Supplementary results from Multiple Instance Learning: A Survey of Problem Characteristics and Applications

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Abstract

This document contains supplementary results for the experiments of *Multiple Instance Learning: A Survey of Problem Characteristics and Applications*. The code used in the experiments is available on-line at `https://github.com/macarbonneau/MILSurvey`

Keywords: Multiple-Instance Learning, Weakly Supervised Learning, Classification, Multi-Instance Learning

1. Detailed Experimental Results on Instance-level Classification

This section contains 3 tables reporting all results on individual data sets from SIVAL [1], Birds [2] and Newsgroups [1] collections. These are the results used to create the critical difference diagrams in the main paper. Table 4 reports the unweighted average recall (UAR), Table 2 reports the F_1-score and Table 3 reports the area under the ROC curve (AUC).

2. Results on Musks and Tiger/Elephant/Fox Data Sets

Here we report the results obtained on the Musk and Tiger/Elephant/Fox Data Sets using our implementation of the reference methods. We use 10 replications of a 10 fold cross-validation procedure. This is the most widely used protocol to report accuracy on these benchmark data sets.

Sometimes our implementation yield better results than in the original papers. This might be attributed to our hyper-parameter optimization procedure or simply to luck in the fold partitioning. For example, in MInD [3], we embed bags using the mean-min distance and then use an SVM classifier with a Gaussian kernel. Both hyper-parameters γ and C are optimized. In the original paper, they used a linear kernel with a fixed C.

In contrast, in some cases, the results obtained are lower than the one reported in the original papers. This can be due to different protocols, and again, test fold partitioning. For example, we use the implementation[1] of the authors for CCE [4] but we obtain lower accuracy. In the original paper, the authors report results using the leave-one-out protocol. Moreover, they reported their best results over different hyper-parameter configurations while we selected hyper-parameters with cross-validation.

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[1] `http://lamda.nju.edu.cn/code_CCE.ashx`

Table 1: Detailed **UAR (%)** results from the experiments on instance-level classification. Each reported result is the average of 10-folds along with the standard error. Results in bold are best results and results with no statistically significant difference from the best ($\alpha = 0.05$).

Dataset	mi-SVM	MI-SVM	C-kNN-ROI	SI-kNN	EM-DD	SI-SVM	MIL-Boost	MILES	RSIS-EoSVM
SIVAL:									
ajaxorange	82.5 (1.1)	53.5 (0.6)	55.5 (1.5)	75.6 (1.6)	56.9 (0.8)	**86.5 (0.7)**	58.3 (0.6)	64.0 (1.3)	67.5 (1.5)
apple	**77.1 (3.0)**	59.1 (2.1)	57.5 (3.2)	**72.1 (1.5)**	58.1 (1.5)	**76.1 (1.8)**	58.5 (1.1)	68.6 (2.4)	50.0 (0.0)
banana	77.0 (2.5)	55.4 (1.2)	57.9 (2.0)	69.7 (1.3)	56.0 (1.3)	**86.8 (0.9)**	53.6 (0.8)	61.8 (1.8)	50.0 (0.0)
bluescrunge	**75.6 (1.7)**	59.4 (2.3)	56.1 (2.1)	70.5 (0.8)	56.9 (2.5)	**71.4 (2.1)**	60.5 (0.7)	**71.4 (1.8)**	50.0 (0.0)
candlewithholder	**74.8 (1.8)**	55.9 (1.5)	56.2 (1.6)	71.6 (1.9)	56.9 (0.6)	**78.8 (1.8)**	56.1 (1.1)	63.9 (1.3)	62.6 (1.3)
cardboardbox	**75.1 (1.4)**	52.7 (1.0)	63.2 (3.0)	71.2 (1.6)	54.8 (0.6)	**76.8 (1.7)**	52.8 (0.6)	62.1 (1.4)	54.2 (1.2)
checkeredscarf	86.4 (0.9)	55.5 (0.5)	58.0 (1.8)	83.5 (0.7)	53.7 (0.3)	**89.7 (1.0)**	54.3 (0.4)	58.7 (0.8)	59.6 (0.9)
cokecan	**86.0 (1.3)**	57.7 (1.7)	48.7 (0.6)	77.5 (1.6)	57.2 (0.8)	**88.3 (0.9)**	58.9 (0.7)	63.8 (1.3)	62.0 (0.9)
dataminingbook	**83.1 (1.8)**	56.2 (1.0)	59.8 (2.9)	76.3 (1.2)	56.7 (1.8)	**85.4 (1.4)**	61.3 (0.5)	61.1 (0.8)	50.0 (0.0)
dirtyrunningshoe	**79.9 (1.7)**	53.1 (0.6)	63.4 (2.7)	78.7 (0.9)	52.5 (0.4)	**83.2 (1.4)**	52.6 (0.5)	57.9 (0.8)	59.2 (0.8)
dirtyworkgloves	**70.4 (1.7)**	54.5 (0.9)	56.3 (1.6)	63.4 (1.3)	53.9 (0.8)	**71.9 (2.4)**	54.2 (0.9)	58.3 (1.1)	51.3 (0.3)
fabricsoftenerbox	88.2 (0.9)	57.9 (1.9)	56.0 (1.7)	76.7 (1.2)	61.0 (1.1)	**92.8 (0.5)**	62.9 (0.8)	61.3 (0.6)	64.8 (0.7)
feltflowerrug	86.3 (1.4)	64.6 (1.5)	65.8 (2.4)	81.9 (1.3)	57.8 (0.8)	**89.9 (0.9)**	61.1 (1.0)	59.7 (1.0)	68.1 (0.8)
glazedwoodpot	**73.5 (2.5)**	54.1 (1.1)	59.7 (1.7)	**73.8 (2.0)**	59.0 (1.4)	**77.1 (2.0)**	52.5 (0.4)	69.0 (0.9)	50.0 (0.0)
goldmedal	76.5 (1.2)	55.5 (1.3)	55.4 (1.8)	67.7 (2.0)	58.4 (0.8)	**82.4 (1.4)**	57.5 (1.0)	62.4 (1.4)	50.0 (0.0)
greenteabox	**88.1 (1.3)**	58.7 (0.8)	51.5 (1.1)	77.9 (1.1)	53.6 (0.4)	**90.9 (0.5)**	55.4 (0.6)	60.3 (0.8)	70.3 (0.8)
juliespot	**81.0 (1.5)**	59.8 (1.1)	53.1 (1.0)	73.1 (1.1)	55.6 (1.1)	**78.9 (1.6)**	54.4 (0.8)	62.1 (1.2)	51.3 (0.6)
largespoon	**66.1 (2.5)**	50.9 (0.7)	54.6 (1.3)	59.4 (1.8)	49.9 (0.5)	**61.6 (1.3)**	51.5 (0.4)	56.0 (2.3)	50.0 (0.0)
rapbook	**74.5 (1.1)**	53.7 (1.0)	54.6 (1.5)	69.2 (1.7)	54.8 (1.0)	**71.9 (1.7)**	52.4 (0.4)	65.7 (1.6)	50.0 (0.0)
smileyfacedoll	**82.2 (1.7)**	57.0 (1.1)	52.1 (1.7)	70.2 (1.5)	58.7 (0.7)	**85.2 (1.7)**	56.3 (0.7)	64.5 (1.1)	50.0 (0.0)
spritecan	79.2 (1.3)	52.2 (1.1)	52.5 (1.3)	72.4 (1.1)	54.4 (0.9)	**84.9 (1.6)**	55.0 (0.8)	61.1 (1.0)	60.1 (0.5)
stripednotebook	85.9 (1.0)	63.2 (2.2)	59.9 (2.5)	78.3 (1.4)	57.3 (1.3)	**91.5 (0.9)**	58.8 (1.2)	58.1 (0.7)	76.4 (2.3)
translucentbowl	81.6 (1.7)	59.8 (1.5)	56.1 (2.2)	70.3 (0.9)	58.8 (1.3)	**90.4 (0.7)**	55.0 (0.6)	59.6 (1.0)	50.0 (0.0)
wd40can	**89.0 (0.9)**	58.6 (1.1)	53.3 (1.4)	77.4 (1.1)	55.4 (0.8)	**90.4 (0.9)**	56.7 (1.0)	63.6 (1.1)	68.1 (2.5)
woodrollingpin	**70.0 (1.1)**	50.2 (0.3)	55.7 (1.1)	**67.4 (1.8)**	55.2 (1.3)	**68.0 (2.0)**	53.8 (0.8)	59.1 (1.8)	50.0 (0.0)
Birds:									
Brown Creeper	**72.0 (0.9)**	58.4 (1.9)	**70.7 (0.9)**	**69.8 (0.8)**	65.3 (1.1)	**72.0 (1.1)**	54.3 (1.4)	66.3 (1.2)	50.1 (0.5)
Winter Wren	65.6 (1.0)	56.9 (0.7)	65.0 (1.3)	**67.6 (0.8)**	58.7 (0.5)	**70.1 (1.3)**	56.5 (0.4)	57.4 (1.2)	58.9 (0.8)
Pacific-slope Flycatcher	78.8 (0.6)	57.1 (2.7)	**77.1 (1.9)**	78.6 (0.9)	71.2 (1.5)	**81.4 (0.9)**	50.0 (0.0)	66.5 (1.2)	66.9 (2.7)
Red-breasted Nuthatch	**83.6 (1.7)**	60.5 (2.0)	65.5 (2.8)	**86.0 (1.7)**	71.8 (1.7)	**85.1 (1.3)**	62.3 (1.1)	67.6 (1.7)	76.3 (1.0)
Dark-eyed Junco	50.0 (0.0)	**55.4 (1.7)**	50.0 (0.0)	**58.4 (2.5)**	50.0 (0.0)	50.8 (0.8)	50.0 (0.0)	**53.7 (3.4)**	50.0 (0.0)
Olive-sided Flycatcher	63.8 (2.3)	61.0 (1.7)	64.8 (2.1)	**78.3 (1.2)**	66.9 (0.8)	**75.1 (2.0)**	50.0 (0.0)	64.8 (1.7)	54.0 (1.0)
Hermit Thrush	**50.0 (0.0)**	**50.0 (0.0)**	**50.0 (0.0)**	**50.0 (0.0)**	**50.0 (0.0)**	**50.0 (0.0)**	**50.0 (0.0)**	**53.4 (2.2)**	**50.0 (0.0)**
Chestnut-backed Chickadee	67.1 (5.0)	66.2 (0.8)	75.3 (2.0)	**82.6 (2.1)**	66.7 (2.2)	**78.3 (1.2)**	50.9 (0.3)	67.5 (1.3)	**79.1 (2.3)**
Varied Thrush	**92.0 (1.2)**	58.2 (5.8)	**89.6 (1.2)**	**90.6 (1.8)**	80.9 (1.9)	**92.2 (1.6)**	60.0 (1.9)	83.4 (1.6)	49.1 (0.1)
Hermit Warbler	64.3 (3.3)	52.9 (1.3)	**71.1 (4.1)**	**76.9 (2.5)**	58.1 (3.1)	**76.8 (2.2)**	49.8 (0.0)	64.9 (3.4)	50.0 (0.0)
Swainson Thrush	**79.7 (1.9)**	**76.8 (2.1)**	63.1 (2.6)	73.1 (1.8)	71.6 (1.6)	**82.0 (1.5)**	49.9 (0.0)	65.4 (2.3)	49.9 (0.0)
Hammonds Flycatcher	**92.2 (0.4)**	55.1 (2.4)	**91.3 (0.7)**	90.5 (0.6)	70.6 (0.7)	**92.8 (0.2)**	71.9 (0.7)	66.0 (1.8)	84.8 (1.0)
Western Tanager	**81.7 (2.0)**	73.6 (3.8)	57.0 (2.9)	**83.3 (2.6)**	71.5 (2.4)	**87.1 (2.5)**	50.7 (0.8)	77.9 (2.6)	50.2 (0.5)
Newsgroups:									
alt.atheism	**84.1 (3.3)**	67.0 (4.6)	49.8 (1.9)	61.6 (2.1)	51.6 (1.3)	**86.6 (2.1)**	54.1 (1.5)	54.5 (1.9)	70.9 (4.1)
comp.graphics	**86.0 (2.7)**	**86.8 (2.9)**	46.1 (2.9)	56.1 (3.1)	49.4 (0.1)	**79.3 (5.6)**	52.1 (1.1)	47.0 (2.1)	**81.4 (3.8)**
comp.os.ms-windows.misc	**68.2 (2.5)**	**69.8 (2.0)**	43.4 (2.2)	**62.1 (3.2)**	52.7 (1.3)	58.0 (3.7)	50.0 (0.0)	49.7 (1.7)	**66.8 (4.9)**
comp.sys.ibm.pc.hardware	**76.4 (2.9)**	**74.3 (4.7)**	46.1 (2.8)	59.3 (3.0)	50.3 (0.7)	64.9 (4.3)	51.3 (0.9)	52.0 (1.9)	**73.2 (2.5)**
comp.sys.mac.hardware	**75.4 (4.0)**	**79.6 (3.1)**	42.1 (3.8)	56.9 (3.5)	51.0 (1.1)	**72.4 (6.1)**	51.9 (1.0)	52.6 (1.3)	**73.2 (3.4)**
comp.windows.x	**69.7 (4.7)**	**73.3 (5.3)**	49.8 (2.1)	**65.7 (3.0)**	51.6 (1.0)	**66.9 (5.5)**	**60.8 (3.1)**	53.8 (4.4)	**70.0 (3.0)**
misc.forsale	**71.4 (3.8)**	**66.6 (4.0)**	52.4 (2.6)	54.8 (3.0)	52.5 (1.5)	**67.5 (4.5)**	55.3 (2.0)	58.8 (2.9)	**65.1 (2.1)**
rec.autos	61.6 (5.2)	56.2 (2.9)	41.0 (3.7)	55.0 (3.2)	51.8 (1.1)	61.5 (5.6)	52.2 (1.2)	46.4 (1.2)	**76.7 (3.9)**
rec.motorcycles	**84.2 (5.9)**	**69.2 (6.1)**	52.0 (2.3)	66.5 (2.5)	58.7 (3.0)	**65.9 (7.3)**	51.4 (1.4)	51.7 (1.8)	**76.2 (2.9)**
rec.sport.baseball	**73.4 (4.7)**	**67.4 (3.7)**	46.2 (2.3)	57.2 (3.1)	55.6 (1.9)	52.5 (3.7)	52.8 (1.2)	49.2 (1.1)	**73.3 (2.1)**
rec.sport.hockey	63.2 (6.7)	**78.9 (4.6)**	37.6 (2.7)	58.6 (5.2)	52.8 (1.8)	58.2 (5.6)	**75.4 (3.3)**	49.1 (2.6)	**79.9 (3.2)**
sci.crypt	**68.8 (6.3)**	52.8 (1.5)	51.8 (2.1)	63.6 (3.9)	**73.6 (2.3)**	**68.3 (6.3)**	62.3 (2.6)	59.2 (2.4)	**75.9 (3.6)**
sci.electronics	**84.1 (5.0)**	78.0 (4.9)	46.0 (2.9)	57.4 (4.0)	49.6 (0.1)	77.9 (4.1)	52.2 (1.2)	47.7 (0.9)	**89.9 (0.9)**
sci.med	**69.2 (6.5)**	**80.2 (3.4)**	49.3 (3.2)	56.1 (3.7)	52.5 (1.7)	**71.0 (6.1)**	53.0 (1.2)	49.6 (1.7)	**73.4 (2.6)**
sci.space	54.3 (4.3)	**82.3 (2.6)**	43.4 (3.1)	61.6 (2.3)	57.9 (2.6)	57.8 (4.7)	53.5 (1.6)	58.6 (3.3)	**75.6 (2.2)**
soc.religion.christian	**66.7 (5.4)**	**77.1 (4.7)**	54.0 (2.3)	63.2 (2.8)	57.2 (2.5)	48.5 (2.4)	59.6 (1.7)	54.4 (2.5)	**72.1 (2.9)**
talk.politics.guns	**78.3 (3.6)**	**64.9 (6.4)**	46.7 (2.0)	58.0 (1.9)	58.8 (4.4)	**70.6 (7.0)**	53.8 (1.3)	53.9 (3.2)	**75.9 (4.5)**
talk.politics.mideast	**84.3 (1.6)**	**74.8 (4.4)**	52.2 (1.6)	66.5 (2.9)	62.6 (2.7)	**85.3 (4.5)**	**78.7 (2.8)**	53.7 (2.9)	**78.8 (2.8)**
talk.politics.misc	**72.8 (3.3)**	**73.9 (5.0)**	53.5 (1.5)	63.2 (2.4)	52.0 (1.2)	58.3 (4.3)	58.5 (2.2)	57.8 (3.2)	**74.5 (2.7)**
talk.religion.misc	54.8 (3.3)	**71.3 (4.6)**	49.5 (2.8)	55.4 (4.9)	51.2 (1.0)	56.8 (3.9)	52.4 (1.3)	51.1 (3.2)	**67.2 (3.3)**
TOTAL WINS	39	19	6	15	2	47	4	3	21

Table 2: Detailed F_1**-Score** results from the experiments on instance-level classification. Each reported result is the average of 10-folds along with the standard error. Results in bold are best results and results with no statistically significant difference from the best ($\alpha = 0.05$).

Dataset	mi-SVM	MI-SVM	C-kNN-ROI	SI-kNN	EM-DD	SI-SVM	MIL-Boost	MILES	RSIS-EoSVM
SIVAL:									
ajaxorange	**68.1 (1.9)**	13.1 (2.0)	18.2 (3.9)	38.3 (2.0)	23.9 (2.4)	**65.9 (1.9)**	28.1 (1.8)	28.2 (1.3)	50.6 (3.7)
apple	**22.2 (2.0)**	**26.7 (5.5)**	12.0 (3.2)	16.1 (1.1)	**25.7 (4.1)**	17.5 (1.3)	**27.7 (3.1)**	14.1 (1.5)	0.0 (0.0)
banana	**43.6 (2.7)**	17.6 (3.6)	13.0 (1.9)	22.8 (2.1)	19.5 (4.0)	**41.7 (2.4)**	12.8 (2.6)	12.9 (0.6)	0.0 (0.0)
bluescrunge	23.1 (2.1)	**27.4 (6.0)**	12.1 (3.3)	14.6 (0.7)	**20.9 (7.1)**	17.2 (1.9)	**33.4 (1.8)**	14.9 (0.7)	0.0 (0.0)
candlewithholder	**52.8 (2.2)**	19.5 (4.7)	16.9 (2.8)	31.1 (1.8)	24.0 (1.8)	**52.6 (2.4)**	21.1 (3.3)	23.4 (1.0)	38.0 (2.7)
cardboardbox	**42.3 (2.0)**	10.8 (3.0)	25.6 (4.5)	29.7 (1.5)	17.0 (1.8)	**41.5 (3.9)**	10.4 (2.2)	23.8 (1.4)	14.5 (3.7)
checkeredscarf	**75.2 (1.7)**	19.9 (1.7)	26.0 (5.3)	66.0 (1.4)	13.7 (1.1)	**78.2 (1.7)**	16.0 (1.3)	32.0 (1.4)	31.9 (2.6)
cokecan	**72.3 (1.9)**	25.2 (5.1)	2.8 (1.4)	48.7 (2.9)	24.9 (2.5)	**70.8 (1.8)**	30.0 (2.0)	28.5 (1.4)	37.8 (2.3)
dataminingbook	**56.2 (4.1)**	21.3 (3.1)	21.0 (5.6)	32.5 (1.8)	22.1 (5.2)	**49.8 (1.4)**	36.6 (1.3)	19.3 (0.9)	0.0 (0.0)
dirtyrunningshoe	**63.1 (2.5)**	12.0 (2.0)	36.3 (5.5)	49.9 (1.7)	9.8 (1.4)	**63.7 (2.4)**	9.9 (1.7)	28.0 (1.0)	30.8 (2.3)
dirtyworkgloves	**36.5 (3.5)**	16.0 (2.7)	18.4 (2.8)	22.3 (1.7)	13.9 (2.6)	**33.2 (2.8)**	15.2 (2.8)	19.1 (1.2)	4.9 (1.3)
fabricsoftenerbox	**79.9 (1.6)**	25.5 (6.0)	19.9 (5.1)	45.5 (2.6)	35.5 (3.1)	**79.0 (0.6)**	40.8 (2.2)	32.4 (1.3)	45.5 (1.6)
feltflowerrug	**73.7 (2.7)**	44.1 (3.6)	43.3 (5.2)	56.2 (3.6)	26.7 (2.4)	**75.0 (1.5)**	35.9 (2.7)	28.8 (1.4)	52.6 (1.8)
glazedwoodpot	**35.0 (3.1)**	14.0 (3.2)	22.2 (2.5)	26.2 (1.9)	**29.2 (4.1)**	**32.4 (3.2)**	9.3 (1.6)	22.9 (1.6)	0.0 (0.0)
goldmedal	**53.1 (1.4)**	18.9 (4.0)	16.6 (3.4)	28.1 (2.4)	28.2 (2.2)	**53.5 (3.3)**	25.4 (3.1)	20.8 (0.6)	0.0 (0.0)
greenteabox	**77.3 (1.5)**	29.3 (2.4)	5.5 (3.7)	57.0 (2.3)	13.4 (1.4)	**77.9 (1.2)**	19.3 (2.0)	30.6 (0.9)	56.9 (1.7)
juliespot	**49.0 (3.4)**	31.9 (3.0)	10.6 (3.2)	38.3 (2.0)	19.5 (3.4)	**42.5 (2.5)**	15.9 (2.3)	24.7 (0.9)	4.6 (2.2)
largespoon	**19.6 (1.3)**	3.7 (2.2)	10.0 (1.6)	12.0 (0.6)	1.5 (1.5)	15.0 (0.8)	5.9 (1.5)	10.8 (1.1)	0.0 (0.0)
rapbook	**31.8 (2.4)**	13.4 (3.2)	15.0 (2.8)	**25.3 (2.0)**	16.9 (3.1)	**26.6 (1.4)**	9.3 (1.4)	22.1 (1.0)	0.0 (0.0)
smileyfacedoll	**61.8 (2.3)**	23.3 (3.3)	7.6 (3.7)	25.3 (1.4)	28.9 (2.0)	**54.2 (3.2)**	21.8 (2.2)	18.7 (1.2)	0.0 (0.0)
spritecan	**60.0 (3.1)**	8.8 (3.6)	11.9 (3.2)	38.8 (1.4)	15.6 (2.9)	**61.0 (3.1)**	17.8 (2.7)	25.9 (1.0)	33.3 (1.4)
stripednotebook	**69.9 (2.4)**	39.6 (5.5)	26.6 (4.4)	39.1 (1.9)	24.6 (3.4)	**67.1 (1.8)**	29.1 (3.6)	20.2 (1.1)	**67.1 (4.5)**
translucentbowl	**61.6 (4.1)**	31.1 (3.8)	14.8 (4.4)	27.0 (0.9)	28.1 (3.3)	**56.5 (2.8)**	18.0 (2.0)	16.7 (1.0)	0.0 (0.0)
wd40can	**77.2 (1.6)**	28.9 (3.1)	11.8 (3.8)	48.3 (1.9)	19.2 (2.3)	**74.5 (2.3)**	23.2 (3.0)	29.2 (1.0)	50.4 (5.3)
woodrollingpin	**24.9 (2.7)**	2.1 (1.1)	11.9 (1.6)	15.0 (1.5)	**17.3 (3.8)**	**22.2 (3.1)**	13.6 (2.7)	12.9 (1.5)	0.0 (0.0)
Birds:									
Brown Creeper	27.9 (1.5)	25.1 (4.6)	23.5 (1.3)	19.1 (1.0)	**45.9 (2.5)**	20.8 (1.0)	14.8 (4.4)	20.2 (1.0)	6.0 (1.0)
Winter Wren	**38.2 (1.8)**	23.7 (2.3)	35.0 (1.8)	**38.2 (0.6)**	29.6 (1.5)	**41.0 (2.1)**	22.9 (1.4)	18.5 (1.5)	29.7 (2.2)
Pacific-slope Flycatcher	38.4 (1.1)	19.6 (5.9)	33.8 (2.1)	27.7 (1.1)	**55.4 (2.9)**	31.1 (1.5)	0.0 (0.0)	16.9 (0.7)	37.1 (4.7)
Red-breasted Nuthatch	**62.4 (2.1)**	31.7 (5.1)	38.0 (5.4)	55.2 (3.1)	**59.2 (3.7)**	52.1 (1.3)	38.8 (2.7)	22.0 (3.5)	**66.6 (1.8)**
Dark-eyed Junco	0.0 (0.0)	**17.6 (5.4)**	0.0 (0.0)	**25.0 (7.1)**	0.0 (0.0)	1.8 (1.8)	0.0 (0.0)	1.9 (0.4)	0.0 (0.0)
Olive-sided Flycatcher	22.7 (3.6)	29.8 (3.6)	21.8 (2.2)	23.1 (1.3)	**46.2 (2.0)**	22.9 (2.3)	0.0 (0.0)	9.4 (0.6)	13.2 (3.2)
Hermit Thrush	**0.0 (0.0)**	**0.0 (0.0)**	**0.0 (0.0)**	**0.0 (0.0)**	**0.0 (0.0)**	**0.0 (0.0)**	**0.0 (0.0)**	**0.6 (0.3)**	**0.0 (0.0)**
Chestnut-backed Chickadee	37.1 (10.5)	45.1 (1.6)	**56.8 (4.2)**	**56.5 (1.9)**	45.0 (4.9)	**56.6 (2.4)**	3.5 (1.2)	13.3 (1.3)	**63.7 (3.4)**
Varied Thrush	31.7 (1.6)	18.5 (12.3)	26.3 (1.7)	24.0 (1.2)	**74.8 (3.1)**	24.1 (1.3)	25.8 (4.2)	9.7 (0.8)	0.0 (0.0)
Hermit Warbler	**19.3 (4.1)**	**7.7 (2.8)**	**19.2 (3.1)**	**17.9 (1.5)**	**20.5 (7.1)**	**18.9 (1.3)**	0.0 (0.0)	**5.6 (0.7)**	0.0 (0.0)
Swainson Thrush	41.5 (3.0)	**65.1 (3.7)**	21.8 (3.0)	33.1 (2.7)	**57.5 (3.1)**	38.2 (1.8)	0.0 (0.0)	6.6 (0.8)	0.0 (0.0)
Hammonds Flycatcher	**88.4 (0.5)**	16.1 (6.0)	**88.8 (0.8)**	**87.9 (0.9)**	58.2 (1.5)	**88.3 (0.5)**	60.7 (1.4)	46.6 (3.2)	81.8 (1.3)
Western Tanager	**57.8 (3.3)**	**59.1 (7.3)**	16.8 (6.0)	**59.0 (4.7)**	**56.7 (4.6)**	**46.9 (3.4)**	2.1 (2.1)	8.9 (0.9)	1.4 (1.4)
Newsgroups:									
alt.atheism	**64.7 (5.5)**	40.7 (8.6)	2.6 (0.2)	3.9 (0.3)	4.0 (2.7)	43.5 (8.1)	14.1 (4.9)	5.7 (1.9)	**50.4 (8.9)**
comp.graphics	**70.1 (5.1)**	**74.0 (2.9)**	3.7 (0.3)	5.6 (0.8)	0.0 (0.0)	**56.6 (8.8)**	6.9 (3.6)	1.7 (0.7)	**72.3 (6.5)**
comp.os.ms-windows.misc	**44.1 (5.6)**	**44.8 (3.7)**	2.2 (0.2)	4.1 (0.6)	7.2 (3.0)	20.0 (8.9)	0.0 (0.0)	2.5 (1.2)	**41.4 (9.4)**
comp.sys.ibm.pc.hardware	**59.9 (4.2)**	**55.5 (9.3)**	2.5 (0.2)	3.9 (0.3)	2.0 (2.0)	28.3 (7.2)	4.2 (2.8)	3.3 (0.8)	**60.2 (5.2)**
comp.sys.mac.hardware	**59.0 (8.1)**	**64.4 (4.0)**	2.4 (0.3)	4.0 (0.5)	4.7 (3.2)	28.1 (7.8)	6.9 (3.5)	4.2 (0.9)	**59.7 (6.0)**
comp.windows.x	**48.2 (9.4)**	**50.1 (9.8)**	4.5 (0.3)	8.2 (0.8)	5.1 (2.7)	**35.2 (9.5)**	29.9 (7.7)	8.8 (4.5)	**52.1 (5.8)**
misc.forsale	**48.2 (7.1)**	**39.7 (8.6)**	2.5 (0.1)	3.0 (0.4)	7.5 (3.9)	**35.4 (8.7)**	17.1 (6.3)	6.4 (1.3)	**44.2 (5.4)**
rec.autos	23.3 (8.2)	17.7 (7.8)	3.1 (0.3)	5.0 (0.9)	5.7 (2.9)	22.5 (8.0)	7.1 (3.7)	1.1 (0.6)	**62.2 (8.1)**
rec.motorcycles	**49.2 (8.5)**	**39.1 (10.8)**	3.1 (0.2)	5.2 (0.5)	19.8 (5.5)	17.7 (7.2)	4.0 (4.0)	3.3 (1.0)	**60.2 (5.3)**
rec.sport.baseball	**52.9 (9.5)**	**43.6 (8.7)**	3.6 (0.2)	5.3 (0.5)	16.0 (4.8)	5.7 (1.9)	9.9 (4.1)	2.8 (0.6)	**58.8 (3.7)**
rec.sport.hockey	29.8 (11.8)	**66.7 (8.5)**	4.7 (0.5)	9.5 (1.7)	9.2 (3.9)	16.5 (6.8)	**59.8 (5.7)**	4.2 (1.6)	**72.7 (5.9)**
sci.crypt	**35.5 (11.2)**	8.7 (4.5)	3.2 (0.2)	4.9 (0.6)	**53.7 (3.7)**	23.3 (6.8)	37.0 (6.6)	6.3 (0.8)	**60.5 (7.7)**
sci.electronics	**69.0 (9.2)**	63.6 (9.0)	3.3 (0.3)	5.3 (1.0)	0.0 (0.0)	63.2 (8.1)	7.6 (3.9)	1.0 (0.5)	**87.1 (1.4)**
sci.med	32.7 (9.7)	**66.7 (6.5)**	4.2 (0.4)	5.2 (0.8)	6.4 (3.7)	31.9 (7.5)	8.7 (3.6)	3.6 (0.9)	**60.7 (4.8)**
sci.space	11.2 (7.4)	**70.6 (3.5)**	3.2 (0.3)	5.6 (0.4)	19.8 (6.0)	8.6 (3.2)	11.3 (4.9)	6.2 (1.2)	**64.3 (3.7)**
soc.religion.christian	**39.0 (10.7)**	**60.4 (9.2)**	3.3 (0.2)	4.6 (0.5)	17.3 (5.8)	2.9 (0.2)	30.9 (4.9)	4.7 (0.9)	**56.2 (5.1)**
talk.politics.guns	**61.6 (5.7)**	28.5 (10.0)	3.3 (0.2)	5.1 (0.5)	21.9 (9.2)	33.1 (12.0)	12.9 (4.3)	4.5 (1.0)	**57.1 (8.3)**
talk.politics.mideast	**74.4 (2.4)**	**59.4 (7.1)**	4.2 (0.3)	7.0 (0.6)	35.0 (7.2)	**66.1 (5.3)**	**70.4 (4.8)**	5.0 (1.3)	**69.1 (4.4)**
talk.politics.misc	**53.1 (5.3)**	**46.8 (9.3)**	3.0 (0.2)	4.3 (0.3)	5.7 (3.2)	18.3 (9.5)	26.1 (6.5)	4.6 (1.1)	**60.5 (3.7)**
talk.religion.misc	11.1 (5.6)	**42.6 (7.0)**	2.7 (0.1)	3.3 (0.6)	3.3 (2.3)	6.5 (2.5)	8.4 (4.4)	4.1 (1.5)	**45.0 (6.0)**
TOTAL WINS	45	22	4	8	14	32	5	2	24

Table 3: Detailed **AUC×100** results from the experiments on instance-level classification. Each reported result is the average of 10-folds along with the standard error. Results in bold are best results and results with no statistically significant difference from the best ($\alpha = 0.05$).

Dataset	mi-SVM	MI-SVM	C-kNN-ROI	SI-kNN	EM-DD	SI-SVM	MIL-Boost	MILES	RSIS-EoSVM
SIVAL:									
ajaxorange	**93.7 (0.9)**	77.2 (5.2)	54.5 (1.9)	83.0 (1.9)	56.3 (1.1)	**93.1 (0.9)**	74.3 (1.3)	67.3 (1.5)	87.2 (1.1)
apple	**87.2 (1.4)**	70.2 (4.5)	55.2 (3.8)	80.5 (2.0)	73.0 (2.6)	**82.3 (2.5)**	**81.4 (4.4)**	74.0 (2.7)	63.4 (2.7)
banana	**91.2 (1.1)**	73.9 (4.5)	57.5 (2.4)	76.3 (1.2)	69.1 (3.6)	**91.6 (0.7)**	77.5 (4.3)	65.0 (2.3)	76.7 (2.6)
bluescrunge	**85.0 (1.3)**	**76.7 (4.9)**	57.6 (1.8)	78.3 (1.0)	**74.9 (6.9)**	**81.1 (2.6)**	**80.8 (2.4)**	77.6 (1.7)	48.4 (3.2)
candlewithholder	**90.4 (0.9)**	74.2 (4.9)	54.4 (2.0)	78.2 (2.6)	55.3 (1.1)	**87.6 (1.2)**	69.2 (1.6)	67.0 (1.7)	76.0 (2.0)
cardboardbox	**85.0 (1.2)**	54.8 (2.4)	63.9 (3.3)	78.7 (1.5)	43.2 (1.6)	**84.7 (1.8)**	71.8 (1.8)	67.7 (2.0)	67.8 (1.8)
checkeredscarf	**95.2 (0.4)**	85.0 (1.4)	59.0 (1.9)	90.3 (0.4)	75.5 (2.6)	**94.9 (0.6)**	88.3 (1.3)	62.5 (1.1)	79.5 (1.3)
cokecan	**95.6 (0.5)**	84.2 (2.6)	46.5 (1.3)	84.6 (1.5)	60.7 (0.9)	**94.1 (0.7)**	86.3 (0.7)	65.5 (1.5)	77.4 (1.5)
dataminingbook	**92.7 (1.1)**	64.6 (4.8)	60.3 (3.5)	82.9 (1.7)	67.0 (4.3)	**92.4 (1.1)**	82.9 (1.1)	63.3 (1.4)	60.4 (3.0)
dirtyrunningshoe	**91.6 (1.1)**	64.7 (4.0)	64.9 (3.2)	86.5 (0.8)	54.9 (1.2)	**91.1 (1.0)**	73.4 (1.1)	62.1 (1.2)	77.2 (1.5)
dirtyworkgloves	**78.0 (2.6)**	58.7 (2.0)	59.9 (2.4)	68.8 (1.6)	54.4 (1.8)	**78.6 (2.8)**	67.2 (1.7)	61.0 (1.1)	63.6 (1.4)
fabricsoftenerbox	**96.8 (0.6)**	81.9 (1.2)	57.2 (2.7)	84.7 (1.2)	61.0 (1.2)	**97.5 (0.4)**	74.5 (1.0)	65.8 (1.0)	76.9 (2.8)
feltflowerrug	**96.2 (0.5)**	83.9 (2.9)	68.3 (3.0)	88.5 (1.8)	70.9 (2.2)	**96.4 (0.6)**	86.7 (1.4)	64.5 (1.4)	76.1 (1.3)
glazedwoodpot	**84.6 (2.3)**	71.8 (2.0)	59.4 (2.2)	**82.2 (1.8)**	79.8 (2.0)	**86.8 (1.5)**	73.2 (2.3)	75.8 (1.5)	73.9 (1.9)
goldmedal	**92.2 (1.1)**	79.4 (3.1)	55.8 (2.5)	75.9 (2.0)	69.7 (3.5)	**89.6 (1.1)**	77.2 (1.9)	67.1 (1.7)	80.0 (2.4)
greenteabox	**95.7 (0.5)**	69.9 (0.9)	51.2 (1.9)	85.3 (1.2)	65.4 (6.7)	**96.3 (0.5)**	77.3 (0.8)	65.0 (0.9)	87.0 (0.6)
juliespot	**88.6 (1.3)**	78.0 (2.1)	53.4 (2.1)	81.1 (1.5)	66.5 (3.7)	**87.2 (2.1)**	80.8 (2.4)	65.2 (1.5)	**84.7 (1.7)**
largespoon	**76.0 (2.5)**	42.9 (3.0)	58.1 (2.9)	62.8 (2.8)	27.7 (3.2)	66.6 (2.2)	45.8 (2.5)	57.6 (2.2)	33.5 (2.4)
rapbook	**82.5 (1.0)**	58.4 (2.3)	53.7 (2.3)	76.1 (1.7)	56.5 (2.4)	**80.9 (1.5)**	75.7 (1.1)	70.2 (2.0)	68.2 (1.8)
smileyfacedoll	**92.9 (0.9)**	76.2 (4.1)	48.9 (2.4)	78.1 (1.6)	63.6 (3.3)	**92.0 (1.4)**	80.8 (2.9)	69.1 (1.6)	66.0 (2.9)
spritecan	**92.7 (1.1)**	64.7 (6.2)	51.4 (1.3)	79.3 (0.7)	57.8 (1.4)	**90.3 (1.3)**	81.3 (1.6)	65.7 (1.4)	72.3 (1.5)
stripednotebook	**96.0 (0.6)**	86.7 (2.2)	60.0 (3.0)	87.0 (1.4)	63.1 (4.1)	**95.5 (0.7)**	91.5 (0.6)	62.8 (1.0)	**94.4 (1.4)**
translucentbowl	**94.8 (1.1)**	84.9 (2.4)	56.0 (3.3)	77.7 (1.2)	74.5 (1.7)	**94.9 (0.4)**	85.5 (1.5)	65.1 (1.7)	73.0 (2.7)
wd40can	**96.7 (0.3)**	76.3 (3.0)	53.1 (1.6)	84.0 (0.8)	62.6 (2.5)	**95.0 (0.9)**	75.6 (1.8)	68.5 (1.4)	90.4 (1.4)
woodrollingpin	**78.0 (1.6)**	45.5 (2.9)	53.9 (2.5)	**74.5 (2.3)**	70.9 (2.2)	**77.3 (2.4)**	**70.7 (4.4)**	61.6 (1.8)	55.6 (2.5)
Birds:									
Brown Creeper	79.5 (0.9)	76.8 (3.1)	77.1 (0.7)	78.6 (0.8)	**93.7 (0.6)**	80.0 (0.9)	83.1 (2.0)	69.5 (1.5)	66.9 (1.4)
Winter Wren	69.4 (0.8)	66.8 (1.5)	**77.4 (2.1)**	**81.8 (0.9)**	62.0 (0.9)	**82.2 (0.9)**	66.9 (1.5)	59.6 (1.6)	62.2 (0.5)
Pacific-slope Flycatcher	**85.9 (1.2)**	71.9 (3.2)	80.8 (2.4)	**86.2 (1.1)**	**86.5 (1.2)**	**88.1 (1.1)**	52.9 (1.9)	69.0 (1.6)	**87.2 (1.4)**
Red-breasted Nuthatch	90.1 (1.5)	81.4 (2.8)	67.1 (3.3)	92.6 (1.4)	**98.3 (0.3)**	91.6 (1.1)	96.1 (0.5)	69.1 (2.3)	84.7 (0.9)
Dark-eyed Junco	**72.0 (3.1)**	71.0 (3.4)	49.9 (0.1)	**79.6 (2.2)**	62.2 (5.1)	**77.7 (3.2)**	48.3 (1.1)	51.4 (3.3)	59.3 (2.8)
Olive-sided Flycatcher	81.1 (1.8)	82.8 (4.1)	69.8 (2.6)	89.0 (0.8)	**94.5 (0.4)**	86.5 (1.1)	46.6 (0.1)	65.6 (2.0)	81.6 (1.8)
Hermit Thrush	50.6 (6.8)	**58.7 (5.0)**	50.0 (0.0)	**70.8 (6.3)**	44.7 (2.2)	**71.9 (5.4)**	55.1 (5.1)	**57.7 (4.9)**	**68.4 (3.2)**
Chestnut-backed Chickadee	**86.2 (2.1)**	82.7 (2.0)	77.4 (2.1)	**89.2 (1.6)**	**89.4 (2.3)**	**89.5 (1.2)**	**83.9 (2.6)**	71.8 (1.4)	**88.3 (2.0)**
Varied Thrush	96.7 (0.6)	47.3 (10.7)	**96.5 (1.2)**	96.3 (1.2)	**99.1 (0.5)**	95.6 (1.5)	85.3 (2.4)	92.0 (1.6)	92.1 (1.1)
Hermit Warbler	76.3 (3.9)	76.4 (2.0)	79.6 (4.1)	**90.9 (0.9)**	74.6 (2.4)	**89.2 (1.7)**	55.6 (3.4)	67.0 (4.5)	75.8 (2.8)
Swainson Thrush	**86.6 (2.1)**	**88.6 (1.8)**	66.6 (3.2)	85.1 (1.5)	**90.3 (1.9)**	**90.7 (1.1)**	44.7 (1.8)	76.0 (1.7)	81.1 (1.8)
Hammonds Flycatcher	96.0 (0.5)	94.8 (0.4)	94.3 (0.9)	97.0 (0.3)	90.9 (1.0)	**98.4 (0.2)**	92.4 (0.7)	71.4 (1.8)	90.5 (0.4)
Western Tanager	91.3 (1.5)	**92.1 (2.2)**	58.1 (3.5)	**92.9 (2.7)**	**96.1 (1.3)**	**95.0 (1.7)**	62.9 (5.1)	82.7 (2.6)	51.8 (1.5)
Newsgroups:									
alt.atheism	**96.5 (1.8)**	**94.5 (3.1)**	49.8 (1.9)	64.5 (2.5)	17.3 (3.6)	**93.0 (2.9)**	54.1 (1.5)	60.4 (2.5)	**92.4 (2.3)**
comp.graphics	**89.3 (1.6)**	**87.4 (3.6)**	46.1 (2.9)	58.9 (4.0)	9.5 (2.7)	**88.9 (3.8)**	52.1 (1.1)	43.4 (2.4)	**87.4 (2.4)**
comp.os.ms-windows.misc	**81.8 (4.2)**	**85.5 (2.6)**	43.4 (2.2)	64.7 (3.5)	32.9 (5.5)	**91.4 (2.6)**	50.0 (0.0)	56.8 (3.0)	77.7 (4.1)
comp.sys.ibm.pc.hardware	**91.5 (2.7)**	**88.9 (4.0)**	46.1 (2.8)	60.4 (4.3)	15.7 (3.4)	**92.9 (2.9)**	51.3 (0.9)	50.6 (2.2)	**87.5 (2.2)**
comp.sys.mac.hardware	**84.7 (3.2)**	**90.2 (4.0)**	42.1 (3.8)	58.0 (4.5)	21.4 (5.0)	**91.5 (3.4)**	51.9 (1.0)	55.3 (2.1)	**85.3 (2.9)**
comp.windows.x	**93.5 (2.1)**	**94.0 (2.9)**	49.8 (2.1)	69.2 (2.8)	22.7 (3.2)	**97.1 (1.1)**	60.8 (3.1)	53.0 (5.2)	92.1 (2.1)
misc.forsale	**89.8 (3.9)**	**90.5 (2.5)**	51.9 (2.7)	58.6 (2.8)	34.8 (8.7)	**92.1 (3.3)**	55.3 (2.0)	68.7 (3.6)	76.0 (2.8)
rec.autos	76.1 (7.4)	**97.3 (1.1)**	41.0 (3.7)	55.7 (4.6)	19.0 (6.4)	73.7 (9.5)	52.2 (1.2)	46.8 (3.3)	84.3 (3.5)
rec.motorcycles	**92.0 (3.8)**	**97.8 (1.2)**	52.0 (2.3)	73.0 (2.2)	27.2 (5.2)	88.4 (3.6)	51.4 (1.4)	61.3 (2.9)	90.0 (3.0)
rec.sport.baseball	**91.4 (3.5)**	**97.6 (1.3)**	46.2 (2.3)	60.0 (3.2)	19.3 (4.6)	78.1 (5.2)	52.8 (1.2)	48.0 (1.9)	88.8 (2.1)
rec.sport.hockey	71.6 (9.5)	**99.0 (0.4)**	37.6 (2.7)	59.4 (5.6)	25.6 (6.6)	67.2 (8.2)	83.2 (4.3)	44.5 (4.0)	93.8 (1.8)
sci.crypt	**96.3 (2.0)**	**98.1 (1.3)**	51.8 (2.1)	64.6 (4.6)	63.4 (6.4)	**98.7 (0.5)**	62.3 (2.6)	70.9 (3.0)	**91.9 (3.8)**
sci.electronics	**94.7 (2.3)**	**96.5 (2.0)**	46.0 (2.9)	58.3 (3.9)	7.6 (3.0)	**96.2 (2.1)**	52.2 (1.2)	37.7 (2.2)	**93.8 (1.4)**
sci.med	**90.9 (4.0)**	**92.7 (2.3)**	49.3 (3.2)	60.8 (3.6)	24.9 (5.4)	**89.5 (4.2)**	53.0 (1.2)	53.4 (2.5)	**89.3 (2.8)**
sci.space	77.1 (5.7)	**97.2 (0.8)**	43.4 (3.1)	63.9 (2.8)	29.4 (6.7)	72.6 (3.9)	53.5 (1.6)	62.2 (4.5)	90.8 (2.3)
soc.religion.christian	**88.7 (6.9)**	**95.1 (2.8)**	54.0 (2.3)	66.4 (3.2)	39.1 (8.2)	83.9 (4.5)	59.6 (1.7)	62.7 (2.5)	**87.2 (3.7)**
talk.politics.guns	**97.6 (0.8)**	**97.1 (1.2)**	46.7 (2.0)	60.8 (1.6)	34.6 (7.5)	**96.2 (2.1)**	53.8 (1.3)	55.6 (3.6)	**92.5 (2.6)**
talk.politics.mideast	**96.7 (2.0)**	**95.4 (3.0)**	52.2 (1.6)	71.3 (3.0)	44.5 (5.2)	**97.3 (1.8)**	78.7 (2.8)	62.3 (3.2)	**92.9 (1.8)**
talk.politics.misc	**93.4 (2.2)**	**93.9 (2.1)**	53.5 (1.5)	67.6 (3.1)	12.3 (5.4)	**95.9 (1.9)**	58.5 (2.2)	64.8 (2.7)	**91.3 (2.5)**
talk.religion.misc	72.1 (6.6)	**93.7 (1.9)**	49.5 (2.8)	59.1 (4.6)	23.3 (4.0)	68.7 (5.9)	52.4 (1.3)	57.6 (2.7)	**87.2 (4.0)**
TOTAL WINS	45	24	2	9	9	46	4	1	17

Table 4: Results from the 16 reference methods on the Musk and Tiger/Elephant/Fox data sets.

	Accuracy (%)					AUC (×100)				
Method	Musk1	Musk2	Tiger	Elephant	Fox	Musk1	Musk2	Tiger	Elephant	Fox
BoW-SVM	64.2 (3.8)	60.5 (4.3)	57.7 (2.2)	58.2 (2.5)	49.6 (3.3)	65.1 (5.6)	55.9 (6.4)	61.3 (2.9)	63.5 (2.4)	50.0 (3.7)
C-kNN	82.9 (2.0)	76.0 (3.2)	79.6 (2.0)	80.9 (1.1)	61.0 (3.0)	93.5 (0.6)	86.3 (1.5)	85.9 (1.6)	88.3 (1.0)	65.9 (4.4)
CCE	79.2 (3.0)	69.9 (3.7)	74.0 (1.6)	67.8 (2.3)	52.3 (1.9)	86.0 (2.4)	76.3 (2.9)	81.2 (0.8)	74.6 (1.8)	54.2 (2.5)
EM-DD	83.9 (1.3)	85.7 (1.7)	71.0 (2.3)	79.2 (0.9)	62.9 (2.8)	87.4 (3.8)	79.3 (5.4)	76.5 (1.9)	87.5 (1.6)	66.2 (2.8)
EMD-kernel	87.0 (2.0)	90.7 (1.1)	85.2 (1.4)	88.3 (1.2)	63.2 (1.6)	95.2 (2.0)	97.5 (1.2)	92.6 (0.8)	95.0 (0.8)	68.0 (1.5)
mi-SVM	85.5 (0.9)	79.9 (2.0)	72.6 (1.1)	74.8 (1.1)	62.2 (2.7)	94.5 (2.0)	92.6 (1.2)	84.8 (1.0)	92.2 (1.1)	64.3 (2.7)
MI-SVM	85.1 (2.6)	80.5 (2.5)	82.2 (1.9)	80.3 (1.5)	61.4 (2.4)	94.2 (1.2)	94.5 (1.8)	90.2 (0.9)	89.3 (1.8)	68.2 (2.5)
miGraph	86.4 (2.1)	75.0 (1.7)	75.5 (1.3)	81.1 (1.0)	61.0 (2.3)	86.9 (3.0)	77.5 (1.8)	81.5 (1.7)	88.2 (0.6)	62.6 (2.8)
MILBoost	56.5 (3.9)	61.4 (7.8)	76.1 (4.7)	75.8 (3.3)	51.0 (0.8)	54.5 (9.2)	67.5 (7.9)	87.3 (2.6)	88.9 (2.7)	63.0 (4.4)
MILES	84.7 (2.4)	87.6 (2.4)	83.4 (2.2)	79.5 (2.0)	68.2 (2.2)	93.9 (1.5)	94.4 (1.5)	89.3 (1.6)	88.2 (1.8)	73.9 (3.5)
MInd	90.1 (1.1)	92.4 (1.3)	82.0 (1.3)	86.8 (1.7)	63.1 (1.5)	95.6 (0.8)	96.3 (0.9)	87.8 (1.3)	92.1 (0.9)	66.9 (1.0)
NSK-SVM	85.2 (2.7)	76.8 (3.9)	74.0 (1.1)	79.0 (1.0)	57.4 (3.1)	91.9 (1.8)	75.1 (5.2)	79.7 (1.4)	85.3 (1.2)	63.4 (1.7)
RSIS-EoSVM	88.4 (1.7)	86.2 (1.7)	82.5 (1.3)	84.6 (0.6)	61.1 (1.8)	92.3 (1.3)	90.4 (3.2)	88.8 (0.9)	90.8 (0.8)	68.2 (1.8)
SI-SVM	85.8 (1.2)	80.7 (1.4)	73.2 (1.4)	73.3 (1.4)	61.8 (1.3)	93.2 (1.8)	93.0 (1.3)	86.4 (1.0)	92.6 (0.5)	67.3 (2.5)
SI-SVM-TH	87.3 (1.9)	85.4 (2.8)	79.6 (2.2)	84.3 (1.4)	62.2 (2.2)	92.4 (1.4)	90.9 (1.7)	86.2 (1.6)	91.1 (0.8)	68.0 (2.2)
SI-kNN	77.7 (1.7)	69.0 (1.9)	69.8 (2.0)	65.6 (1.4)	52.9 (0.7)	90.8 (1.7)	84.4 (2.1)	83.3 (1.3)	89.2 (1.3)	63.3 (1.6)