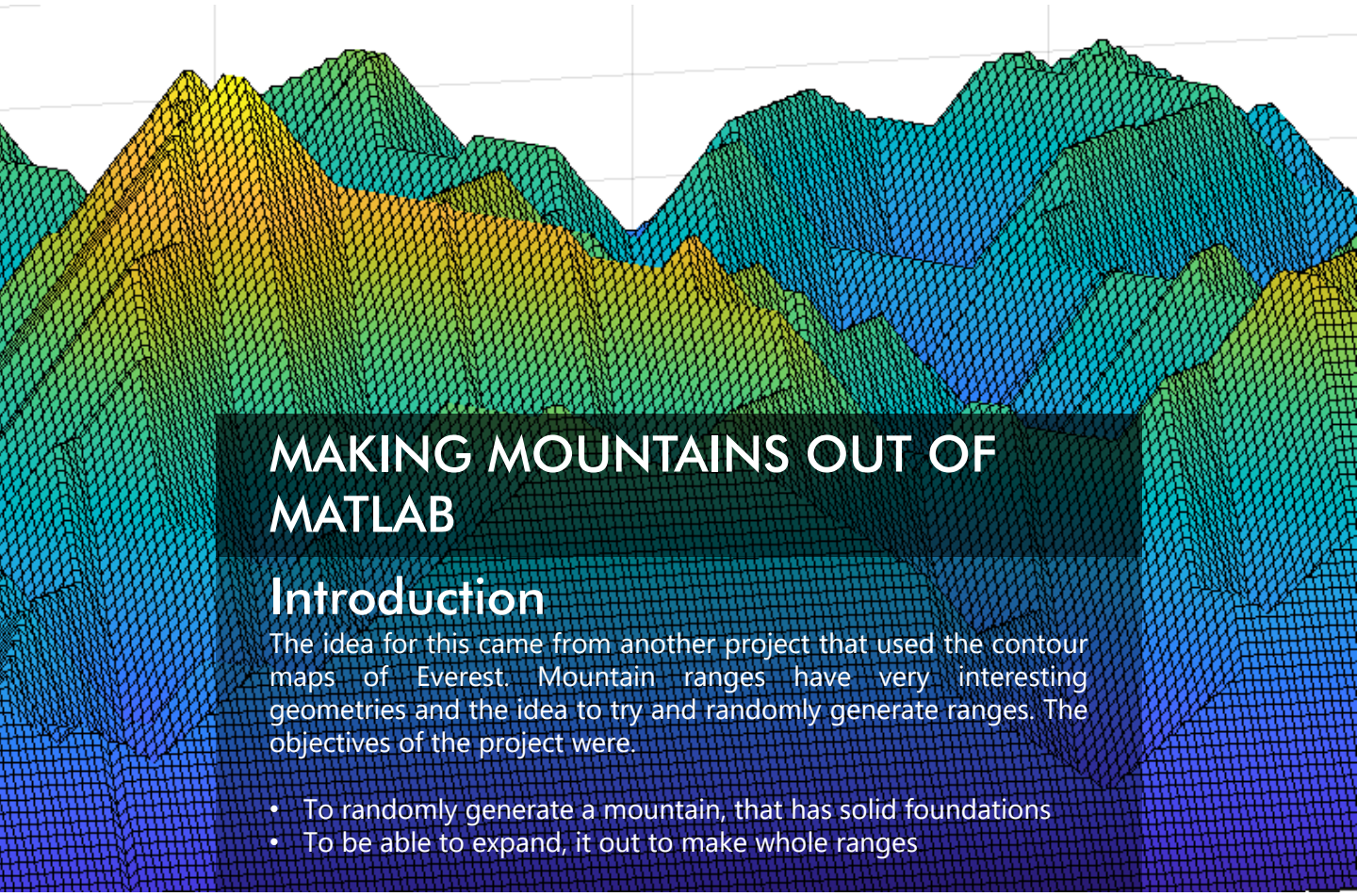

MAKING MOUNTAINS OUT OF MATLAB

Introduction

The idea for this came from another project that used the contour maps of Everest. Mountain ranges have very interesting geometries and the idea to try and randomly generate ranges. The objectives of the project were.

- To randomly generate a mountain, that has solid foundations
- To be able to expand, it out to make whole ranges

Discussion

Originally, the project was going to accomplished by drawing circular contour maps in python and interpolating between them to make a whole map. While this would be fine for a single mountain but harder to create a range

Instead, it was decided to use a matrix. A matrix can act as a grid in the XY plane with each element having a 'height' value. An algorithm to build up the mountain layer by layer. This process can be seen in figures 1 & 2.

An algorithm would check an element to assess the if this was an element was 'stable' enough to build on. If it was suitable to build on, a random number generator would decided if the height value would increase. From there the mesh and surf functions could be used to visualise the mountain.

Points of Note

- The chance parameter (k) was much higher than expected often needing values of 0.9999 for the desired effect in large matrices
- The smoothness was determined by both the chance parameter and the size of the square matrix (n demonstrated in figures 3, and 4

Limitations

- To increase ability to generate random ranges it would be interesting to randomly vary layer height. However, this would interfere with the stability criteria.
- The stability criteria also limits the geometry that can be generated. It only supports steady inclines, this removes the idea of cliffs and other interesting geometries

Improvements

- Interpolation could be used to smooth the geometry. It would also means that the matrix size could be reduced for the same result.
- A smarter stability criteria could generate more interesting geometries.
- Adaptive code which code only apply the algorithm to the appropriate parts would reduce build time.

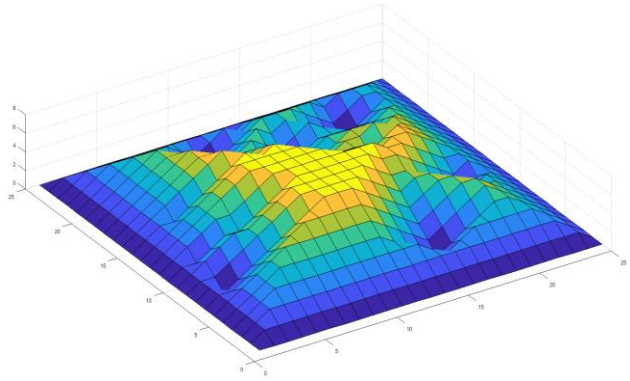

Figure 1: Process stopped on layer 7 – n = 25, k = 0.995

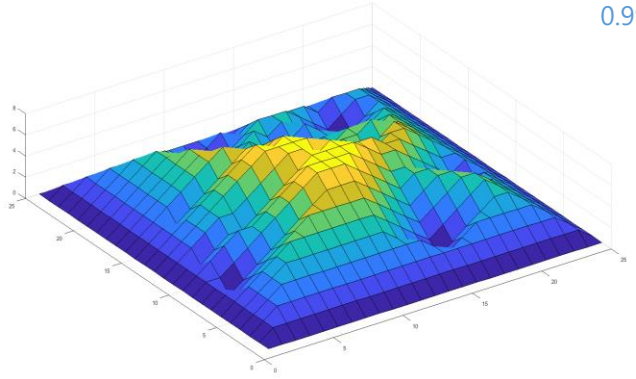

Figure 2: Process stopped on layer 8 – n = 25, k = 0.995

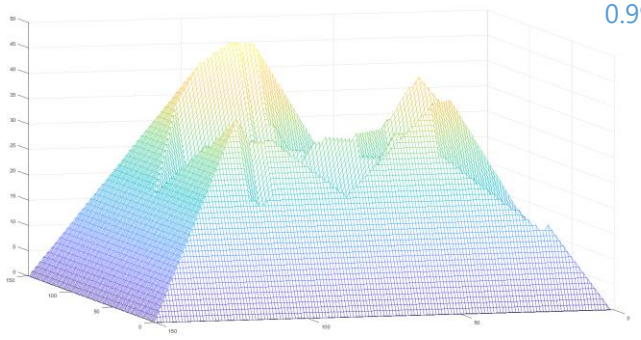

Figure 3: n = 150, k = 0.99995

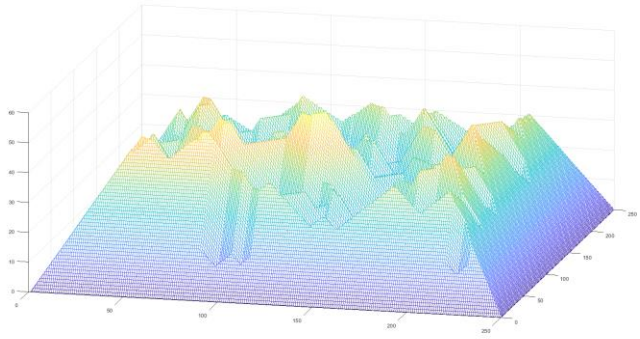

Figure 4: n = 250, k = 0.99995

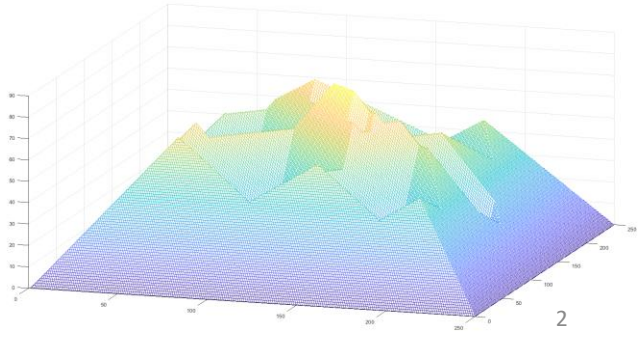

Figure 3: n = 250, k = 0.9999995