Supplementary Material to Flexible Density Peak Clustering for Real-World Data

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Abstract

We introduce a set of experiments which are skipped in the paper for space reason.

1. Experiments with best parameters for datasets

In Section 4.7 of the paper, we compare our algorithm with 15 baseline algorithms. In these 15 algorithms, there are 6 algorithms, i.e., FKNN-DPC, DPC-KNN, SNN-DPC, 3W-DPET, DenMune, DPC-FSC and MDPC+, each of which uses a fixed parameter for different datasets. For each of these 6 algorithms, the fixed parameter is selected from a set of candidates to generate the best average result. We set the parameters in this way to demonstrate the generalization of algorithms.

Another way of setting parameters is to use different best parameters for different datasets. In other words, for each dataset, we run the algorithm with different parameter values and report only the best result. This help find the best possible result, demonstrating the potential of the algorithm. With this setting of parameters, we report the comparison between our algorithm and these 6 algorithms in Table 1 and Table 2. In this comparison, our algorithm tests the parameter κ in the range [5,20] and ϵ in the range [0.01,0.04].

It can be observed in Table 1 that with synthetic datasets, our algorithm ranks as the best one in the 8 algorithms. In Table 2 our algorithm performs

inferior to only SNN-DPC and DenMune in average results. These comparisons, together with those in the paper, indicate that our algorithm is competitive in comparison with some other algorithms.

Table 1: Clustering results (NMI) on 25 synthetic datasets, with the best parameters for each dataset.

	FKNN-DPC	DPC-KNN	SNN-DPC	3W-DPET	DenMune	DPC-FSC	MDPC+	Ours
D31	0.97	0.96	0.97	0.97	0.96	0.96	0.90	0.96
R15	0.99	0.99	0.99	0.99	0.99	1.00	0.99	0.99
Mouse	0.88	0.97	0.90	0.81	0.94	0.87	0.71	0.94
Unbalance	1.00	1.00	1.00	1.00	1.00	0.64	0.77	1.00
Varydensity	1.00	1.00	1.00	1.00	1.00	1.00	0.76	1.00
S1	0.99	0.99	0.99	0.99	0.99	0.10	0.94	0.99
S2	0.95	0.95	0.94	0.95	0.95	0.08	0.89	0.94
A1	0.98	0.98	0.97	0.97	0.98	0.24	0.92	0.98
A2	0.99	0.99	0.98	0.99	0.99	0.28	0.95	0.99
A3	0.99	0.99	0.99	0.99	0.99	0.32	0.96	0.99
G2-2-10	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
G2-2-30	0.93	0.94	0.92	0.93	0.94	0.94	0.51	0.93
G2-128-30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
G2-1024-50	1.00	0.10	1.00	1.00	1.00	1.00	0.82	1.00
Dim032	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00
Dim064	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00
Dim128	1.00	1.00	1.00	1.00	0.99	1.00	0.79	1.00
Dim256	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dim512	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dim1024	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spread-2-10	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00
Spread-10-20	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
Spread-20-35	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
Spread-35-2	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Spread-50-50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
mean	0.99	0.95	0.99	0.94	0.99	0.82	0.91	0.99

Table 2: Clustering results (NMI) on 25 real datasets, with the best parameters for each dataset.

	FKNN-DPC	DPC-KNN	SNN-DPC	3W-DPET	DenMune	DPC-FSC	MDPC+	Ours
Thyroid	0.48	0.37	0.68	0.48	0.54	0.63	0.17	0.51
Wine	0.84	0.75	0.88	0.82	0.49	0.89	0.60	0.47
Iris	0.91	0.77	0.91	0.76	0.80	0.79	0.72	0.81
Glass	0.37	0.28	0.40	0.40	0.44	0.33	0.31	0.45
Wdbc	0.63	0.44	0.76	0.65	0.52	0.62	0.53	0.49
Yeast	0.17	0.32	0.30	0.32	0.33	0.27	0.11	0.32
Breast	0.74	0.68	0.84	0.70	0.78	0.05	0.07	0.47
Leaves	0.69	0.72	0.69	0.72	0.71	0.67	0.52	0.74
Seeds	0.77	0.73	0.75	0.63	0.73	0.71	0.66	0.66
Segment	0.71	0.02	0.75	0.02	0.68	0.69	0.66	0.63
Libras	0.64	0.58	0.66	0.49	0.67	0.57	0.43	0.69
Ionosphere	0.32	0.03	0.38	0.00	0.27	0.45	0.29	0.38
Waveform	0.35	0.33	0.40	0.42	0.35	0.39	0.24	0.45
Ecoli	0.63	0.62	0.70	0.61	0.69	0.69	0.63	0.72
Cnae9	0.47	0.47	0.47	0.42	0.59	0.33	0.25	0.63
Olivertti	0.91	0.82	0.90	0.81	0.88	0.90	0.48	0.90
Dermatology	0.87	0.69	0.92	0.75	0.94	0.93	0.82	0.94
Balance-scale	0.37	0.18	0.47	0.08	0.30	0.07	0.28	0.27
Appendicitis	0.29	0.26	0.28	0.00	0.28	0.34	0.23	0.30
Arcene	0.12	0.02	0.07	0.00	0.27	0.00	0.08	0.24
Optdigits	0.87	0.02	0.86	0.02	0.94	0.85	0.84	0.92
Robotnavi	0.14	0.13	0.14	0.09	0.29	0.11	0.06	0.28
SCC	0.81	0.72	0.81	0.72	0.86	0.81	0.79	0.85
Pendigits	0.81	0.77	0.79	0.70	0.88	0.75	0.76	0.88
USPS	0.64	0.46	0.61	0.48	0.81	0.44	0.41	0.81
mean	0.58	0.45	0.62	0.44	0.60	0.53	0.44	0.59