Joshua Krasnogorov

Martin Cenek

CS-429

23 March 2025

Assignment 5 Write-Up

I only ran the algorithm for 50 epochs, as convergence was normally reached very quickly. I min-maxed normalized the datapoints and ran everything on the random seed 47 for repeatability.

**Joensuu Region**

|  |  |  |
| --- | --- | --- |
| cluster count | mean entropy | centroid locations |
| 4 | 0.093 | Centroid 1: (0.275, 0.439), Centroid 2: (0.697, 0.504)  Centroid 3: (0.616, 0.491), Centroid 4: (0.674, 0.713) |
| 6 | 0.077 | Centroid 1: (0.149, 0.566), Centroid 2: (0.675, 0.687)  Centroid 3: (0.614, 0.492), Centroid 4: (0.383, 0.257)  Centroid 5: (0.645, 0.503), Centroid 6: (0.660, 0.414) |
| 8 | 0.068 | Centroid 1: (0.149, 0.566), Centroid 2: (0.383, 0.257)  Centroid 3: (0.492, 0.673), Centroid 4: (0.700, 0.408)  Centroid 5: (0.679, 0.710), Centroid 6: (0.616, 0.492)  Centroid 7: (0.643, 0.522), Centroid 8: (0.727, 0.594) |
| 10 | 0.062 | Centroid 1: (0.417, 0.260), Centroid 2: (0.700, 0.408)  Centroid 3: (0.148, 0.565), Centroid 4: (0.614, 0.492)  Centroid 5: (0.727, 0.594), Centroid 6: (0.394, 0.532)  Centroid 7: (0.345, 0.047), Centroid 8: (0.687, 0.718)  Centroid 9: (0.637, 0.500), Centroid 10: (0.545, 0.672) |
| 20 | 0.037 | …omitted for brevity |

**Finland**

|  |  |  |
| --- | --- | --- |
| cluster count | mean entropy | centroid locations |
| 4 | 0.104 | Centroid 1: (0.796, 0.276), Centroid 2: (0.214, 0.156)  Centroid 3: (0.552, 0.241), Centroid 4: (0.462, 0.764) |
| 6 | 0.090 | Centroid 1: (0.870, 0.270), Centroid 2: (0.488, 0.611)  Centroid 3: (0.562, 0.179), Centroid 4: (0.790, 0.271)  Centroid 5: (0.825, 0.348), Centroid 6: (0.214, 0.156) |
| 8 | 0.064 | Centroid 1: (0.833, 0.346), Centroid 2: (0.597, 0.296)  Centroid 3: (0.462, 0.764), Centroid 4: (0.787, 0.269)  Centroid 5: (0.800, 0.274), Centroid 6: (0.121, 0.222)  Centroid 7: (0.870, 0.270), Centroid 8: (0.404, 0.095) |
| 10 | 0.061 | Centroid 1: (0.833, 0.346), Centroid 2: (0.587, 0.302)  Centroid 3: (0.694, 0.306), Centroid 4: (0.870, 0.270)  Centroid 5: (0.714, 0.175), Centroid 6: (0.121, 0.222)  Centroid 7: (0.804, 0.276), Centroid 8: (0.462, 0.764)  Centroid 9: (0.404, 0.095), Centroid 10: (0.791, 0.271) |
| 20 | 0.040 | …omitted for brevity |

**Conclusions**

For the Joensuu region, it would wise to

For the entirety of Finland,