

I run the whole data set. The best purity score I got is around 0.30 to 0.35. The following outputs I test in different ridge value.

EPS: 0.001

Ridge: 4

Success with total iterations: 53

The final mean for each cluster

```
[array([ 4.26958685, 20.24488242, 39.93483614, 18.82310259,
        40.39862842, 20.27237927, 40.20334298, 18.82040753,
        39.65353353, 18.01608225, 51.86195981,  2.17711593,
        86.58803294, 18.01972363, 35.72351599, 20.24358836,
        44.83592827, 17.36060459, 42.08921607,  2.28437069,
        758.5607165, 91.6082766,  3.20731779, 59.59090447,
         1.03335783, 25.06265202]), array([ 4.27632305, 20.60567448, 43.09071411, 19.70957242,
        42.28288722, 20.73377912, 43.09161499, 19.24453622,
        43.32213647, 18.15492494, 53.45198628,  5.17758228,
        90.13439953, 18.24154281, 40.22532353, 19.83478764,
        48.20866916, 17.48522187, 45.43226279,  5.27757671,
        754.15147472, 87.70916708,  5.51830867, 34.14873809,
         3.32083794, 25.17013707]), array([ 1.13589902, 21.22216505, 38.74582933, 19.73121621,
        39.17884472, 21.68949151, 38.08708098, 20.39377966,
        37.15756993, 18.97627947, 47.9318573,  6.76569372,
        51.92286798, 20.06562139, 33.0244993, 21.75591035,
        40.47034469, 19.08012819, 40.05740546,  6.32510521,
        756.26611334, 74.39877921,  4.02863444, 34.99880526,
         1.76136478, 24.63891512]), array([ 18.98568455, 21.39520546, 41.34586795, 20.17006473,
        40.8826389, 21.37501127, 40.95676487, 20.35831025,
        40.55517917, 19.19111811, 65.42135277,  5.38604822,
        70.56615756, 19.23778319, 36.08580446, 21.28986791,
        43.74484197, 18.2683759, 41.67809192,  5.34082462,
        754.55727538, 82.20197778,  4.57451196, 36.26869971,
         2.3484722, 24.16954767]), array([ 1.13589902, 21.22216505, 38.74582933, 19.73121621,
        39.17884472, 21.68949151, 38.08708098, 20.39377966,
        37.15756993, 18.97627947, 47.9318573,  6.76569372,
        51.92286798, 20.06562139, 33.0244993, 21.75591035,
        40.47034469, 19.08012819, 40.05740546,  6.32510521,
        756.26611334, 74.39877921,  4.02863444, 34.99880526,
         1.76136478, 24.63891512]), array([ 4.27632305, 20.60567448, 43.09071411, 19.70957242,
        42.28288722, 20.73377912, 43.09161499, 19.24453622,
        43.32213647, 18.15492494, 53.45198628,  5.17758228,
        90.13439953, 18.24154281, 40.22532353, 19.83478764,
        48.20866916, 17.48522187, 45.43226279,  5.27757671,
        754.15147472, 87.70916708,  5.51830867, 34.14873809,
         3.32083794, 25.17013707]))]
```

The final covariance matrix for each cluster

```
[array([[ 5.62e+01,  1.38e+00,  5.29e+00,  2.57e+00,  1.55e+00,  4.61e-01,
         4.18e+00,  1.69e+00,  4.68e+00,  9.90e-01, -3.90e-02,  2.82e+00,
         1.49e+01, -6.29e-01,  3.92e+00, -2.13e-02,  9.28e-01, -1.15e+00,
        -1.56e-01,  2.85e+00,  1.17e+00,  2.53e+00,  1.16e+00,  3.76e-02,
         3.22e+00,  2.94e+00],
        [ 1.38e+00,  1.98e+00,  4.80e-01,  1.73e+00,  6.79e-01,  1.62e+00,
         5.67e-01,  1.68e+00,  1.19e+00,  1.50e+00, -2.38e-01,  2.33e+00,
        -5.20e+00,  1.27e+00,  2.16e+00,  1.30e+00,  7.93e-01,  1.20e+00,
```

1.48e+00, 2.34e+00, -2.24e+00, 1.84e+00, 6.98e-01, 6.78e-01,  
2.60e+00, 1.16e+00],  
[ 5.29e+00, 4.80e-01, 1.08e+01, 1.88e+00, 7.45e+00, 8.07e-01,  
8.07e+00, 5.54e-02, 1.25e+01, 3.61e-01, 7.63e+00, 9.44e+00,  
2.26e+01, -7.95e-01, 1.46e+01, -1.41e+00, 1.19e+01, -4.95e-01,  
1.07e+01, 9.03e+00, -1.83e+00, 7.52e+00, 3.31e+00, 3.94e-01,  
1.01e+01, 5.31e-01],  
[ 2.57e+00, 1.73e+00, 1.88e+00, 2.15e+00, 7.84e-01, 1.24e+00,  
2.08e+00, 1.21e+00, 3.31e+00, 1.24e+00, 1.62e+00, 2.94e+00,  
3.47e+00, 5.20e-01, 4.10e+00, 5.78e-01, 2.62e+00, 4.98e-01,  
2.87e+00, 2.92e+00, -1.93e+00, 2.14e+00, 1.15e+00, 8.35e-01,  
3.23e+00, 1.18e+00],  
[ 1.55e+00, 6.79e-01, 7.45e+00, 7.84e-01, 7.87e+00, 1.43e+00,  
5.14e+00, 7.73e-01, 8.60e+00, 6.64e-01, 4.62e+00, 8.96e+00,  
5.67e+00, 4.83e-01, 1.13e+01, -2.35e-01, 8.98e+00, 7.71e-01,  
8.46e+00, 8.43e+00, -1.51e+00, 7.12e+00, 2.44e+00, -9.57e-02,  
9.47e+00, 1.10e-01],  
[ 4.61e-01, 1.62e+00, 8.07e-01, 1.24e+00, 1.43e+00, 1.77e+00,  
4.72e-01, 1.63e+00, 1.09e+00, 1.37e+00, -1.32e-01, 2.63e+00,  
-6.57e+00, 1.40e+00, 2.24e+00, 1.35e+00, 1.20e+00, 1.42e+00,  
1.67e+00, 2.56e+00, -3.27e+00, 2.33e+00, 7.36e-01, 4.43e-01,  
2.90e+00, 9.55e-01],  
[ 4.18e+00, 5.67e-01, 8.07e+00, 2.08e+00, 5.14e+00, 4.72e-01,  
8.23e+00, -3.51e-01, 1.14e+01, 2.11e-01, 8.54e+00, 6.66e+00,  
2.55e+01, -1.40e+00, 1.33e+01, -1.81e+00, 1.12e+01, -1.16e+00,  
1.04e+01, 6.63e+00, 1.56e+00, 5.74e+00, 2.42e+00, 1.36e+00,  
7.47e+00, 6.32e-01],  
[ 1.69e+00, 1.68e+00, 5.54e-02, 1.21e+00, 7.73e-01, 1.63e+00,  
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-9.49e+00, 1.73e+00, 8.76e-01, 1.57e+00, -3.58e-01, 1.56e+00,  
2.80e-01, 1.13e+00, -3.10e+00, 1.36e+00, 1.02e-01, 2.10e-01,  
1.32e+00, 1.28e+00],  
[ 4.68e+00, 1.19e+00, 1.25e+01, 3.31e+00, 8.60e+00, 1.09e+00,  
1.14e+01, -3.74e-01, 1.87e+01, 6.81e-01, 1.10e+01, 1.38e+01,  
3.60e+01, -1.70e+00, 2.14e+01, -2.40e+00, 1.76e+01, -1.11e+00,  
1.66e+01, 1.33e+01, 8.44e-01, 1.02e+01, 4.89e+00, 1.35e+00,  
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[ 9.90e-01, 1.50e+00, 3.61e-01, 1.24e+00, 6.64e-01, 1.37e+00,  
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-5.27e+00, 1.25e+00, 1.54e+00, 1.22e+00, 3.56e-01, 1.15e+00,  
9.40e-01, 1.64e+00, -2.23e+00, 1.46e+00, 3.63e-01, 6.57e-01,  
1.85e+00, 1.19e+00],  
[-3.90e-02, -2.38e-01, 7.63e+00, 1.62e+00, 4.62e+00, -1.32e-01,  
8.54e+00, 5.02e-01, 1.10e+01, -2.45e-01, 5.45e+01, 1.46e+00,  
2.71e+01, -1.33e+00, 1.45e+01, -1.06e+00, 1.36e+01, -1.37e+00,  
9.56e+00, 9.41e-01, -4.61e+00, 7.22e+00, 1.78e-02, 1.95e+00,  
2.09e+00, 2.46e+00],  
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1.33e+01, 3.89e-01, 1.77e+01, -4.94e-03, 1.24e+01, 1.30e+00,  
1.30e+01, 2.02e+01, -1.92e+00, 8.22e+00, 6.63e+00, -4.86e-01,  
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2.55e+01, -9.49e+00, 3.60e+01, -5.27e+00, 2.71e+01, 1.33e+01,

1.60e+02, -1.31e+01, 3.51e+01, -1.33e+01, 3.38e+01, -1.19e+01,  
 2.69e+01, 1.25e+01, 9.60e+00, 1.08e+01, 8.50e+00, -9.63e-01,  
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 -1.31e+01, 2.21e+00, -5.95e-01, 1.99e+00, -1.51e+00, 1.85e+00,  
 -9.11e-01, 4.56e-01, -4.08e+00, 6.66e-01, 9.56e-03, 3.87e-01,  
 5.41e-01, 1.15e+00],  
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 1.87e+01, 1.58e+00],  
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 -1.33e+01, 1.99e+00, -1.84e+00, 2.42e+00, -2.02e+00, 1.73e+00,  
 -1.86e+00, -7.08e-02, -4.54e+00, 2.50e-01, -3.23e-01, 1.74e-01,  
 -3.80e-02, 1.31e+00],  
 [9.28e-01, 7.93e-01, 1.19e+01, 2.62e+00, 8.98e+00, 1.20e+00,  
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 3.38e+01, -1.51e+00, 2.21e+01, -2.02e+00, 2.16e+01, -8.44e-01,  
 1.79e+01, 1.17e+01, -4.15e-01, 1.15e+01, 4.62e+00, 2.84e-01,  
 1.34e+01, 1.14e-02],  
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 -1.16e+00, 1.56e+00, -1.11e+00, 1.15e+00, -1.37e+00, 1.30e+00,  
 -1.19e+01, 1.85e+00, -1.66e-01, 1.73e+00, -8.44e-01, 1.77e+00,  
 -1.93e-01, 1.22e+00, -3.84e+00, 1.22e+00, 2.28e-01, 1.49e-01,  
 1.39e+00, 9.96e-01],  
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 2.69e+01, -9.11e-01, 2.06e+01, -1.86e+00, 1.79e+01, -1.93e-01,  
 1.87e+01, 1.25e+01, 3.73e+00, 9.99e+00, 4.10e+00, 1.30e+00,  
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 1.25e+01, 4.56e-01, 1.66e+01, -7.08e-02, 1.17e+01, 1.22e+00,  
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 9.60e+00, -4.08e+00, -1.50e+00, -4.54e+00, -4.15e-01, -3.84e+00,  
 3.73e+00, -6.76e-01, 5.88e+01, -6.90e+00, -2.99e+00, -6.10e-01,  
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 [2.53e+00, 1.84e+00, 7.52e+00, 2.14e+00, 7.12e+00, 2.33e+00,  
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 1.08e+01, 6.66e-01, 1.43e+01, 2.50e-01, 1.15e+01, 1.22e+00,  
 9.99e+00, 7.48e+00, -6.90e+00, 2.19e+01, 2.52e+00, -5.60e+00,  
 1.08e+01, 6.65e-01],  
 [1.16e+00, 6.98e-01, 3.31e+00, 1.15e+00, 2.44e+00, 7.36e-01,  
 2.42e+00, 1.02e-01, 4.89e+00, 3.63e-01, 1.78e-02, 6.63e+00,  
 8.50e+00, 9.56e-03, 5.61e+00, -3.23e-01, 4.62e+00, 2.28e-01,  
 4.10e+00, 6.23e+00, -2.99e+00, 2.52e+00, 5.05e+00, -6.84e-01,  
 6.56e+00, 1.33e-01],  
 [3.76e-02, 6.78e-01, 3.94e-01, 8.35e-01, -9.57e-02, 4.43e-01,

1.36e+00, 2.10e-01, 1.35e+00, 6.57e-01, 1.95e+00, -4.86e-01,  
-9.63e-01, 3.87e-01, 1.26e+00, 1.74e-01, 2.84e-01, 1.49e-01,  
1.30e+00, 3.15e-01, -6.10e-01, -5.60e+00, -6.84e-01, 2.39e+01,  
-5.48e-01, -1.32e+00],  
[ 3.22e+00, 2.60e+00, 1.01e+01, 3.23e+00, 9.47e+00, 2.90e+00,  
7.47e+00, 1.32e+00, 1.48e+01, 1.85e+00, 2.09e+00, 2.13e+01,  
1.42e+01, 5.41e-01, 1.87e+01, -3.80e-02, 1.34e+01, 1.39e+00,  
1.39e+01, 1.97e+01, -1.70e+00, 1.08e+01, 6.56e+00, -5.48e-01,  
2.12e+01, 8.20e-01],  
[ 2.94e+00, 1.16e+00, 5.31e-01, 1.18e+00, 1.10e-01, 9.55e-01,  
6.32e-01, 1.28e+00, 1.05e+00, 1.19e+00, 2.46e+00, 6.02e-01,  
-2.20e+00, 1.15e+00, 1.58e+00, 1.31e+00, 1.14e-02, 9.96e-01,  
-2.59e-01, 7.48e-01, -5.70e+00, 6.65e-01, 1.33e-01, -1.32e+00,  
8.20e-01, 2.14e+02]], array([[ 5.67e+01, 1.97e+00, 9.68e-01, 1.85e+00, -6.82e-01, 1.16e+00,  
-1.92e-01, 3.03e+00, -7.38e-01, 1.42e+00, -2.41e+00, 6.87e-01,  
-3.90e+00, 1.01e+00, -1.63e+00, 2.06e+00, -4.82e+00, 5.12e-01,  
-4.02e+00, 4.70e-01, -3.99e+00, -3.40e-01, -4.08e-01, 3.56e+00,  
4.30e-01, -1.82e+00],  
[ 1.97e+00, 2.00e+00, -4.44e-01, 2.00e+00, -1.08e+00, 1.46e+00,  
1.81e-01, 1.46e+00, 1.45e-01, 1.27e+00, 6.83e-01, 3.20e-02,  
-1.39e+00, 9.29e-01, 2.43e-01, 1.51e+00, -6.72e-02, 8.72e-01,  
1.62e-01, 6.43e-02, -2.40e+00, -3.88e-01, 1.02e-01, 2.01e+00,  
-5.19e-03, 4.70e-01],  
[ 9.68e-01, -4.44e-01, 8.26e+00, 1.31e-01, 6.11e+00, 1.90e-01,  
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3.40e+00, -7.04e-01, 6.90e+00, -1.08e+00, 6.03e+00, -2.38e-01,  
5.77e+00, 5.98e+00, -2.22e-01, -7.64e-01, 1.91e+00, 3.52e+00,  
5.79e+00, -4.31e-01],  
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-6.11e-01, 7.87e-01, 1.08e+00, 1.30e+00, 6.64e-01, 7.85e-01,  
9.33e-01, 6.59e-01, -1.99e+00, -5.57e-01, 4.45e-01, 2.30e+00,  
5.54e-01, 3.22e-01],  
[-6.82e-01, -1.08e+00, 6.11e+00, -8.00e-01, 6.03e+00, -4.08e-01,  
3.75e+00, -5.88e-01, 5.74e+00, -3.85e-01, 1.09e+00, 5.64e+00,  
2.91e+00, -8.47e-01, 6.08e+00, -1.35e+00, 5.60e+00, -4.16e-01,  
5.08e+00, 5.47e+00, 1.39e+00, 1.48e-01, 1.67e+00, 1.68e+00,  
5.43e+00, -4.14e-01],  
[ 1.16e+00, 1.46e+00, 1.90e-01, 1.47e+00, -4.08e-01, 1.55e+00,  
3.88e-01, 1.20e+00, 2.31e-01, 1.07e+00, 7.34e-01, 6.83e-01,  
-1.93e+00, 7.98e-01, 2.62e-01, 1.35e+00, 3.87e-01, 9.30e-01,  
7.02e-01, 6.45e-01, -2.82e+00, -5.93e-01, 2.80e-01, 2.28e+00,  
5.38e-01, 4.72e-01],  
[-1.92e-01, 1.81e-01, 5.00e+00, 7.93e-01, 3.75e+00, 3.88e-01,  
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4.12e+00, -5.67e-01, 6.52e+00, -8.87e-01, 6.23e+00, -3.48e-01,  
6.03e+00, 4.09e+00, 5.23e-01, -5.56e-01, 1.74e+00, 2.13e+00,  
3.95e+00, -2.25e-01],  
[ 3.03e+00, 1.46e+00, -6.71e-02, 1.42e+00, -5.88e-01, 1.20e+00,  
1.15e-01, 2.20e+00, -6.25e-01, 1.21e+00, 1.16e+00, -4.13e-01,  
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2.81e+01, -8.61e-01, 3.97e+00, 8.44e-01, 5.77e+00, -3.97e-01,  
1.44e+00, -5.95e+00, -3.18e+00, 5.23e+01, -5.45e+00, -1.29e+01,  
3.12e+00, -7.39e-01],  
[-4.08e-01, 1.02e-01, 1.91e+00, 4.45e-01, 1.67e+00, 2.80e-01,  
1.74e+00, -5.00e-01, 3.39e+00, -1.05e-01, 4.03e-02, 5.36e+00,  
-5.32e+00, -5.10e-01, 3.62e+00, -8.78e-01, 3.45e+00, -1.25e-01,  
3.27e+00, 5.04e+00, -4.42e+00, -5.45e+00, 6.65e+00, 4.81e+00,  
4.07e+00, -3.01e-01],  
[ 3.56e+00, 2.01e+00, 3.52e+00, 2.30e+00, 1.68e+00, 2.28e+00,  
2.13e+00, 1.75e+00, 3.11e+00, 1.27e+00, -4.30e-01, 6.95e+00,  
-6.82e+00, 8.81e-01, 1.66e+00, 1.00e+00, 8.09e-01, 1.55e+00,  
2.49e+00, 6.71e+00, -1.61e+01, -1.29e+01, 4.81e+00, 6.84e+01,

```
4.40e+00, 2.65e+00],  
[ 4.30e-01, -5.19e-03, 5.79e+00, 5.54e-01, 5.43e+00, 5.38e-01,  
 3.95e+00, -4.10e-01, 8.10e+00, -5.99e-02, -6.20e-01, 1.17e+01,  
 3.69e+00, -1.19e+00, 7.84e+00, -9.79e-01, 7.36e+00, -7.12e-02,  
 7.40e+00, 1.09e+01, 8.31e-01, 3.12e+00, 4.07e+00, 4.40e+00,  
 1.13e+01, -5.25e-01],  
[-1.82e+00, 4.70e-01, -4.31e-01, 3.22e-01, -4.14e-01, 4.72e-01,  
 -2.25e-01, 4.57e-01, -5.49e-01, 1.31e-01, -1.75e+00, -4.54e-01,  
 3.41e-01, 1.90e-01, -5.44e-01, 1.87e-01, -6.73e-01, 2.89e-01,  
 -3.28e-01, -4.29e-01, -2.82e+00, -7.39e-01, -3.01e-01, 2.65e+00,  
 -5.25e-01, 2.12e+02]]])]
```

cluster: 0

Length is: 3620

cluster: 1

Length is: 8098

cluster: 2

Length is: 5437

cluster: 3

Length is: 2580

cluster: 4

Length is: 0

cluster: 5

Length is: 0

The purity\_score is: 0.28269571826703827

-----  
EPS: 0.001

Ridge: 10

Success with total iterations: 75

The final mean for each cluster

```
[array([ 5.7469588 , 20.09759839, 40.95707616, 18.99183106,  
 40.75720708, 20.1384858 , 41.18812711, 18.58264541,  
 41.03529809, 17.87048355, 53.68508415, 2.75315579,  
 92.27841036, 17.6787228 , 37.11629746, 19.89497092,  
 46.21990656, 17.04128091, 43.06665517, 2.79610403,  
 757.62276473, 92.25283979, 3.70105396, 58.09075928,  
 1.64077617, 25.55227425]), array([ 5.7469588 , 20.09759839, 40.95707616, 18.99183106,  
 40.75720708, 20.1384858 , 41.18812711, 18.58264541,  
 41.03529809, 17.87048355, 53.68508415, 2.75315579,  
 92.27841036, 17.6787228 , 37.11629746, 19.89497092,  
 46.21990656, 17.04128091, 43.06665517, 2.79610403,  
 757.62276473, 92.25283979, 3.70105396, 58.09075928,  
 1.64077617, 25.55227425]), array([ 7.67048007, 21.3261581 , 37.74188617, 19.22480245,  
 39.38443196, 21.57071478, 37.06281419, 20.55451079,  
 35.93606726, 19.16099387, 52.22032598, 4.92283492,  
 52.61226089, 20.11903545, 31.72180178, 22.20197832,  
 39.62701625, 19.18960749, 39.13050684, 4.6264592 ,  
 759.06735321, 81.71758677, 3.04816774, 44.17031628,  
 1.52261761, 25.57524973]), array([ 5.7469588 , 20.09759839, 40.95707616, 18.99183106,  
 40.75720708, 20.1384858 , 41.18812711, 18.58264541,  
 41.03529809, 17.87048355, 53.68508415, 2.75315579,  
 92.27841036, 17.6787228 , 37.11629746, 19.89497092,  
 46.21990656, 17.04128091, 43.06665517, 2.79610403,
```



757.62276473, 92.25283979, 3.70105396, 58.09075928,  
 1.64077617, 25.55227425]), array([ 7.92393013, 20.74819262, 43.31090875, 19.87390237,  
 42.37059954, 20.79515985, 43.32156486, 19.46610653,  
 43.52679313, 18.33861268, 56.80238703, 5.07543729,  
 89.66956059, 18.32922211, 40.36691219, 19.97841298,  
 48.24681241, 17.51696634, 45.27758188, 5.20990019,  
 753.72621586, 87.54474741, 5.51959169, 34.02821167,  
 3.23396349, 24.72897432]), array([ 0.81360107, 21.04574201, 39.52030897, 19.66659615,  
 39.7525134 , 21.46548627, 39.06266393, 20.0527182 ,  
 38.28238132, 18.75041506, 48.59804071, 6.41371118,  
 60.07642468, 19.62829596, 34.27731765, 21.26370509,  
 41.83606908, 18.71116607, 40.96149403, 6.07477079,  
 755.1910994 , 76.55368377, 4.39632322, 33.81094983,  
 1.92958599, 24.53486215]))]

The final covariance matrix for each cluster

[array([[ 8.46e+01, 1.82e+00, 7.12e+00, 2.61e+00, 3.41e+00, 1.22e+00,  
 5.26e+00, 2.57e+00, 5.16e+00, 1.58e+00, 8.19e+00, 6.01e+00,  
 7.55e+00, -9.88e-02, 5.20e+00, 1.04e+00, 5.35e-01, -5.12e-01,  
 5.10e-01, 5.62e+00, 4.33e+00, 1.59e+00, 9.29e-01, -1.02e+00,  
 5.82e+00, 3.28e+00],  
 [ 1.82e+00, 2.33e+00, 1.20e+00, 2.34e+00, 7.43e-01, 1.86e+00,  
 1.59e+00, 1.88e+00, 2.54e+00, 1.70e+00, 1.62e+00, 2.28e+00,  
 -5.20e-01, 1.25e+00, 3.70e+00, 1.23e+00, 2.01e+00, 1.11e+00,  
 2.61e+00, 2.37e+00, -4.33e+00, 2.04e+00, 1.22e+00, 3.23e-01,  
 2.66e+00, 1.23e+00],  
 [ 7.12e+00, 1.20e+00, 1.10e+01, 2.01e+00, 8.80e+00, 1.73e+00,  
 7.58e+00, 1.02e+00, 1.24e+01, 9.81e-01, 7.87e+00, 1.19e+01,  
 1.23e+01, 4.34e-01, 1.51e+01, -2.67e-01, 1.21e+01, 6.43e-01,  
 1.16e+01, 1.13e+01, 3.30e-01, 7.67e+00, 3.94e+00, -7.05e-01,  
 1.24e+01, 1.35e+00],  
 [ 2.61e+00, 2.34e+00, 2.01e+00, 2.61e+00, 1.09e+00, 1.80e+00,  
 2.33e+00, 1.78e+00, 3.67e+00, 1.71e+00, 2.46e+00, 3.12e+00,  
 1.97e+00, 1.06e+00, 4.88e+00, 1.04e+00, 3.04e+00, 9.34e-01,  
 3.55e+00, 3.14e+00, -3.02e+00, 2.17e+00, 1.50e+00, 4.72e-01,  
 3.44e+00, 1.31e+00],  
 [ 3.41e+00, 7.43e-01, 8.80e+00, 1.09e+00, 8.42e+00, 1.50e+00,  
 6.11e+00, 8.28e-01, 1.03e+01, 6.29e-01, 6.74e+00, 1.07e+01,  
 8.57e+00, 4.11e-01, 1.30e+01, -3.91e-01, 1.06e+01, 6.70e-01,  
 1.03e+01, 1.01e+01, -3.66e-01, 7.26e+00, 3.35e+00, -1.19e+00,  
 1.12e+01, 1.24e+00],  
 [ 1.22e+00, 1.86e+00, 1.73e+00, 1.80e+00, 1.50e+00, 1.90e+00,  
 1.61e+00, 1.76e+00, 2.58e+00, 1.48e+00, 1.75e+00, 2.75e+00,  
 -7.65e-01, 1.29e+00, 3.82e+00, 1.21e+00, 2.59e+00, 1.25e+00,  
 2.94e+00, 2.79e+00, -4.95e+00, 2.39e+00, 1.30e+00, -3.89e-02,  
 3.13e+00, 1.34e+00],  
 [ 5.26e+00, 1.59e+00, 7.58e+00, 2.33e+00, 6.11e+00, 1.61e+00,  
 7.13e+00, 9.07e-01, 1.04e+01, 1.07e+00, 7.33e+00, 8.61e+00,  
 1.16e+01, 1.07e-01, 1.28e+01, -3.96e-01, 1.04e+01, 2.25e-01,  
 1.06e+01, 8.43e+00, 3.81e+00, 5.34e+00, 2.80e+00, 4.39e-01,  
 9.19e+00, 1.70e+00],  
 [ 2.57e+00, 1.88e+00, 1.02e+00, 1.78e+00, 8.28e-01, 1.76e+00,  
 9.07e-01, 2.51e+00, 1.27e+00, 1.55e+00, 3.01e+00, 1.29e+00,  
 -2.72e+00, 1.52e+00, 2.58e+00, 1.36e+00, 1.14e+00, 1.35e+00,  
 1.67e+00, 1.37e+00, -4.79e+00, 1.55e+00, 4.69e-01, -3.46e-02,

1.59e+00, 1.34e+00],  
[ 5.16e+00, 2.54e+00, 1.24e+01, 3.67e+00, 1.03e+01, 2.58e+00,  
1.04e+01, 1.27e+00, 1.82e+01, 1.79e+00, 1.07e+01, 1.67e+01,  
1.93e+01, 2.74e-01, 2.17e+01, -7.07e-01, 1.76e+01, 6.31e-01,  
1.77e+01, 1.61e+01, 4.37e+00, 9.55e+00, 5.89e+00, 1.92e-01,  
1.75e+01, 2.44e+00],  
[ 1.58e+00, 1.70e+00, 9.81e-01, 1.71e+00, 6.29e-01, 1.48e+00,  
1.07e+00, 1.55e+00, 1.79e+00, 1.64e+00, 2.18e+00, 1.55e+00,  
-8.10e-01, 1.17e+00, 2.79e+00, 1.10e+00, 1.46e+00, 1.02e+00,  
1.92e+00, 1.66e+00, -3.63e+00, 1.35e+00, 7.11e-01, 7.76e-01,  
1.84e+00, 9.11e-01],  
[ 8.19e+00, 1.62e+00, 7.87e+00, 2.46e+00, 6.74e+00, 1.75e+00,  
7.33e+00, 3.01e+00, 1.07e+01, 2.18e+00, 7.33e+01, 5.32e+00,  
8.52e+00, 7.10e-01, 1.45e+01, 1.35e+00, 1.32e+01, 6.19e-01,  
1.03e+01, 4.72e+00, -8.60e-02, 8.13e+00, 5.87e-01, 1.91e+00,  
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4.68e+01, -3.68e+00, 2.12e+01, -4.26e+00, 1.83e+01, -2.99e+00,  
1.81e+01, 1.79e+01, 2.42e+01, 4.07e+00, 6.10e+00, -5.81e-01,  
1.84e+01, 8.94e-01],  
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2.12e+01, 1.33e+00, 2.90e+01, -1.77e-01, 2.23e+01, 1.54e+00,  
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2.16e+01, 3.10e+00],  
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-4.26e+00, 1.48e+00, -1.77e-01, 2.01e+00, -5.24e-01, 1.22e+00,  
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1.83e+01, 2.43e-01, 2.23e+01, -5.24e-01, 2.19e+01, 7.51e-01,  
1.97e+01, 1.48e+01, 4.84e+00, 1.08e+01, 5.84e+00, -8.96e-01,  
1.64e+01, 1.93e+00],  
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-2.99e+00, 1.36e+00, 1.54e+00, 1.22e+00, 7.51e-01, 1.26e+00,  
9.98e-01, 1.06e+00, -6.11e+00, 1.47e+00, 5.94e-01, -1.20e-01,  
1.27e+00, 1.01e+00],  
[ 5.10e-01, 2.61e+00, 1.16e+01, 3.55e+00, 1.03e+01, 2.94e+00,  
1.06e+01, 1.67e+00, 1.77e+01, 1.92e+00, 1.03e+01, 1.59e+01,  
1.81e+01, 3.73e-01, 2.25e+01, -8.82e-01, 1.97e+01, 9.98e-01,

2.12e+01, 1.55e+01, 7.07e+00, 9.75e+00, 5.39e+00, 1.17e-01,  
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1.55e+01, 2.03e+01, 6.54e-01, 8.24e+00, 7.46e+00, -1.80e+00,  
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2.42e+01, -6.94e+00, 1.88e+00, -7.78e+00, 4.84e+00, -6.11e+00,  
7.07e+00, 6.54e-01, 7.30e+01, -5.34e+00, -3.54e+00, -7.79e-01,  
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4.07e+00, 9.80e-01, 1.35e+01, 5.99e-01, 1.08e+01, 1.47e+00,  
9.75e+00, 8.24e+00, -5.34e+00, 2.18e+01, 3.14e+00, -7.74e+00,  
1.16e+01, 1.59e+00],  
[ 9.29e-01, 1.22e+00, 3.94e+00, 1.50e+00, 3.35e+00, 1.30e+00,  
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6.10e+00, 3.94e-01, 7.02e+00, -7.27e-02, 5.84e+00, 5.94e-01,  
5.39e+00, 7.46e+00, -3.54e+00, 3.14e+00, 5.91e+00, -1.72e+00,  
7.88e+00, 1.21e-02],  
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4.39e-01, -3.46e-02, 1.92e-01, 7.76e-01, 1.91e+00, -2.97e+00,  
-5.81e-01, 1.98e-01, -6.95e-01, 2.56e-01, -8.96e-01, -1.20e-01,  
1.17e-01, -1.80e+00, -7.79e-01, -7.74e+00, -1.72e+00, 4.03e+01,  
-2.97e+00, -1.59e+00],  
[ 5.82e+00, 2.66e+00, 1.24e+01, 3.44e+00, 1.12e+01, 3.13e+00,  
9.19e+00, 1.59e+00, 1.75e+01, 1.84e+00, 5.95e+00, 2.29e+01,  
1.84e+01, 5.34e-01, 2.16e+01, -3.40e-01, 1.64e+01, 1.27e+00,  
1.69e+01, 2.14e+01, -1.46e-01, 1.16e+01, 7.88e+00, -2.97e+00,  
2.30e+01, 3.33e+00],  
[ 3.28e+00, 1.23e+00, 1.35e+00, 1.31e+00, 1.24e+00, 1.34e+00,  
1.70e+00, 1.34e+00, 2.44e+00, 9.11e-01, 8.42e-01, 2.61e+00,  
8.94e-01, 9.81e-01, 3.10e+00, 1.21e+00, 1.93e+00, 1.01e+00,  
2.29e+00, 3.15e+00, -2.50e+00, 1.59e+00, 1.21e-02, -1.59e+00,  
3.33e+00, 2.10e+02]]), array([[ 8.46e+01, 1.82e+00, 7.12e+00, 2.61e+00, 3.41e+00, 1.22e+00,  
5.26e+00, 2.57e+00, 5.16e+00, 1.58e+00, 8.19e+00, 6.01e+00,  
7.55e+00, -9.88e-02, 5.20e+00, 1.04e+00, 5.35e-01, -5.12e-01,  
5.10e-01, 5.62e+00, 4.33e+00, 1.59e+00, 9.29e-01, -1.02e+00,  
5.82e+00, 3.28e+00],  
[ 1.82e+00, 2.33e+00, 1.20e+00, 2.34e+00, 7.43e-01, 1.86e+00,  
1.59e+00, 1.88e+00, 2.54e+00, 1.70e+00, 1.62e+00, 2.28e+00,  
-5.20e-01, 1.25e+00, 3.70e+00, 1.23e+00, 2.01e+00, 1.11e+00,  
2.61e+00, 2.37e+00, -4.33e+00, 2.04e+00, 1.22e+00, 3.23e-01,  
2.66e+00, 1.23e+00],  
[ 7.12e+00, 1.20e+00, 1.10e+01, 2.01e+00, 8.80e+00, 1.73e+00,  
7.58e+00, 1.02e+00, 1.24e+01, 9.81e-01, 7.87e+00, 1.19e+01,  
1.23e+01, 4.34e-01, 1.51e+01, -2.67e-01, 1.21e+01, 6.43e-01,  
1.16e+01, 1.13e+01, 3.30e-01, 7.67e+00, 3.94e+00, -7.05e-01,  
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[-7.07e-01, 3.78e-01, 8.07e+00, 9.62e-01, 7.52e+00, 5.46e-01,  
8.08e+00, -3.08e-01, 1.06e+01, 5.78e-01, 8.08e+00, 2.53e+00,  
3.02e+01, -4.98e-01, 1.25e+01, -1.07e+00, 1.29e+01, -1.18e-01,  
1.24e+01, 3.15e+00, -6.54e+00, 1.30e+01, 2.63e+00, 2.62e+00,  
5.73e+00, -6.79e-01],  
[-5.60e-02, 3.51e+00, 4.34e+00, 5.29e+00, 1.28e+00, 4.46e+00,

1.14e+00, 4.18e+00, 4.25e+00, 4.04e+00, -3.29e+00, 2.12e+01,  
-7.90e+01, 4.15e+00, 3.52e+00, 3.87e+00, 4.65e-01, 4.42e+00,  
3.15e+00, 1.93e+01, -5.92e+00, -3.01e+01, 2.74e+00, 1.09e+01,  
1.23e+01, -2.63e+00],  
[ 2.85e-01, -1.95e+00, -8.67e+00, -2.05e+00, -8.17e+00, -2.82e+00,  
-6.35e+00, -9.29e-01, -8.25e+00, -2.51e+00, -9.88e+00, -6.89e+00,  
-4.26e+00, -3.72e-01, -1.04e+01, -2.07e+00, -1.09e+01, -2.19e+00,  
-6.54e+00, -5.92e+00, 5.76e+01, -1.55e+01, -6.60e+00, -1.49e+01,  
-9.04e+00, 2.57e-01],  
[-1.84e+00, -4.32e+00, 1.08e+01, -1.02e+01, 2.52e+01, -2.95e+00,  
9.32e+00, -6.66e+00, 1.40e+01, -2.11e+00, 1.64e+01, -3.32e+01,  
2.10e+02, -8.51e+00, 2.39e+01, -5.59e+00, 3.21e+01, -3.67e+00,  
1.30e+01, -3.01e+01, -1.55e+01, 1.98e+02, -6.42e+00, -3.65e+01,  
1.04e+01, 6.98e+00],  
[ 1.31e-01, 1.17e-01, 1.57e+00, 7.05e-01, 4.25e-01, -7.93e-03,  
1.91e+00, -4.77e-01, 2.72e+00, -1.44e-01, 1.93e+00, 2.97e+00,  
-4.29e+00, -4.30e-01, 2.27e+00, -5.83e-01, 2.02e+00, -2.64e-01,  
2.63e+00, 2.74e+00, -6.60e+00, -6.42e+00, 6.24e+00, 5.63e+00,  
1.51e+00, -5.94e-01],  
[ 2.08e-01, 3.27e+00, 3.14e+00, 4.41e+00, -1.02e-01, 3.51e+00,  
2.36e+00, 3.41e+00, 3.33e+00, 2.96e+00, 3.93e-01, 1.13e+01,  
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2.62e+00, 1.09e+01, -1.49e+01, -3.65e+01, 5.63e+00, 8.01e+01,  
3.69e+00, -5.66e+00],  
[-3.86e-01, 2.44e+00, 6.65e+00, 2.94e+00, 6.63e+00, 3.64e+00,  
3.16e+00, 2.60e+00, 7.15e+00, 3.37e+00, 5.12e-01, 1.35e+01,  
-3.28e+01, 2.20e+00, 8.32e+00, 2.53e+00, 6.96e+00, 3.44e+00,  
5.73e+00, 1.23e+01, -9.04e+00, 1.04e+01, 1.51e+00, 3.69e+00,  
1.39e+01, -1.22e+00],  
[ 1.12e-01, -1.68e-01, -1.51e+00, -2.75e-01, -1.18e+00, -3.99e-01,  
-1.16e+00, -1.90e-01, -1.45e+00, -2.25e-01, -1.44e+00, -2.80e+00,  
8.69e+00, -6.56e-01, -1.03e+00, -4.74e-01, -1.01e+00, -2.33e-01,  
-6.79e-01, -2.63e+00, 2.57e-01, 6.98e+00, -5.94e-01, -5.66e+00,  
-1.22e+00, 2.06e+02]]])

cluster: 0

Length is: 3088

cluster: 1

Length is: 0

cluster: 2

Length is: 1933

cluster: 3

Length is: 0

cluster: 4

Length is: 8373

cluster: 5

Length is: 6341

The purity\_score is: 0.24813782619711172

-----  
EPS: 0.001

Ridge: 15

The final mean for each cluster

[array([ 3.20380951, 20.57139725, 39.32263166, 18.73039517,

40.67627835, 20.76735953, 39.22344912, 19.31525372,  
38.56510977, 18.37697244, 50.13977559, 2.81106038,  
79.35861515, 18.72278485, 34.83612801, 20.95847983,  
43.79897067, 18.08353536, 41.41677571, 2.78869209,  
757.83318218, 91.7495539, 3.10373721, 59.62588173,  
1.5519551, 25.18749252]), array([ 0.8411947, 23.14015377, 39.11931669, 23.01453315,  
36.66483444, 23.97169995, 37.50599234, 22.89928374,  
37.23218534, 21.14210783, 46.02005047, 15.65588867,  
8.22469678, 22.34325879, 33.45171692, 23.49687892,  
39.83697176, 21.34922158, 39.68112777, 13.83511838,  
756.5456914, 58.2777807, 4.12581301, 37.09252119,  
5.33948403, 24.50709979]), array([ 0.91868812, 21.95498957, 39.76562407, 20.01948446,  
41.30179875, 22.87008492, 38.22637141, 21.29541017,  
38.01168316, 20.03291433, 48.05105469, 7.83973558,  
46.81637045, 21.02367325, 34.66333671, 22.76860118,  
41.98420487, 20.27068334, 41.11699027, 7.3971395,  
755.2740091, 82.07806228, 3.56688514, 35.25837437,  
4.35334629, 25.04062353]), array([ 13.72633232, 22.43304187, 39.48190019, 21.05819562,  
39.49569134, 23.11356768, 37.61136102, 21.99960711,  
37.67211678, 20.63840455, 59.04130547, 10.1418828,  
31.1618147, 21.36737075, 33.0788388, 23.16110906,  
40.06370487, 20.45387657, 39.19563767, 9.37894845,  
756.69338124, 72.23555179, 3.57217148, 35.50245047,  
4.24680741, 25.46077263]), array([ 18.16570399, 21.32786424, 42.3531785, 20.22321714,  
41.65465741, 21.26191976, 42.09400881, 20.22169102,  
42.03117342, 18.96448969, 62.25613231, 5.19783713,  
85.10950217, 18.6897615, 38.01765702, 21.01640559,  
45.76782966, 17.94117728, 43.14733276, 5.2687307,  
753.55637869, 86.75741044, 5.12581002, 36.64201902,  
3.13506627, 24.51854472]), array([ 1.53585159, 20.52835212, 42.03070289, 19.44589402,  
41.58757103, 20.76826958, 41.92105906, 19.11507373,  
41.8282808, 18.09836401, 52.45383798, 4.97390011,  
88.25452906, 18.35697051, 38.38839712, 20.11500502,  
46.60544554, 17.65514007, 44.20153237, 5.03013825,  
754.1597392, 86.10329354, 5.08311152, 34.38703605,  
2.7748088, 25.17119913]))]

The final covariance matrix for each cluster

[array([[ 4.10e+01, 2.45e-01, 2.84e+00, 1.27e+00, 9.36e-02, -6.27e-01,  
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1.36e+01, -8.86e-01, 2.06e-01, -4.51e-01, -1.38e+00, -1.41e+00,  
-2.17e+00, -1.19e-01, -1.13e+00, -7.67e-02, 2.00e-01, -1.05e+00,  
-1.40e-01, -1.20e+00],  
[ 2.45e-01, 1.62e+00, 1.11e-01, 1.23e+00, 6.98e-01, 1.42e+00,  
-1.18e-01, 1.46e+00, 2.76e-01, 1.25e+00, -5.36e-01, 2.00e+00,  
-8.26e+00, 1.28e+00, 8.75e-01, 1.44e+00, -1.89e-02, 1.26e+00,  
4.53e-01, 1.93e+00, -1.88e+00, 1.07e+00, 2.05e-01, 6.58e-01,  
2.07e+00, 5.06e-01],  
[ 2.84e+00, 1.11e-01, 9.86e+00, 1.71e+00, 6.33e+00, 4.05e-01,  
7.36e+00, -3.42e-01, 1.12e+01, 6.93e-02, 7.57e+00, 7.58e+00,  
2.51e+01, -1.04e+00, 1.27e+01, -1.37e+00, 1.07e+01, -7.48e-01,  
8.77e+00, 7.23e+00, -5.00e+00, 6.42e+00, 2.79e+00, 5.43e-01,  
8.17e+00, 9.98e-01],  
[ 1.27e+00, 1.23e+00, 1.71e+00, 1.75e+00, 4.82e-01, 8.54e-01,  
1.64e+00, 8.12e-01, 2.71e+00, 8.11e-01, 1.68e+00, 2.55e+00,



3.61e+00, 3.29e-01, 3.16e+00, 5.44e-01, 2.09e+00, 3.48e-01,  
1.89e+00, 2.44e+00, -2.66e+00, 1.38e+00, 8.15e-01, 6.97e-01,  
2.63e+00, 4.40e-01],  
[ 9.36e-02, 6.98e-01, 6.33e+00, 4.82e-01, 7.65e+00, 1.53e+00,  
3.78e+00, 9.06e-01, 6.50e+00, 9.47e-01, 2.85e+00, 7.43e+00,  
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6.25e+00, 6.96e+00, -2.55e+00, 5.99e+00, 1.52e+00, 3.47e-01,  
7.83e+00, 1.05e+00],  
[-6.27e-01, 1.42e+00, 4.05e-01, 8.54e-01, 1.53e+00, 1.78e+00,  
-2.59e-01, 1.53e+00, 2.28e-01, 1.34e+00, -1.03e+00, 2.44e+00,  
-1.10e+01, 1.50e+00, 1.03e+00, 1.52e+00, 3.08e-01, 1.61e+00,  
8.04e-01, 2.26e+00, -2.82e+00, 1.94e+00, 1.71e-01, 7.12e-01,  
2.54e+00, 6.96e-01],  
[ 2.00e+00, -1.18e-01, 7.36e+00, 1.64e+00, 3.78e+00, -2.59e-01,  
7.65e+00, -9.89e-01, 1.02e+01, -3.81e-01, 8.64e+00, 4.31e+00,  
3.05e+01, -1.78e+00, 1.16e+01, -1.94e+00, 1.03e+01, -1.64e+00,  
8.64e+00, 4.42e+00, -1.64e+00, 4.63e+00, 2.06e+00, 1.02e+00,  
5.12e+00, 7.98e-01],  
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1.22e+00, 3.47e-01],  
[ 1.84e+00, 2.76e-01, 1.12e+01, 2.71e+00, 6.50e+00, 2.28e-01,  
1.02e+01, -1.20e+00, 1.63e+01, -7.03e-02, 1.10e+01, 1.00e+01,  
3.97e+01, -2.15e+00, 1.79e+01, -2.34e+00, 1.55e+01, -1.65e+00,  
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2.87e-01, 1.45e+00, -1.95e+00, 1.15e+00, -1.58e-01, 7.24e-01,  
1.61e+00, 5.94e-01],  
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3.62e+01, -1.84e+00, 1.43e+01, -1.54e+00, 1.38e+01, -2.06e+00,  
9.02e+00, 1.13e+00, -6.15e+00, 6.79e+00, 7.95e-01, 1.12e+00,  
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2.41e+00, 8.42e-01, 1.27e+01, 7.23e-01, 8.72e+00, 1.65e+00,  
8.09e+00, 1.61e+01, -6.00e+00, 5.68e+00, 4.83e+00, 7.89e-01,  
1.68e+01, 4.91e-01],  
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2.35e+02, -1.77e+01, 3.87e+01, -1.73e+01, 3.92e+01, -1.70e+01,  
2.69e+01, 3.64e+00, -7.87e+00, 1.42e+01, 1.07e+01, -5.73e+00,  
5.96e+00, -3.26e+00],  
[-8.86e-01, 1.28e+00, -1.04e+00, 3.29e-01, 8.76e-01, 1.50e+00,  
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8.21e-01, 7.54e-01],  
[ 2.06e-01, 8.75e-01, 1.27e+01, 3.16e+00, 8.46e+00, 1.03e+00,

1.16e+01, -2.33e-01, 1.79e+01, 5.50e-01, 1.43e+01, 1.27e+01,  
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1.59e+01, 1.20e+01, -7.33e+00, 1.15e+01, 4.22e+00, 1.33e+00,  
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-1.74e+00, 6.03e-01, -2.92e+00, 8.53e-02, -4.96e-01, 4.97e-01,  
6.01e-01, 6.19e-01],  
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3.92e+01, -2.15e+00, 1.90e+01, -2.22e+00, 1.99e+01, -1.60e+00,  
1.45e+01, 8.43e+00, -5.15e+00, 9.63e+00, 3.74e+00, 8.61e-01,  
9.89e+00, 1.29e+00],  
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-1.70e+01, 2.09e+00, -1.02e+00, 2.00e+00, -1.60e+00, 2.09e+00,  
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1.59e+00, 8.06e-01],  
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2.69e+01, -1.17e+00, 1.59e+01, -1.74e+00, 1.45e+01, -6.67e-01,  
1.43e+01, 7.96e+00, 6.19e-02, 7.64e+00, 2.92e+00, 1.55e+00,  
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3.64e+00, 8.04e-01, 1.20e+01, 6.03e-01, 8.43e+00, 1.48e+00,  
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1.55e+01, 8.44e-01],  
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-7.87e+00, -2.03e+00, -7.33e+00, -2.92e+00, -5.15e+00, -2.29e+00,  
6.19e-02, -4.19e+00, 6.54e+01, -1.11e+01, -3.30e+00, -1.41e+00,  
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4.63e+00, 7.38e-01, 8.61e+00, 1.15e+00, 6.79e+00, 5.68e+00,  
1.42e+01, 2.35e-01, 1.15e+01, 8.53e-02, 9.63e+00, 8.43e-01,  
7.64e+00, 5.11e+00, -1.11e+01, 2.12e+01, 1.14e+00, -4.77e+00,  
8.37e+00, 7.07e-01],  
[2.00e-01, 2.05e-01, 2.79e+00, 8.15e-01, 1.52e+00, 1.71e-01,  
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1.07e+01, -3.59e-01, 4.22e+00, -4.96e-01, 3.74e+00, -1.86e-01,  
2.92e+00, 4.64e+00, -3.30e+00, 1.14e+00, 4.72e+00, -2.17e-01,  
4.79e+00, 3.40e-01],  
[-1.05e+00, 6.58e-01, 5.43e-01, 6.97e-01, 3.47e-01, 7.12e-01,  
1.02e+00, 1.75e-01, 1.31e+00, 7.24e-01, 1.12e+00, 7.89e-01,  
-5.73e+00, 6.05e-01, 1.33e+00, 4.97e-01, 8.61e-01, 5.03e-01,  
1.55e+00, 1.12e+00, -1.41e+00, -4.77e+00, -2.17e-01, 2.46e+01,  
3.71e-01, 1.33e+00],  
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5.12e+00, 1.22e+00, 1.10e+01, 1.61e+00, 2.19e+00, 1.68e+01,  
5.96e+00, 8.21e-01, 1.37e+01, 6.01e-01, 9.89e+00, 1.59e+00,  
9.09e+00, 1.55e+01, -5.85e+00, 8.37e+00, 4.79e+00, 3.71e-01,  
1.66e+01, 9.38e-01],

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[ 8.49e-01, 7.73e-01, 1.19e+01, 2.27e+00, 1.01e+01, 8.11e-01,  
1.13e+01, 1.70e-01, 1.73e+01, 7.20e-01, 9.68e+00, 9.22e+00,  
1.80e+01, -7.72e-01, 2.20e+01, -1.94e+00, 1.99e+01, -5.02e-01,  
1.69e+01, 9.19e+00, 6.19e+00, 1.28e+01, 5.73e+00, 2.34e+00,

1.14e+01, -7.29e-01],  
[ 3.19e-01, 1.41e+00, -1.36e+00, 1.12e+00, -1.51e+00, 1.32e+00,  
-1.07e+00, 1.33e+00, -2.06e+00, 1.16e+00, 8.81e-01, -1.14e+00,  
-3.32e+00, 1.31e+00, -1.94e+00, 2.55e+00, -1.08e+00, 1.25e+00,  
-1.27e+00, -1.22e+00, -7.10e+00, 9.66e-01, -9.10e-01, 1.39e+00,  
-1.05e+00, -1.09e-01],  
[-4.53e-01, 7.21e-01, 1.06e+01, 2.00e+00, 9.44e+00, 1.04e+00,  
1.10e+01, 4.96e-02, 1.66e+01, 8.06e-01, 1.13e+01, 8.21e+00,  
1.69e+01, -1.11e+00, 1.99e+01, -1.08e+00, 2.32e+01, -2.38e-01,  
1.76e+01, 8.28e+00, 3.00e+00, 1.66e+01, 5.85e+00, 1.10e+00,  
1.12e+01, -1.57e+00],  
[-5.64e-02, 8.62e-01, -3.27e-01, 7.24e-01, -4.17e-01, 9.63e-01,  
-3.98e-01, 9.68e-01, -7.78e-01, 8.03e-01, 6.38e-01, 7.70e-02,  
-3.01e+00, 8.52e-01, -5.02e-01, 1.25e+00, -2.38e-01, 9.59e-01,  
-7.97e-02, -2.10e-02, -4.57e+00, 3.34e-01, -1.30e-01, 1.77e+00,  
4.08e-02, -1.79e-02],  
[-3.16e-02, 8.07e-01, 9.61e+00, 2.08e+00, 8.10e+00, 1.17e+00,  
9.94e+00, 1.17e-01, 1.47e+01, 7.89e-01, 8.54e+00, 8.63e+00,  
1.32e+01, -7.82e-01, 1.69e+01, -1.27e+00, 1.76e+01, -7.97e-02,  
1.66e+01, 8.65e+00, 5.20e+00, 7.97e+00, 4.87e+00, 2.97e+00,  
9.96e+00, -1.15e+00],  
[ 3.47e-01, 4.34e-01, 7.06e+00, 1.34e+00, 5.88e+00, 8.21e-01,  
5.27e+00, -1.09e-01, 9.69e+00, 1.62e-01, 6.88e-01, 1.29e+01,  
1.47e+00, -8.66e-01, 9.19e+00, -1.22e+00, 8.28e+00, -2.10e-02,  
8.65e+00, 1.24e+01, 2.24e+00, -5.53e+00, 5.71e+00, 7.37e+00,  
1.12e+01, -9.48e-01],  
[ 9.86e-01, -3.44e+00, 3.39e+00, -2.37e+00, 3.70e+00, -4.06e+00,  
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2.19e+01, -3.43e+00, 6.19e+00, -7.10e+00, 3.00e+00, -4.57e+00,  
5.20e+00, 2.24e+00, 8.40e+01, -1.38e+01, -3.08e+00, -1.35e+01,  
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[ 1.07e+00, 4.28e-01, 3.59e+00, 2.81e-02, 5.41e+00, 6.35e-01,  
3.39e+00, -6.23e-01, 7.09e+00, 6.68e-01, 8.06e+00, -4.06e+00,  
2.53e+01, -1.48e+00, 1.28e+01, 9.66e-01, 1.66e+01, 3.34e-01,  
7.97e+00, -5.53e+00, -1.38e+01, 8.86e+01, -1.43e+00, -1.26e+01,  
1.03e+01, 4.30e-01],  
[ 1.53e-01, 2.02e-01, 3.43e+00, 7.36e-01, 2.85e+00, 3.58e-01,  
3.01e+00, -4.66e-01, 5.32e+00, 3.98e-02, 1.52e+00, 5.94e+00,  
-2.16e+00, -5.76e-01, 5.73e+00, -9.10e-01, 5.85e+00, -1.30e-01,  
4.87e+00, 5.71e+00, -3.08e+00, -1.43e+00, 7.36e+00, 5.28e+00,  
5.49e+00, -8.67e-01],  
[ 7.41e-01, 2.02e+00, 3.07e+00, 2.18e+00, 1.86e+00, 2.51e+00,  
1.53e+00, 1.79e+00, 2.47e+00, 1.36e+00, -7.72e-01, 7.89e+00,  
-7.92e+00, 1.37e+00, 2.34e+00, 1.39e+00, 1.10e+00, 1.77e+00,  
2.97e+00, 7.37e+00, -1.35e+01, -1.26e+01, 5.28e+00, 7.59e+01,  
5.07e+00, -2.51e-01],  
[ 5.59e-01, 5.09e-01, 7.67e+00, 1.34e+00, 6.81e+00, 9.36e-01,  
5.85e+00, -2.12e-01, 1.09e+01, 2.77e-01, 2.23e+00, 1.20e+01,  
5.88e+00, -1.12e+00, 1.14e+01, -1.05e+00, 1.12e+01, 4.08e-02,  
9.96e+00, 1.12e+01, -2.43e-01, 1.03e+01, 5.49e+00, 5.07e+00,  
1.29e+01, -8.42e-01],  
[ 1.10e+00, 4.85e-02, -4.22e-01, -8.92e-02, -6.65e-01, 1.35e-01,  
-6.59e-01, 2.33e-01, -1.00e+00, -2.24e-01, -1.53e+00, -9.26e-01,  
-1.82e-01, 6.55e-02, -7.29e-01, -1.09e-01, -1.57e+00, -1.79e-02,

-1.15e+00, -9.48e-01, 7.89e-01, 4.30e-01, -8.67e-01, -2.51e-01,  
-8.42e-01, 2.13e+02]]])

cluster: 0

Length is: 2348

cluster: 1

Length is: 3217

cluster: 2

Length is: 7024

cluster: 3

Length is: 1490

cluster: 4

Length is: 1573

cluster: 5

Length is: 4083

The purity\_score is: 0.29338738282239674