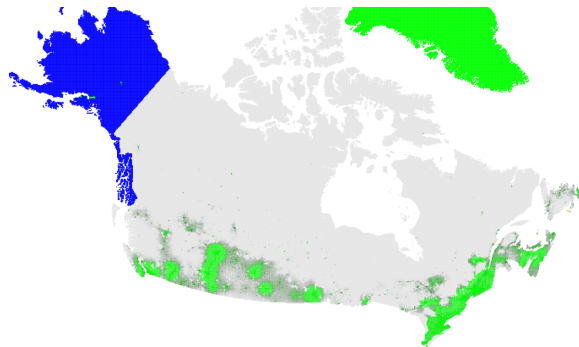


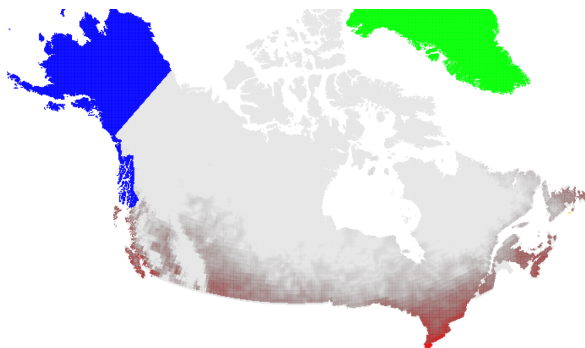
Hi, I have done some major optimization on the smoothing and the EC codes –

- A major recoding to adopt all kind of matrix operations with primitive `double[][]` grid instead of MASON's `DoubleGrid2D`, to avoid lots of small function calls.
- Implemented a faster convolution algorithm for the smoothing operation, now algorithm is 3 times faster with the same kernel size.
- Did multiple tests with kernel dimensions. A dimension of 23×23 , radius = 3.0 and passes = 2 gives extremely fast and comparatively better smoothing. Please do not ask how I settled with this number.
- All operations are done on the bounding-box, including during the fitness computation – so overall EC runs are even faster.
- The problem with *normalization-before-fitness-coputation* is gone, please do not ask why – I have no idea.
- Doing Evolution Strategy (ES) instead of GA, and it is faster.
- Hope this ends the phase 1.

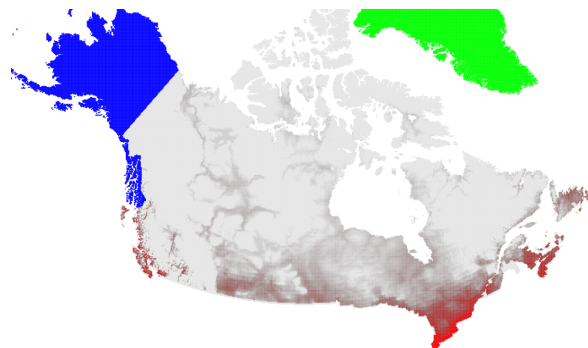
Now the coefficient values are more meaningful, and normalization before the comparison also gives better approximation to the actual population distribution. Please see the below figures (darker regions mean more desirable) –



(a) Smoothed population map.



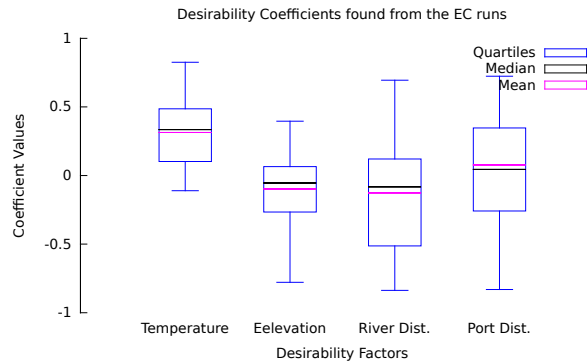
(b) Without Normalization Before Fitness Calculation



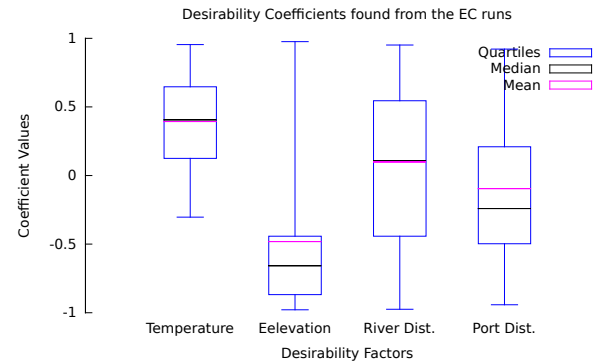
(c) Normalization Before Fitness Calculation

The statistics are more meaningful now –

For example, if you look at figure (1e), the *elevation* coefficient distribution is negative. This could be interpreted as higher elevation levels are negatively penalized, and so forth.

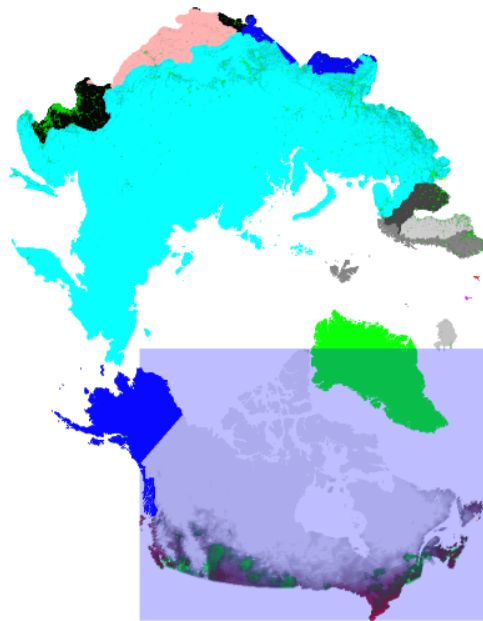


(d) Without Normalization Before Fitness Calculation



(e) Normalization Before Fitness Calculation

... and the bounding-box looks like this –



(f) Bounding-Box