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            Project 4 By Hongyan Wang
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Dataset "A"

Method	Accuracy
PPwM	0.8909899888765295
DPwM(d = 1)	0.8909899888765295
DPwM(d = 2)	0.8815350389321468
DPwM(d = 3)	0.8776418242491657
DPwM(d = 4)	0.8759733036707452
DPwM(d = 5)	0.8759733036707452
DPwM(s = 0.1)	0.8909899888765295
DPwM(s = 0.5)	0.8909899888765295
DPwM(s = 1)	0.8909899888765295
KNN(Primal)	0.7586206896551724
KNN(d = 1)	0.7586206896551724
KNN(d = 2)	0.9410456062291435
KNN(d = 3)	0.9365962180200222
KNN(d = 4)	0.9265850945494994
KNN(d = 5)	0.917686318131257
KNN(s = 0.1)	0.8937708565072302
KNN(s = 0.5)	0.9121245828698554
KNN(s = 1)	0.939377085650723

Dataset "B"

Method	Accuracy
PPwM	0.768
DPwM(d = 1)	0.768
DPwM(d = 2)	0.7452631578947368
DPwM(d = 3)	0.7029473684210527
DPwM(d = 4)	0.6850526315789474
DPwM(d = 5)	0.6829473684210526
DPwM(s = 0.1)	0.308
DPwM(s = 0.5)	0.768
DPwM(s = 1)	0.768
KNN(Primal)	0.7724210526315789
KNN(d = 1)	0.7724210526315789
KNN(d = 2)	0.8490526315789474
KNN(d = 3)	0.8301052631578948
KNN(d = 4)	0.8170526315789474
KNN(d = 5)	0.7941052631578948
KNN(s = 0.1)	0.7682105263157895
KNN(s = 0.5)	0.7884210526315789
KNN(s = 1)	0.8258947368421052

Dataset "back"

Method	Accuracy
PPwM	0.7741935483870968
DPwM(d = 1)	0.7741935483870968
DPwM(d = 2)	0.8387096774193549
DPwM(d = 3)	0.8064516129032258
DPwM(d = 4)	0.8064516129032258
DPwM(d = 5)	0.7741935483870968
DPwM(s = 0.1)	0.7419354838709677
DPwM(s = 0.5)	0.7741935483870968
DPwM(s = 1)	0.7741935483870968
KNN(Primal)	0.6774193548387096
KNN(d = 1)	0.6774193548387096
KNN(d = 2)	0.8064516129032258
KNN(d = 3)	0.8387096774193549
KNN(d = 4)	0.8387096774193549
KNN(d = 5)	0.7419354838709677
KNN(s = 0.1)	0.7741935483870968
KNN(s = 0.5)	0.7741935483870968
KNN(s = 1)	0.7741935483870968

Dataset "sonar"

Method	Accuracy
PPwM	0.85
DPwM(d = 1)	0.85
DPwM(d = 2)	0.8
DPwM(d = 3)	0.85
DPwM(d = 4)	0.85
DPwM(d = 5)	0.7
DPwM(s = 0.1)	0.6
DPwM(s = 0.5)	0.45
DPwM(s = 1)	0.6
KNN(Primal)	0.85
KNN(d = 1)	0.85
KNN(d = 2)	0.85
KNN(d = 3)	1.0
KNN(d = 4)	0.85
KNN(d = 5)	0.85
KNN(s = 0.1)	0.2
KNN(s = 0.5)	0.85
KNN(s = 1)	0.85

Question I: Are the primal and dual version of algorithms with linear kernel indeed identical?

Yes. From the table, we can see that for all the datasets, and for all algorithms, primal and dual version with linear kernel have the same accuracy.

Question II: How does the kernel parameter affect the results for the polynomial

and RBF kernels?

Generally we can see that

- as d increases, the accuracy decreases.
- There is not clear pattern for s, but we can safely say that as s increas, the accuracy doesn't decrease. Sometimes it doesn't change, and sometimes it increases.

Question III: Is the effect consistent across algorithms?

For parameter d, the effect is consistent across algorithms. For parameter s, it's not.

Question IV: How do Perceptron and k-NN compare in the experiments across the kernels?

It seems that K-NN performs better than Perceptron in most cases.