Assignment 6

Submitted by: Nafis Neehal

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Filename: Iris

RUN	python .\assign_6.py .\iris.txt 3 1e-6

Purity Score	96.67%

Means	
Cluster 1	[5.006 3.418 1.464 0.244]
Cluster 2	[5.915 2.778 4.202 1.297]
Cluster 3	[6.545 2.949 5.480 1.985]

Covariance Matrix	
Cluster 1	[0.122 0.098 0.016 0.01] [0.098 0.142 0.011 0.011] [0.016 0.011 0.03 0.006] [0.01 0.011 0.006 0.011]
Cluster 2	[0.275 0.097 0.185 0.054] [0.097 0.093 0.091 0.043] [0.185 0.091 0.201 0.061] [0.054 0.043 0.061 0.032]
Cluster 3	[0.387 0.092 0.303 0.062] [0.092 0.11 0.084 0.056] [0.303 0.084 0.328 0.075] [0.062 0.056 0.075 0.086]

Number of Iterations for Convergence	35

Cluster Assignments	[1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 2 2 2 3 2 2 2 2 2 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3]

Confusion Matrix		Predicted Label		
		Class 1	Class 2	Class 3
True Label	Class 1	50	0	0

	Class 2	0	45	5
	Class 3	0	0	50

Cluster Name	**Cluster Size**
Iris-setosa	50
Iris-versicolor	45
Iris-virginica	55

Filename: 1R2RC_truth

RUN	python .\assign_6.py .\1R2RC_truth.txt 3 1e-6

Purity Score	95.64%

Means	
Cluster 1	[-0.528 0.366 -0.529 0.37 -0.531 0.37 -0.532 0.369 -0.533 0.37 -0.534 0.376 -0.535 0.384 -0.534 0.388 -0.534 0.392 -0.535 0.397 -0.532 0.401 -0.528 0.406 -0.524 0.411 -0.523 0.416 -0.525 0.424 -0.529 0.43 -0.53 0.436 -0.531 0.441 -0.531 0.447 -0.533 0.457 -0.535 0.464 -0.539 0.476 -0.54 0.484 -0.539 0.491 -0.54 0.499 -0.539 0.505 -0.54 0.512 -0.541 0.517 -0.545 0.525]
Cluster 2	[0.482 -0.225 0.479 -0.225 0.475 -0.225 0.472 -0.228 0.473 -0.229 0.472 -0.229 0.469 -0.228 0.467 -0.227 0.465 -0.228 0.464 -0.226 0.466 -0.229 0.467 -0.229 0.467 -0.23 0.467 -0.229 0.465 -0.229 0.461 -0.229 0.457 -0.23 0.454 -0.23 0.452 -0.232 0.449 -0.231 0.447 -0.231 0.441 -0.229 0.438 -0.228 0.437 -0.23 0.434 -0.229 0.432 -0.231 0.431 -0.23 0.431 -0.232 0.427 -0.231]
Cluster 3	[-0.258 -0.249 -0.259 -0.25 -0.261 -0.252 -0.262 -0.255 -0.261 -0.258 -0.261 -0.258 -0.263 -0.256 -0.264 -0.256 -0.264 -0.257 -0.264 -0.257 -0.262 -0.259 -0.26 -0.259 -0.259 -0.26 -0.257 -0.26 -0.258 -0.26 -0.261 -0.26 -0.264 -0.261 -0.264 -0.262 -0.263 -0.263 -0.265 -0.262 -0.267 -0.262 -0.271 -0.26 -0.272 -0.259 -0.271 -0.261 -0.271 -0.26 -0.272 -0.261 -0.272 -0.261 -0.272 -0.263 -0.275 -0.262]

Covariance Matrix	
Cluster 1	[[0.029 0.001 0.029 ... -0.002 0.029 -0.002] [0.001 0.013 0.001 ... 0.01 0.001 0.01] [0.029 0.001 0.029 ... -0.002 0.029 -0.002] ... [-0.002 0.01 -0.002 ... 0.016 -0.002 0.016] [0.029 0.001 0.029 ... -0.002 0.03 -0.002] [-0.002 0.01 -0.002 ... 0.016 -0.002 0.016]]
Cluster 2	[[0.037 0.002 0.037 ... 0.003 0.039 0.003] [0.002 0.051 0.002 ... 0.052 0.001 0.052] [0.037 0.002 0.037 ... 0.003 0.039 0.003] ... [0.003 0.052 0.003 ... 0.054 0.003 0.054] [0.039 0.001 0.039 ... 0.003 0.041 0.003] [0.003 0.052 0.003 ... 0.054 0.003 0.054]]
Cluster 3	[[0.089 -0.007 0.089 ... -0.007 0.089 -0.007] [-0.007 0.263 -0.007 ... 0.263 -0.008 0.263] [0.089 -0.007 0.089 ... -0.007 0.089 -0.007] ...

	[-0.007 0.263 -0.007 ... 0.263 -0.008 0.263] [0.089 -0.008 0.089 ... -0.008 0.089 -0.008] [-0.007 0.263 -0.007 ... 0.263 -0.008 0.263]]

Number of Iterations for Convergence	34

Cluster Assignments	[2 2 2 3 2 2 2 1 2 2 2 1 1 2 2 2 1 1 2 2 1 1 2 1 1 2 2 1 2 1 1 1 2 1 3 2 1 2 2 2 3 2 2 2 1 2 3 1 1 2 2 2 2 1 3 3 3 2 1 2 2 2 3 3 2 2 2 3 2 3 2 2 2 2 2 2 2 2 2 2 3 1 1 3 1 3 1 2 3 3 2 2 3 2 3 3 3 3 3 2 1 3 2 2 2 2 2 2 3 1 3 3 2 2 1 3 1 3 3 3 2 1 3 3 2 2 2 2 3 3 2 3 3 2 3 3 3 3 3 2 3 3 2 3 1 3 2 1 2 2 2 2 3 2 2 2 3 2 2 3 1 3 3 2 3 2 3 3 3 1 2 3 1 3 2 2 3 2 1 3 1 3 3 1 3 3 3 3 3 2 3 3 2 3 1 3 3 3 1 1 1 3 2 2 2 1 3 3 3 3 2 3 2 3 2 3 3 3 2 1 3 3 3 3 3 3 2 3 3 1 1 3 3 3 3 3 2 3 3 2 3 3 2 3 3 3 1 3 1 3 3 3 3 3 3 3 3 3 2 3 3 3 3 1 3 3 3 3 3 3 2 3 1 3 3 3 3 2 3 3 3 1 3 2 3 3 1 3 3 3 1 3 3 1 3 3 3 3 3 2 1 2 1 3 3 1 3 3 3 3 3 2 2 3 2 1 1 2 1 1 3 2 1 3 1 1 3 3 3 2 3 2 2 3 3 1 3 1 2 3 3 3 3 3 3 3 1 3 3 3 3 1 1 2 3 3 2 3 3 3 3 1 2 3 3 2 3 3 3 1 3 1 1 3 3 2 3 1 2 2 1 2 3 2 3 3 3 3 2 3 3 3 3 3 3 2 2 3 1 3 3 3 3 1 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3 3 1 3 1 3 3 3 3 2 3 2 1 2 3 3 3 3 3 3 1 3 3 3 1 3 3 3 3 3 3 3 3 2 3 1 2 3 1 3 2 1]

Confusion Matrix		Predicted Label		
		Class 1	Class 2	Class 3
True Label	Class 1	85	0	4
	Class 2	0	119	2
	Class 3	0	14	235

Cluster Name	**Cluster Size**
Class 1	85
Class 2	133
Class 3	241

Filename: Dancing Truth

RUN	python .\assign_6.py .\dancing_truth.txt 5 1e-6

Means	
Cluster 1	[-0.096 -0.441 -0.095 -0.441 -0.094 -0.442 -0.094 -0.443 -0.094 -0.444 -0.094 -0.444 -0.094 -0.443 -0.095 -0.442 -0.096 -0.442 -0.097 -0.441 -0.098 -0.44 -0.1 -0.439 -0.101 -0.438 -0.102 -0.438 -0.103 -0.437 -0.104 -0.437 -0.105 -0.437 -0.106 -0.437 -0.107 -0.438 -0.108 -0.438 -0.11 -0.439 -0.111 -0.439 -0.111 -0.439 -0.112 -0.439 -0.112 -0.439 -0.112 -0.439 -0.112 -0.438 -0.111 -0.437 -0.11 -0.437 -0.108 -0.437 -0.107 -0.437 -0.106 -0.438 -0.105 -0.439 -0.104 -0.441 -0.104 -0.442 -0.103 -0.442 -0.104 -0.442 -0.104 -0.442 -0.105 -0.441 -0.106 -0.441]
Cluster 2	[-0.027 0.208 -0.026 0.207 -0.025 0.206 -0.025 0.206 -0.025 0.206 -0.025 0.206 -0.025 0.207 -0.022 0.208 -0.017 0.21 -0.011 0.214 -0.004 0.217 0.001 0.22 0.006 0.223 0.009 0.224 0.01 0.225 0.011 0.225 0.012 0.225 0.012 0.224 0.011 0.224 0.011 0.223 0.01 0.222 0.01 0.22 0.011 0.219 0.012 0.219 0.013 0.219 0.015 0.219 0.017 0.219 0.02 0.219 0.022 0.219 0.024 0.219 0.026 0.219 0.028 0.218 0.029 0.216 0.029 0.214 0.028 0.213 0.027 0.213 0.025 0.213 0.024 0.214 0.022 0.215 0.02 0.217]
Cluster 3	[0.485 -0.226 0.479 -0.214 0.474 -0.204 0.471 -0.197 0.47 -0.193 0.472 -0.193 0.476 -0.196 0.482 -0.202 0.489 -0.21 0.497 -0.221 0.505 -0.233 0.512 -0.248 0.52 -0.264 0.526 -0.281 0.53 -0.3 0.534 -0.322 0.537 -0.346 0.537 -0.373 0.535 -0.403 0.531 -0.432 0.526 -0.46 0.519 -0.484 0.513 -0.502 0.508 -0.514 0.504 -0.518 0.502 -0.512 0.5 -0.496 0.498 -0.473 0.494 -0.445 0.489 -0.415 0.482 -0.387 0.475 -0.363 0.469 -0.344 0.466 -0.333 0.464 -0.328 0.464 -0.332 0.468 -0.343 0.473 -0.36 0.48 -0.384 0.488 -0.412]
Cluster 4	[0.309 -0.418 0.311 -0.415 0.312 -0.412 0.313 -0.41 0.313 -0.408 0.313 -0.408 0.313 -0.408 0.312 -0.41 0.311 -0.412 0.309 -0.414 0.307 -0.416 0.305 -0.419 0.303 -0.422 0.301 -0.424 0.298 -0.428 0.294 -0.431 0.29 -0.435 0.286 -0.44 0.281 -0.446 0.276 -0.453 0.27 -0.46 0.263 -0.466 0.259 -0.472 0.256 -0.476 0.254 -0.478 0.254 -0.478 0.256 -0.476 0.259 -0.474 0.262 -0.471 0.266 -0.467 0.27 -0.463 0.274 -0.459 0.277 -0.457 0.279 -0.455 0.28 -0.454 0.279 -0.454 0.277 -0.456 0.274 -0.458 0.271 -0.46 0.266 -0.463]
Cluster 5	[-0.585 -0.533 -0.593 -0.557 -0.597 -0.576 -0.597 -0.589 -0.594 -0.595 -0.591 -0.594 -0.589 -0.59 -0.588 -0.58 -0.587 -0.568 -0.584 -0.553 -0.582 -0.537 -0.578 -0.52 -0.573 -0.504 -0.567 -0.487 -0.561 -0.47 -0.554 -0.454 -0.548 -0.438 -0.541 -0.423 -0.535 -0.409 -0.531 -0.396 -0.526 -0.384 -0.523 -0.376 -0.522 -0.369 -0.522 -0.366 -0.525 -0.367 -0.53 -0.37 -0.536 -0.377 -0.544 -0.388 -0.553 -0.401 -0.562 -0.416 -0.57 -0.431 -0.574 -0.445 -0.576 -0.456 -0.576 -0.464 -0.573 -0.468 -0.57 -0.468 -0.567 -0.464 -0.563 -0.457 -0.559 -0.446 -0.553 -0.434]

Purity Score	91.79%

Covariance Matrix	
Cluster 1	[[0.035 -0. 0.034 ... -0.001 0.034 -0.001] [-0. 0.057 -0. ... 0.056 0.001 0.056] [0.034 -0. 0.035 ... -0.001 0.034 -0.001] ... [-0.001 0.056 -0.001 ... 0.057 -0. 0.056] [0.034 0.001 0.034 ... -0. 0.035 -0.] [-0.001 0.056 -0.001 ... 0.056 -0. 0.057]]
Cluster 2	[[0.005 0.001 0.004 ... 0.001 0.002 0.001] [0.001 0.014 0.001 ... 0.013 -0.001 0.013] [0.004 0.001 0.005 ... 0.001 0.002 0.001] ... [0.001 0.013 0.001 ... 0.015 -0.001 0.014] [0.002 -0.001 0.002 ... -0.001 0.003 -0.001] [0.001 0.013 0.001 ... 0.014 -0.001 0.015]]
Cluster 3	[[0.003 0.002 0.002 ... 0.001 0.002 0.001] [0.002 0.039 0.001 ... 0.033 0.013 0.031] [0.002 0.001 0.003 ... 0. 0.002 0.] ... [0.001 0.033 0. ... 0.029 0.011 0.027] [0.002 0.013 0.002 ... 0.011 0.007 0.01] [0.001 0.031 0. ... 0.027 0.01 0.026]]
Cluster 4	[[0.005 -0. 0.004 ... -0.002 0.003 -0.002] [-0. 0.011 -0. ... 0.01 0.001 0.01] [0.004 -0. 0.005 ... -0.002 0.003 -0.003] ... [-0.002 0.01 -0.002 ... 0.012 -0. 0.011] [0.003 0.001 0.003 ... -0. 0.004 -0.001] [-0.002 0.01 -0.003 ... 0.011 -0.001 0.012]]
Cluster 5	[[0.017 -0.012 0.017 ... -0.019 0.011 -0.019] [-0.012 0.014 -0.013 ... 0.018 -0.007 0.019] [0.017 -0.013 0.019 ... -0.02 0.012 -0.021] ... [-0.019 0.018 -0.02 ... 0.027 -0.012 0.027] [0.011 -0.007 0.012 ... -0.012 0.009 -0.013] [-0.019 0.019 -0.021 ... 0.027 -0.013 0.029]]

Cluster Assignments	[1 1 4 3 1 1 3 5 3 2 3 3 2 3 2 1 5 1 4 5 2 1 3 1 2 3 1 5 5 2 5 3 5 3 4 2 4 3 1 3 3 5 4 5 1 5 3 1 1 3 1 1 3 3 5 1 4 2 1 1 5 4 3 5 4 1 3 2 5 4 3 2 2 4 1 2 5 3 1 1 3 1 5 1 1 3 1 4 1 1 5 1 4 1 2 3 1 2 3 1 3 2 4 1 3 3 1 3 1 4 3 1 3 4 1 3 3 1 5 1 1 1 4 4 5 2 1 1 2 4 4 2 4 1 4 1 5 2 1 1 4 1 1 3 2 5 1 1 1 1 5 3 4 1 1 1 1 2 4 1 4 1 1 5 1 1 2 1 5 1 1 5 1 1 1 4 5 1 1 2 1 1 1 1 5 2 5 3 4 1 4 1 3 1 5 1 1 1 1 1 5 1 1 1 5 2 2 1 1 1 2 4 5 1 2 1 1 1 2 1 1 1 1 1 1 1 1 1 5 1 1 1 5 1 1 1 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 1 4 1 1 1 1 2 3 1 1 1]

Number of Iterations for Convergence	84

Confusion Matrix		Predicted Label				
		Class 1	Class 2	Class 3	Class 4	Class 5
True Label	Class 1	121	0	0	1	6
	Class 2	3	30	0	0	0
	Class 3	0	0	36	0	0
	Class 4	10	0	2	29	0
	Class 5	0	0	0	0	30

Cluster Name	**Cluster Size**
Class 1	134
Class 2	30
Class 3	38
Class 4	30
Class 5	36