

Input and Output for Assignment 4

(final output on page 11 and 12)

Input :

Initial means are

	a	b	c	d	e
1	-9.4204480	1.672011	0.5089758	1.919512	-1.2325192
2	-0.7937296	-8.406403	1.3410895	-7.408800	1.0881077
3	2.9175982	2.718769	4.4998348	6.377856	-0.4397304

iteration no is 1

cluster1

mean1

	a	b	c	d	e
	-9.4204480	1.6720109	0.5089758	1.9195125	-1.2325192

cov1

	a	b	c	d	e
a	5.985680	-2.089963	-1.5818739	-0.6721620	-1.2599845
b	-2.089963	7.305001	-1.4128364	-1.9661746	-1.6846534
c	-1.581874	-1.412836	5.7619557	-1.4918565	-0.9824421
d	-0.672162	-1.966175	-1.4918565	5.0982408	-0.8905932
e	-1.259985	-1.684653	-0.9824421	-0.8905932	5.0434275

cluster2

mean2

	a	b	c	d	e
	-0.7940714	-8.4063790	1.3429678	-7.4077954	1.0883341

cov2

	a	b	c	d	e
a	18.40006	11.86390	13.05764	10.18516	12.57426
b	11.86390	18.64869	13.30232	10.51993	13.29332
c	13.05764	13.30232	19.15432	12.25455	15.19714
d	10.18516	10.51993	12.25455	17.05884	12.44665
e	12.57426	13.29332	15.19714	12.44665	21.04011

cluster3

cov3

mean3

	a	b	c	d	e
	2.9183410	2.7198585	4.4981140	6.3781482	-0.4401291

cov3

	a	b	c	d	e
a	8.749969	-3.954609	4.804421	-6.609096	9.91628
b	-3.954609	11.048413	-5.783369	9.426482	-11.69843
c	4.804421	-5.783369	9.933372	-8.911018	11.96886
d	-6.609096	9.426482	-8.911018	18.858745	-18.76723

e 9.916280 -11.698432 11.968864 -18.767229 30.12665

probs are

0.3363229 0.3453234 0.3183537

current log likelihood is

[1] -95098.71

previous log likelihood is

[1] 0.1

iteration no is 2

cluster1

mean1

	a	b	c	d	e
	-9.4205060	1.6720724	0.5089308	1.9195034	-1.2324936

cov1

	a	b	c	d	e
a	5.9858831	-2.090019	-1.5820851	-0.6721671	-1.2599166
b	-2.0900186	7.304879	-1.4127506	-1.9661996	-1.6845217
c	-1.5820851	-1.412751	5.7620046	-1.4919348	-0.9823376
d	-0.6721671	-1.966200	-1.4919348	5.0981603	-0.8904070
e	-1.2599166	-1.684522	-0.9823376	-0.8904070	5.0429855

cluster2

mean2

	a	b	c	d	e
	-0.1831928	-7.7277414	1.9469064	-6.6807636	1.6196682

cov2

	a	b	c	d	e
a	22.10993	15.62496	16.26908	14.18844	15.63820
b	15.62496	22.54165	16.71423	14.52362	16.56081
c	16.26908	16.71423	22.64098	16.17123	18.27582
d	14.18844	14.52362	16.17123	21.55906	15.99915
e	15.63820	16.56081	18.27582	15.99915	23.71488

cluster3

cov3

mean3

	a	b	c	d	e
	2.536827	3.104285	4.061753	7.005323	-1.320706

cov3

	a	b	c	d	e
a	6.503355	-3.585795	3.115404	-5.368328	6.814663
b	-3.585795	9.982440	-5.190547	8.518503	-10.629332
c	3.115404	-5.190547	7.476592	-7.796976	8.261310
d	-5.368328	8.518503	-7.796976	16.643502	-16.369918
e	6.814663	-10.629332	8.261310	-16.369918	24.058562

probs are

0.3363134 0.3782597 0.2854268

current log likelihood is

[1] -98994.16

previous log likelihood is

[1] -95098.71

iteration no is 3

cluster1

mean1

	a	b	c	d	e
	-9.4205261	1.6720925	0.5089545	1.9195567	-1.2325717

cov1

	a	b	c	d	e
a	5.985577	-2.089884	-1.582008	-0.6719820	-1.2600897
b	-2.089884	7.304713	-1.412763	-1.9662602	-1.6843796
c	-1.582008	-1.412763	5.762066	-1.4918616	-0.9825120
d	-0.671982	-1.966260	-1.491862	5.0982172	-0.8905837
e	-1.260090	-1.684380	-0.982512	-0.8905837	5.0432891

cluster2

mean2

	a	b	c	d	e
	0.1713816	-7.3707978	2.3142853	-6.3079899	1.9871336

	a	b	c	d	e
a	23.38398	16.87246	17.44728	15.41086	17.06273
b	16.87246	23.69436	17.74265	15.72950	17.90369
c	17.44728	17.74265	23.87780	17.28962	19.50689
d	15.41086	15.72950	17.28962	22.81109	17.13565
e	17.06273	17.90369	19.50689	17.13565	25.08275

cluster3

cov3

mean3

	a	b	c	d	e
	2.241167	3.550116	3.690686	7.688975	-2.156220

	a	b	c	d	e
a	5.115679	-2.635674	1.946899	-3.439285	4.031911
b	-2.635674	7.780693	-3.640833	5.713763	-7.587262
c	1.946899	-3.640833	5.815178	-5.385393	5.033825
d	-3.439285	5.713763	-5.385393	12.078489	-10.983038
e	4.031911	-7.587262	5.033825	-10.983038	16.959273

probs are

0.336315 0.4022754 0.2614096

current log likelihood is

[1] -102065.2

previous log likelihood is

[1] -98994.16

iteration no is 4

cluster1

mean1

	a	b	c	d	e
	-9.4205468	1.6721053	0.5089535	1.9195673	-1.2325795

cov1

	a	b	c	d	e
a	5.985468	-2.089837	-1.5820123	-0.6719210	-1.2601217
b	-2.089837	7.304680	-1.4127629	-1.9662887	-1.6843492
c	-1.582012	-1.412763	5.7620839	-1.4918656	-0.9825199
d	-0.671921	-1.966289	-1.4918656	5.0982051	-0.8905796
e	-1.260122	-1.684349	-0.9825199	-0.8905796	5.0432869

cluster2

mean2

	a	b	c	d	e
	0.3989927	-7.1541384	2.5596857	-6.0691634	2.2295424

	a	b	c	d	e
a	23.86436	17.29754	18.04054	15.94369	17.69096
b	17.29754	23.96099	18.15606	16.23392	18.37468
c	18.04054	18.15606	24.43122	17.79777	20.08580
d	15.94369	16.23392	17.79777	23.34730	17.60735
e	17.69096	18.37468	20.08580	17.60735	25.66664

cluster3

cov3

mean3

	a	b	c	d	e
	1.999576	3.972345	3.367925	8.297107	-2.875985

	a	b	c	d	e
a	4.1211054	-1.361649	0.8286628	-1.444612	1.594368
b	-1.3616486	5.369867	-1.8281432	2.354499	-3.730085
c	0.8286628	-1.828143	4.3635565	-2.734051	1.884284
d	-1.4446120	2.354499	-2.7340513	7.154235	-5.138261
e	1.5943680	-3.730085	1.8842836	-5.138261	10.027699

probs are

0.3363136 0.4200294 0.243657

current log likelihood is

[1] -103525.2

previous log likelihood is

[1] -102065.2

iteration no is 5

cluster1

mean1

	a	b	c	d	e
	-9.4205614	1.6721135	0.5089522	1.9195750	-1.2325835

cov1

	a	b	c	d	e
a	5.9854005	-2.089810	-1.5820199	-0.6718787	-1.2601406
b	-2.0898101	7.304665	-1.4127620	-1.9663079	-1.6843348
c	-1.5820199	-1.412762	5.7620975	-1.4918674	-0.9825253
d	-0.6718787	-1.966308	-1.4918674	5.0981947	-0.8905765
e	-1.2601406	-1.684335	-0.9825253	-0.8905765	5.0432897

cluster2

mean2

	a	b	c	d	e
	0.5245994	-6.9859114	2.7050324	-5.8587533	2.3437311

	a	b	c	d	e
a	23.79001	17.47044	18.12586	16.28817	17.65223
b	17.47044	24.26299	18.40016	16.88909	18.41653
c	18.12586	18.40016	24.49630	18.18729	19.99505
d	16.28817	16.88909	18.18729	24.19872	17.82646
e	17.65223	18.41653	19.99505	17.82646	25.47693

cluster3

cov3

mean3

	a	b	c	d	e
	1.854169	4.285466	3.140671	8.714164	-3.379047

	a	b	c	d	e
a	3.7041524	-0.61204445	0.1824500	-0.34234120	0.2578649
b	-0.6120444	3.63132854	-0.6072887	0.04016705	-0.9524094
c	0.1824500	-0.60728871	3.4197673	-1.00483583	-0.1067574
d	-0.3423412	0.04016705	-1.0048358	4.06741954	-1.4610259
e	0.2578649	-0.95240937	-0.1067574	-1.46102590	5.5590027

probs are

0.3363126 0.4330677 0.2306197

current log likelihood is

[1] -106541.4

previous log likelihood is

[1] -103525.2

iteration no is 6

cluster1

mean1

	a	b	c	d	e
	-9.4206026	1.6721418	0.5089468	1.9195965	-1.2325987

cov1

	a	b	c	d	e
a	5.9852325	-2.089735	-1.5820495	-0.6717643	-1.2601971
b	-2.0897349	7.304589	-1.4127507	-1.9663613	-1.6842671
c	-1.5820495	-1.412751	5.7621396	-1.4918724	-0.9825463
d	-0.6717643	-1.966361	-1.4918724	5.0981697	-0.8905686
e	-1.2601971	-1.684267	-0.9825463	-0.8905686	5.0432795

cluster2

mean2

	a	b	c	d	e
	0.5563972	-6.9214197	2.7480024	-5.7803718	2.3705892

cov2

	a	b	c	d	e
a	23.68541	17.52607	18.10571	16.39182	17.57374
b	17.52607	24.49692	18.52509	17.26322	18.42610
c	18.10571	18.52509	24.48093	18.35713	19.91484
d	16.39182	17.26322	18.35713	24.63268	17.89127
e	17.57374	18.42610	19.91484	17.89127	25.33418

cluster3

cov3

mean3

	a	b	c	d	e
	1.817054	4.367419	3.065671	8.829752	-3.535710

cov3

	a	b	c	d	e
a	3.66617362	-0.4682693	0.01372052	-0.1061356	-0.06013146
b	-0.46826927	3.2661360	-0.29652880	-0.4992564	-0.26276222
c	0.01372052	-0.2965288	3.12287620	-0.5234561	-0.74078621
d	-0.10613557	-0.4992564	-0.52345613	3.3555327	-0.50813998
e	-0.06013146	-0.2627622	-0.74078621	-0.5081400	4.25026832

probs are

0.3363096 0.4372175 0.2264729

current log likelihood is

[1] -109207.3

previous log likelihood is

[1] -106541.4

iteration no is 7

cluster1

mean1

	a	b	c	d	e
	-9.420640	1.672166	0.508942	1.919616	-1.232611

cov1

	a	b	c	d	e
a	5.9850857	-2.089672	-1.5820781	-0.6716606	-1.2602451
b	-2.0896722	7.304532	-1.4127416	-1.9664090	-1.6842136
c	-1.5820781	-1.412742	5.7621779	-1.4918758	-0.9825643
d	-0.6716606	-1.966409	-1.4918758	5.0981456	-0.8905615
e	-1.2602451	-1.684214	-0.9825643	-0.8905615	5.0432749

cluster2

mean2

	a	b	c	d	e
	0.556480	-6.921087	2.748154	-5.780003	2.370692

cov2	a	b	c	d	e
a	23.68501	17.52615	18.10554	16.39203	17.57343
b	17.52615	24.49863	18.52561	17.26547	18.42620
c	18.10554	18.52561	24.48067	18.35783	19.91455
d	16.39203	17.26547	18.35783	24.63501	17.89156
e	17.57343	18.42620	19.91455	17.89156	25.33356

cluster3

cov3

mean3

	a	b	c	d	e
	1.816915	4.367623	3.065379	8.830111	-3.536339

cov3	a	b	c	d	e
a	3.66613293	-0.4679031	0.01312731	-0.1054236	-0.06140707
b	-0.46790311	3.2657056	-0.29570474	-0.5003787	-0.26093841
c	0.01312731	-0.2957047	3.12183291	-0.5219747	-0.74351283
d	-0.10542364	-0.5003787	-0.52197468	3.3538682	-0.50491422
e	-0.06140707	-0.2609384	-0.74351283	-0.5049142	4.24477078

probs are

0.3363068 0.4372359 0.2264573

current log likelihood is

[1] -109216

previous log likelihood is

[1] -109207.3

iteration no is 8

cluster1

```
mean1
      a      b      c      d      e
-9.4206401 1.6721661 0.5089419 1.9196165 -1.2326116
```

```
cov1
      a      b      c      d      e
a 5.9850839 -2.089671 -1.5820784 -0.6716593 -1.2602457
b -2.0896714 7.304532 -1.4127415 -1.9664095 -1.6842130
c -1.5820784 -1.412742 5.7621783 -1.4918759 -0.9825645
d -0.6716593 -1.966410 -1.4918759 5.0981453 -0.8905614
e -1.2602457 -1.684213 -0.9825645 -0.8905614 5.0432748
```

cluster2

```
mean2
      a      b      c      d      e
0.5564796 -6.9210863 2.7481543 -5.7800026 2.3706915
```

```
cov2
      a      b      c      d      e
a 23.68501 17.52614 18.10554 16.39203 17.57343
b 17.52614 24.49863 18.52561 17.26548 18.42620
c 18.10554 18.52561 24.48067 18.35783 19.91455
d 16.39203 17.26548 18.35783 24.63501 17.89156
e 17.57343 18.42620 19.91455 17.89156 25.33356
```

cluster3

cov3

```
mean3
      a      b      c      d      e
1.816915 4.367623 3.065379 8.830111 -3.536339
```

```
cov3
      a      b      c      d      e
a 3.66613292 -0.4679031 0.0131273 -0.1054236 -0.06140713
b -0.46790308 3.2657056 -0.2957047 -0.5003788 -0.26093835
c 0.01312730 -0.2957047 3.1218329 -0.5219746 -0.74351290
d -0.10542359 -0.5003788 -0.5219746 3.3538682 -0.50491411
e -0.06140713 -0.2609383 -0.7435129 -0.5049141 4.24477062
```

probs are

```
0.3363068 0.4372359 0.2264573
```

current log likelihood is

```
[1] -109216
```

previous log likelihood is

```
[1] -109216
```

iteration no is 9

cluster1

```
mean1
      a      b      c      d      e
```


-9.4206401 1.6721661 0.5089419 1.9196165 -1.2326116

cov1

	a	b	c	d	e
a	5.9850839	-2.089671	-1.5820784	-0.6716593	-1.2602457
b	-2.0896714	7.304532	-1.4127415	-1.9664095	-1.6842130
c	-1.5820784	-1.412742	5.7621783	-1.4918759	-0.9825645
d	-0.6716593	-1.966410	-1.4918759	5.0981453	-0.8905614
e	-1.2602457	-1.684213	-0.9825645	-0.8905614	5.0432748

cluster2

mean2

	a	b	c	d	e
	0.5564796	-6.9210863	2.7481543	-5.7800026	2.3706915

	a	b	c	d	e
a	23.68501	17.52614	18.10554	16.39203	17.57343
b	17.52614	24.49863	18.52561	17.26548	18.42620
c	18.10554	18.52561	24.48067	18.35783	19.91455
d	16.39203	17.26548	18.35783	24.63501	17.89156
e	17.57343	18.42620	19.91455	17.89156	25.33356

cluster3

cov3

mean3

	a	b	c	d	e
	1.816915	4.367623	3.065379	8.830111	-3.536339

	a	b	c	d	e
a	3.66613292	-0.4679031	0.0131273	-0.1054236	-0.06140713
b	-0.46790308	3.2657056	-0.2957047	-0.5003788	-0.26093835
c	0.01312730	-0.2957047	3.1218329	-0.5219746	-0.74351290
d	-0.10542359	-0.5003788	-0.5219746	3.3538682	-0.50491411
e	-0.06140713	-0.2609383	-0.7435129	-0.5049141	4.24477062

probs are

0.3363068 0.4372359 0.2264573

current log likelihood is

[1] -109216

previous log likelihood is

[1] -109216

iteration no is 10

cluster1

mean1

	a	b	c	d	e
	-9.4206401	1.6721661	0.5089419	1.9196165	-1.2326116

cov1

	a	b	c	d	e
a	5.9850839	-2.089671	-1.5820784	-0.6716593	-1.2602457
b	-2.0896714	7.304532	-1.4127415	-1.9664095	-1.6842130
c	-1.5820784	-1.412742	5.7621783	-1.4918759	-0.9825645
d	-0.6716593	-1.966410	-1.4918759	5.0981453	-0.8905614
e	-1.2602457	-1.684213	-0.9825645	-0.8905614	5.0432748

cluster2

mean2

	a	b	c	d	e
mean2	0.5564796	-6.9210863	2.7481543	-5.7800026	2.3706915

	a	b	c	d	e
cov2	23.68501	17.52614	18.10554	16.39203	17.57343
a	23.68501	17.52614	18.10554	16.39203	17.57343
b	17.52614	24.49863	18.52561	17.26548	18.42620
c	18.10554	18.52561	24.48067	18.35783	19.91455
d	16.39203	17.26548	18.35783	24.63501	17.89156
e	17.57343	18.42620	19.91455	17.89156	25.33356

cluster3

cov3

mean3

	a	b	c	d	e
mean3	1.816915	4.367623	3.065379	8.830111	-3.536339

	a	b	c	d	e
cov3	3.66613292	-0.4679031	0.0131273	-0.1054236	-0.06140713
a	3.66613292	-0.4679031	0.0131273	-0.1054236	-0.06140713
b	-0.46790308	3.2657056	-0.2957047	-0.5003788	-0.26093835
c	0.01312730	-0.2957047	3.1218329	-0.5219746	-0.74351290
d	-0.10542359	-0.5003788	-0.5219746	3.3538682	-0.50491411
e	-0.06140713	-0.2609383	-0.7435129	-0.5049141	4.24477062

probs are

0.3363068 0.4372359 0.2264573

current log likelihood is

[1] -109216

previous log likelihood is

[1] -109216

total elements in respective clusters are

[1] 150

[1] 195

[1] 101

Final mean for cluster 1

	a	b	c	d	e
Final mean for cluster 1	-9.4206401	1.6721661	0.5089419	1.9196165	-1.2326116

Final mean for cluster 2

	a	b	c	d	e
	0.5564796	-6.9210863	2.7481543	-5.7800026	2.3706915

Final mean for cluster 3

	a	b	c	d	e
	1.816915	4.367623	3.065379	8.830111	-3.536339

Final covariance for cluster 1

	a	b	c	d	e
a	5.9850839	-2.089671	-1.5820784	-0.6716593	-1.2602457
b	-2.0896714	7.304532	-1.4127415	-1.9664095	-1.6842130
c	-1.5820784	-1.412742	5.7621783	-1.4918759	-0.9825645
d	-0.6716593	-1.966410	-1.4918759	5.0981453	-0.8905614
e	-1.2602457	-1.684213	-0.9825645	-0.8905614	5.0432748

Final covariance for cluster 2

	a	b	c	d	e
a	23.68501	17.52614	18.10554	16.39203	17.57343
b	17.52614	24.49863	18.52561	17.26548	18.42620
c	18.10554	18.52561	24.48067	18.35783	19.91455
d	16.39203	17.26548	18.35783	24.63501	17.89156
e	17.57343	18.42620	19.91455	17.89156	25.33356

Final covariance for cluster 3

	a	b	c	d	e
a	3.66613292	-0.4679031	0.0131273	-0.1054236	-0.06140713
b	-0.46790308	3.2657056	-0.2957047	-0.5003788	-0.26093835
c	0.01312730	-0.2957047	3.1218329	-0.5219746	-0.74351290
d	-0.10542359	-0.5003788	-0.5219746	3.3538682	-0.50491411
e	-0.06140713	-0.2609383	-0.7435129	-0.5049141	4.24477062

3D Plot

