0.06529092788696289 seconds to run KMEANS on FRUITS data set

0.03204679489135742 seconds to run KMEANS on Phones data set

0.530778169631958 seconds to run EM on FRUITS data set

0.09795427322387695 seconds to run EM on Phones data set

Part_2 ----------

0.016094207763671875 seconds to run PCA transformation on Fruits database

0.015793800354003906 seconds to run PCA transformation on Phones database

0.1372053623199463 seconds to run ICA transformation on Fruits database

0.0 seconds to run ICA transformation on Phones database

0.0 seconds to run RP transformation on Fruits database

0.0 seconds to run RP transformation on Phones database

0.4662811756134033 seconds to run MLLE transformation on Fruits database

1.255725622177124 seconds to run MLLE transformation on Phones database

Part 3

1.6192045211791992 seconds for part_3 Fruits dataset KMeans method PCA dimencity reduction method

Part 3

1.8887879848480225 seconds for part_3 Fruits dataset KMeans method ICA dimencity reduction method

Part 3

1.886094093322754 seconds for part_3 Fruits dataset KMeans method RP dimencity reduction method

Part 3

2.318875312805176 seconds for part_3 Fruits dataset KMeans method MLLE dimencity reduction method

Part 3

11.316715478897095 seconds for part_3 Fruits dataset EM method PCA dimencity reduction method

Part 3

16.678526163101196 seconds for part_3 Fruits dataset EM method ICA dimencity reduction method

Part 3

14.542266368865967 seconds for part_3 Fruits dataset EM method RP dimencity reduction method

Part 3

18.711116313934326 seconds for part_3 Fruits dataset EM method MLLE dimencity reduction method

Part 3

2.7019383907318115 seconds for part_3 Phones dataset KMeans method PCA dimencity reduction method

Part 3

3.3213627338409424 seconds for part_3 Phones dataset KMeans method ICA dimencity reduction method

Part 3

3.2918829917907715 seconds for part_3 Phones dataset KMeans method RP dimencity reduction method

Part 3

4.643864870071411 seconds for part_3 Phones dataset KMeans method MLLE dimencity reduction method

Part 3

12.776022672653198 seconds for part_3 Phones dataset EM method PCA dimencity reduction method

Part 3

32.758837938308716 seconds for part_3 Phones dataset EM method ICA dimencity reduction method

Part 3

29.845545530319214 seconds for part_3 Phones dataset EM method RP dimencity reduction method

Part 3

43.20071291923523 seconds for part_3 Phones dataset EM method MLLE dimencity reduction method

0.0933675765991211 seconds to train vanilla NN on Fruits dataset

Part 4 ----------

---

	precision	recall	f1-score	support
0.0	1.0000	0.6667	0.8000	15
1.0	0.7391	0.7391	0.7391	23
2.0	0.9524	0.9091	0.9302	44
3.0	0.7647	1.0000	0.8667	13

4.0	0.9167	1.0000	0.9565	33
5.0	0.9737	0.9737	0.9737	38
6.0	0.7143	0.7143	0.7143	14
accuracy			0.8889	180
macro avg	0.8658	0.8576	0.8544	180
weighted avg	0.8950	0.8889	0.8876	180

Part 4 ----------

0.07297301292419434 seconds to train PCA NN on Fruits dataset

---

	precision	recall	f1-score	support
0.0	1.0000	0.8667	0.9286	15
1.0	0.8182	0.7826	0.8000	23
2.0	0.9545	0.9545	0.9545	44
3.0	0.8125	1.0000	0.8966	13
4.0	0.9697	0.9697	0.9697	33
5.0	0.9744	1.0000	0.9870	38
6.0	0.7692	0.7143	0.7407	14
accuracy			0.9222	180
macro avg	0.8998	0.8983	0.8967	180
weighted avg	0.9232	0.9222	0.9214	180

Part 4 ----------

0.09102416038513184 seconds to train ICA NN on Fruits dataset

---

	precision	recall	f1-score	support
0.0	1.0000	0.8000	0.8889	15
1.0	0.6786	0.8261	0.7451	23
2.0	0.9535	0.9318	0.9425	44

3.0	0.8125	1.0000	0.8966	13
4.0	1.0000	1.0000	1.0000	33
5.0	1.0000	0.9737	0.9867	38
6.0	0.8182	0.6429	0.7200	14
accuracy			0.9111	180
macro avg	0.8947	0.8821	0.8828	180
weighted avg	0.9199	0.9111	0.9121	180

Part 4 ----------

0.07487893104553223 seconds to train RP NN on Fruits dataset

---

	precision	recall	f1-score	support
0.0	0.8571	0.8000	0.8276	15
1.0	0.8462	0.4783	0.6111	23
2.0	0.9149	0.9773	0.9451	44
3.0	0.7059	0.9231	0.8000	13
4.0	1.0000	0.9697	0.9846	33
5.0	1.0000	0.9737	0.9867	38
6.0	0.5500	0.7857	0.6471	14
accuracy			0.8778	180
macro avg	0.8392	0.8440	0.8289	180
weighted avg	0.8914	0.8778	0.8750	180

Part 4 ----------

0.09136819839477539 seconds to train MLLE NN on Fruits dataset

---

	precision	recall	f1-score	support
0.0	0.9286	0.8667	0.8966	15
1.0	0.6429	0.7826	0.7059	23

2.0	0.9286	0.8864	0.9070	44
3.0	0.8571	0.9231	0.8889	13
4.0	0.9429	1.0000	0.9706	33
5.0	1.0000	0.9737	0.9867	38
6.0	0.8000	0.5714	0.6667	14
accuracy			0.8889	180
macro avg	0.8714	0.8577	0.8603	180
weighted avg	0.8946	0.8889	0.8889	180

Part 5 ----------

0.13379955291748047 seconds to train Vanila KMeans NN on Fruits dataset

---

	precision	recall	f1-score	support
0	0.9375	0.8824	0.9091	17
1	0.9500	0.9500	0.9500	20
2	0.9667	1.0000	0.9831	29
3	1.0000	1.0000	1.0000	22
4	0.9091	0.8333	0.8696	12
5	1.0000	1.0000	1.0000	4
6	1.0000	0.8889	0.9412	18
7	0.8571	0.9000	0.8780	20
8	0.9048	1.0000	0.9500	19
9	1.0000	1.0000	1.0000	19
accuracy			0.9500	180
macro avg	0.9525	0.9455	0.9481	180
weighted avg	0.9512	0.9500	0.9497	180

Part 5 ----------

0.11417698860168457 seconds to train Vanila EM NN on Fruits dataset

---

	precision	recall	f1-score	support
0	0.8235	0.7778	0.8000	18
1	0.8636	0.9500	0.9048	20
2	0.8974	0.8974	0.8974	39
3	0.9444	0.8500	0.8947	20
4	0.9000	0.9000	0.9000	20
5	0.8824	0.8333	0.8571	18
6	0.9091	1.0000	0.9524	20
7	0.8462	0.8462	0.8462	13
8	0.5000	0.5000	0.5000	6
9	1.0000	1.0000	1.0000	6
accuracy			0.8778	180
macro avg	0.8567	0.8555	0.8553	180
weighted avg	0.8781	0.8778	0.8770	180

Part 5 ----------

0.061585426330566406 seconds to train PCA KMeans NN on Fruits dataset

---

	precision	recall	f1-score	support
0	0.9565	1.0000	0.9778	22
1	1.0000	1.0000	1.0000	4
2	1.0000	1.0000	1.0000	29
3	1.0000	1.0000	1.0000	16
4	1.0000	0.9167	0.9565	12
5	1.0000	0.9524	0.9756	21
6	1.0000	1.0000	1.0000	21
7	1.0000	1.0000	1.0000	18
8	0.9474	1.0000	0.9730	18

9	1.0000	1.0000	1.0000	19
accuracy			0.9889	180
macro avg	0.9904	0.9869	0.9883	180
weighted avg	0.9894	0.9889	0.9888	180

Part 5 ----------

0.09311318397521973 seconds to train PCA EM NN on Fruits dataset

---

	precision	recall	f1-score	support
0	0.8889	0.8889	0.8889	9
1	1.0000	0.7692	0.8696	13
2	0.9630	0.8387	0.8966	31
3	0.5714	0.5714	0.5714	7
4	1.0000	1.0000	1.0000	32
5	0.8750	1.0000	0.9333	21
6	0.9231	0.8571	0.8889	14
7	0.8889	0.9600	0.9231	25
8	0.8750	0.9333	0.9032	15
9	0.8667	1.0000	0.9286	13
accuracy			0.9111	180
macro avg	0.8852	0.8819	0.8804	180
weighted avg	0.9154	0.9111	0.9102	180

Part 5 ----------

0.09355401992797852 seconds to train ICA KMeans NN on Fruits dataset

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	precision	recall	f1-score	support
0	1.0000	1.0000	1.0000	27
1	1.0000	0.9000	0.9474	30

2	0.9394	1.0000	0.9688	31
3	0.8667	1.0000	0.9286	13
4	1.0000	0.9048	0.9500	21
5	0.9000	0.9643	0.9310	28
7	0.9524	0.9091	0.9302	22
8	1.0000	1.0000	1.0000	3
9	1.0000	1.0000	1.0000	5
accuracy			0.9556	180
macro avg	0.9620	0.9642	0.9618	180
weighted avg	0.9586	0.9556	0.9556	180

Part 5 ----------

0.09485459327697754 seconds to train ICA EM NN on Fruits dataset

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	precision	recall	f1-score	support
0	0.8000	0.7500	0.7742	16
1	0.9310	1.0000	0.9643	27
2	0.8000	0.9412	0.8649	17
3	0.9062	0.9667	0.9355	30
4	0.9474	0.8571	0.9000	21
5	1.0000	0.8889	0.9412	18
6	1.0000	0.8710	0.9310	31
8	0.7000	0.8235	0.7568	17
9	1.0000	0.6667	0.8000	3
accuracy			0.8944	180
macro avg	0.8983	0.8628	0.8742	180
weighted avg	0.9029	0.8944	0.8953	180

Part 5 ----------

0.09307670593261719 seconds to train RP KMeans NN on Fruits dataset

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	precision	recall	f1-score	support
0	0.9375	0.8333	0.8824	18
1	1.0000	1.0000	1.0000	19
2	0.8889	1.0000	0.9412	16
3	0.9474	0.7826	0.8571	23
4	0.7857	1.0000	0.8800	11
5	0.8462	0.8800	0.8627	25
6	1.0000	0.9444	0.9714	18
7	0.9286	0.9286	0.9286	14
8	0.9286	0.9286	0.9286	14
9	0.8696	0.9091	0.8889	22
accuracy			0.9111	180
macro avg	0.9132	0.9207	0.9141	180
weighted avg	0.9156	0.9111	0.9108	180

Part 5 ----------

0.10294556617736816 seconds to train RP EM NN on Fruits dataset

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	precision	recall	f1-score	support
0	0.7778	1.0000	0.8750	7
1	0.8696	0.9091	0.8889	22
2	0.7273	0.8421	0.7805	19
3	1.0000	0.8108	0.8955	37
4	0.9231	0.8276	0.8727	29
5	0.6429	1.0000	0.7826	9
6	0.9474	0.8571	0.9000	21
7	0.6364	0.8750	0.7368	8

8	0.8889	0.8000	0.8421	20
9	0.6250	0.6250	0.6250	8
accuracy			0.8444	180
macro avg	0.8038	0.8547	0.8199	180
weighted avg	0.8651	0.8444	0.8480	180

Part 5 ----------

0.12155985832214355 seconds to train MLLE KMeans NN on Fruits dataset

---

	precision	recall	f1-score	support
0	1.0000	1.0000	1.0000	11
1	1.0000	1.0000	1.0000	29
2	1.0000	1.0000	1.0000	5
3	0.9730	1.0000	0.9863	36
4	0.9333	1.0000	0.9655	14
5	1.0000	0.9286	0.9630	14
6	1.0000	1.0000	1.0000	4
7	1.0000	0.9524	0.9756	21
8	1.0000	1.0000	1.0000	37
9	1.0000	1.0000	1.0000	9
accuracy			0.9889	180
macro avg	0.9906	0.9881	0.9890	180
weighted avg	0.9894	0.9889	0.9889	180

Part 5 ----------

0.13242864608764648 seconds to train MLLE EM NN on Fruits dataset

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	precision	recall	f1-score	support
0	0.8000	0.9524	0.8696	21

1	1.0000	0.6667	0.8000	6
2	0.8667	0.6842	0.7647	19
3	0.6296	0.7727	0.6939	22
4	0.9000	0.8182	0.8571	11
5	1.0000	0.9565	0.9778	23
6	0.8235	0.7778	0.8000	36
7	0.8333	0.6250	0.7143	8
8	0.9375	1.0000	0.9677	15
9	0.8095	0.8947	0.8500	19
accuracy			0.8333	180
macro avg	0.8600	0.8148	0.8295	180
weighted avg	0.8432	0.8333	0.8331	180

338.7788829803467 seconds to run whole assignment on 8 logical cores CPU