

I ran the full data set multiply times, and my resulting purity score is around 0.3. Some conclusions: by increasing the ridge value, purity score increases, but It also have a larger variance. Since all the data are random, there are some expected fluctuations between my output purity scores. I copied and pasted my three outputs below from the console because the required output is too long for screenshots.

The input k 6, eps 0.001, ridge 12, maxiter 100:

At iteration 57, it is convergent

Means: -----

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Covariance Matrix: -----

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2.44662926e+00, 2.10707045e+02]]]]

cluster: 0, Length is 4562

cluster: 1, Length is 0

cluster: 2, Length is 11830

cluster: 3, Length is 3343

cluster: 4, Length is 0

cluster: 5, Length is 0

The purity_score is: 0.13063085888016215

The input k 6, eps 0.001, ridge 15, maxiter 100:

At iteration 76, it is convergent

Means: -----

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Covariance Matrix: -----

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cluster: 0, Length is 5458

cluster: 1, Length is 3016

cluster: 2, Length is 0

cluster: 3, Length is 7411

cluster: 4, Length is 0

cluster: 5, Length is 3847

The purity_score is: 0.288383582467697

The input k 6, eps 0.001, ridge 15, maxiter 100:

At iteration 57, it is convergent

Means: -----

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Covariance Matrix: -----

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-1.11653218e+01, 5.93269930e+00, -3.00134847e-01,
1.15517192e+00, -1.95612572e-01],
[-8.74309300e-02, 6.33045873e-01, -1.94762357e+00,
-6.17782169e-01, 1.04449407e+00, -2.19708523e-02,
-1.25208759e+00, 1.57200949e-01, -1.43564528e+00,
7.95654065e-01, -1.38411061e+00, -1.20334622e-01,

2.55652918e+00, 8.50791592e-01, -6.94733481e-01,
1.88207524e+00, 1.18910219e+00, 6.93298635e-01,
4.14361850e-01, 3.01541707e-01, 5.13215641e+00,
1.03815071e+01, -3.00134847e-01, 1.35852349e+02,
2.05910863e+00, -2.70833764e+00],
[1.02865147e-01, 2.90524844e+00, 6.70903693e+00,
3.34874900e+00, 6.92441121e+00, 4.15749174e+00,
2.82019788e+00, 3.00429680e+00, 7.05339997e+00,
3.81908234e+00, 1.00656324e+00, 1.41262093e+01,
-3.75708441e+01, 2.70270110e+00, 8.34130488e+00,
3.14139630e+00, 6.49422726e+00, 3.96429196e+00,
5.24768759e+00, 1.28326733e+01, -1.04650752e+01,
9.47746586e+00, 1.15517192e+00, 2.05910863e+00,
1.42151827e+01, -2.43538162e-01],
[-9.41311342e-01, -6.52203699e-02, -1.26012146e+00,
-2.08559472e-01, -1.02730831e+00, -1.34828427e-01,
-1.26798815e+00, 1.34448895e-01, -6.17358134e-01,
-2.16661829e-02, -3.13404415e-01, -1.74528574e+00,
6.12980247e+00, -1.53093147e-01, -5.05563900e-01,
1.45105447e-01, 1.34220476e-01, 3.08208833e-02,
-3.31396317e-01, -1.23557444e+00, -4.68701638e-01,
4.88018618e+00, -1.95612572e-01, -2.70833764e+00,
-2.43538162e-01, 2.08743980e+02]]])

cluster: 0, Length is 9356

cluster: 1, Length is 0

cluster: 2, Length is 3593

cluster: 3, Length is 0

cluster: 4, Length is 3078

cluster: 5, Length is 4331

The purity_score is: 0.30883962503166963