

Supplementary Material – Learning from the Mistakes of Others: Matching Errors in Cross-Dataset Learning

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1. Learning from the mistakes in 3D models

	SVM Images	SVM Combined	SVM [2] Adaptive	SVM (ours) MMD
airplane v. backpack	98.87 ± 0.05	98.63 ± 0.05	98.18 ± 0.22	98.93 ± 0.03
airplane v. bicycle	97.22 ± 0.14	97.20 ± 0.15	96.99 ± 0.22	97.44 ± 0.13
airplane v. boat	92.97 ± 0.27	92.73 ± 0.25	93.06 ± 0.15	93.74 ± 0.16
airplane v. car	95.62 ± 0.13	95.58 ± 0.11	95.40 ± 0.11	95.84 ± 0.10
airplane v. chair	96.74 ± 0.15	96.80 ± 0.14	96.89 ± 0.10	96.72 ± 0.17
airplane v. couch	98.24 ± 0.09	98.05 ± 0.09	97.73 ± 0.15	98.45 ± 0.07
airplane v. helicopter	81.86 ± 0.43	83.38 ± 0.34	83.53 ± 0.39	81.99 ± 0.46
airplane v. laptop	98.64 ± 0.07	98.34 ± 0.07	98.15 ± 0.12	98.72 ± 0.06
backpack v. bicycle	97.76 ± 0.05	97.67 ± 0.07	97.52 ± 0.11	97.86 ± 0.06
backpack v. boat	98.22 ± 0.08	98.00 ± 0.07	97.64 ± 0.15	98.25 ± 0.07
backpack v. car	97.33 ± 0.08	96.51 ± 0.10	96.31 ± 0.17	97.47 ± 0.07
backpack v. chair	94.44 ± 0.24	93.92 ± 0.18	94.36 ± 0.14	94.26 ± 0.23
backpack v. couch	95.94 ± 0.13	95.62 ± 0.14	95.53 ± 0.22	96.10 ± 0.10
backpack v. helicopter	98.72 ± 0.05	98.37 ± 0.07	98.26 ± 0.12	98.72 ± 0.03
backpack v. laptop	96.51 ± 0.16	96.32 ± 0.10	96.28 ± 0.13	96.63 ± 0.11
bicycle v. boat	96.64 ± 0.12	96.77 ± 0.11	96.74 ± 0.10	96.77 ± 0.10
bicycle v. car	96.69 ± 0.13	96.68 ± 0.13	96.48 ± 0.10	97.06 ± 0.08
bicycle v. chair	94.43 ± 0.14	94.64 ± 0.15	94.86 ± 0.14	94.72 ± 0.15
bicycle v. couch	98.16 ± 0.11	98.09 ± 0.11	97.89 ± 0.14	98.42 ± 0.07
bicycle v. helicopter	96.08 ± 0.15	96.19 ± 0.11	96.03 ± 0.18	96.11 ± 0.15
bicycle v. laptop	98.30 ± 0.07	98.15 ± 0.07	97.95 ± 0.19	98.34 ± 0.05
boat v. car	94.00 ± 0.12	94.07 ± 0.16	93.91 ± 0.17	94.27 ± 0.12
boat v. chair	94.20 ± 0.15	94.31 ± 0.10	94.63 ± 0.10	94.48 ± 0.15
boat v. couch	97.00 ± 0.10	96.89 ± 0.11	96.71 ± 0.14	97.16 ± 0.07
boat v. helicopter	92.52 ± 0.26	91.87 ± 0.24	92.07 ± 0.32	92.66 ± 0.26
boat v. laptop	98.05 ± 0.07	97.75 ± 0.12	97.80 ± 0.14	98.11 ± 0.06
car v. chair	95.88 ± 0.12	95.73 ± 0.13	95.99 ± 0.11	96.03 ± 0.13
car v. couch	97.07 ± 0.09	96.70 ± 0.10	96.56 ± 0.16	97.29 ± 0.08
car v. helicopter	94.97 ± 0.16	95.12 ± 0.13	95.02 ± 0.16	95.15 ± 0.14
car v. laptop	96.99 ± 0.08	96.92 ± 0.09	96.76 ± 0.11	97.20 ± 0.07
chair v. couch	86.09 ± 0.31	85.63 ± 0.34	86.31 ± 0.31	86.45 ± 0.27
chair v. helicopter	96.99 ± 0.18	97.17 ± 0.20	97.39 ± 0.16	96.81 ± 0.16
chair v. laptop	93.64 ± 0.25	93.78 ± 0.20	93.86 ± 0.19	94.08 ± 0.20
couch v. helicopter	98.65 ± 0.08	98.45 ± 0.07	98.33 ± 0.12	98.71 ± 0.05
couch v. laptop	93.73 ± 0.19	93.60 ± 0.21	93.56 ± 0.28	93.69 ± 0.22
helicopter v. laptop	98.80 ± 0.05	98.48 ± 0.07	98.41 ± 0.13	98.72 ± 0.05
average accuracy	95.78	95.67	95.64	95.93

Table 1. Learning image classifiers with the mistakes of 3D model classifiers. The best result is highlighted in **boldface** and an extra **blue** for our SVM MMD.

2. Learning from the mistakes in abstract images (instance-level setting)

	SVM Images	SVM Combined	SVM [2] Adaptive	SVM+ [1]	SVM (ours) MMD
carrying	96.79 ± 0.38	95.71 ± 0.55	96.57 ± 0.51	97.00 ± 0.48	97.00 ± 0.36
catching	84.77 ± 0.94	82.16 ± 1.04	82.27 ± 0.96	85.80 ± 0.91	85.91 ± 1.10
pushing	78.55 ± 1.49	77.98 ± 1.21	78.06 ± 1.32	79.27 ± 0.98	79.19 ± 1.17
pulling	69.52 ± 1.16	65.73 ± 1.33	66.45 ± 1.39	67.58 ± 1.69	66.85 ± 1.62
reaching for	65.08 ± 1.43	68.83 ± 0.95	65.50 ± 0.92	65.08 ± 1.43	68.92 ± 1.49
jumping over	90.67 ± 0.92	91.25 ± 0.85	92.31 ± 0.72	90.29 ± 0.94	90.67 ± 1.02
hitting	84.07 ± 0.88	82.50 ± 0.98	82.41 ± 0.95	83.98 ± 0.91	84.17 ± 0.88
kicking	91.08 ± 0.66	90.92 ± 0.75	90.33 ± 0.93	91.25 ± 0.69	92.33 ± 0.68
elbowing	85.91 ± 1.11	84.77 ± 1.31	85.45 ± 1.15	84.89 ± 1.28	86.02 ± 1.01
tripping	85.53 ± 0.96	85.23 ± 1.05	85.83 ± 0.80	86.29 ± 0.92	86.74 ± 0.88
waving at	68.04 ± 1.44	69.13 ± 1.62	68.48 ± 1.59	68.04 ± 1.54	68.15 ± 1.66
pointing at	73.45 ± 1.63	77.24 ± 1.25	74.14 ± 1.64	73.71 ± 1.10	74.74 ± 1.06
pointing away from	66.62 ± 1.62	65.00 ± 1.53	63.62 ± 1.86	65.88 ± 1.72	68.50 ± 1.97
looking at	64.44 ± 1.32	65.48 ± 1.29	64.03 ± 1.05	66.69 ± 0.95	66.45 ± 1.05
looking away from	69.22 ± 1.01	69.45 ± 1.17	68.52 ± 1.07	71.64 ± 1.13	73.05 ± 0.96
laughing at	71.95 ± 1.14	71.56 ± 1.63	72.19 ± 1.37	73.05 ± 1.14	74.30 ± 0.95
laughing with	81.77 ± 1.37	81.35 ± 1.42	80.94 ± 1.24	80.73 ± 1.21	79.38 ± 1.20
hugging	87.19 ± 1.04	87.97 ± 0.95	87.27 ± 0.83	87.89 ± 1.12	87.97 ± 0.97
wrestling with	90.68 ± 0.70	89.55 ± 0.65	91.02 ± 0.84	90.91 ± 0.70	90.45 ± 0.61
dancing with	83.53 ± 0.75	83.46 ± 0.94	82.87 ± 1.05	83.53 ± 0.69	84.41 ± 0.60
holding hand with	85.56 ± 0.98	86.37 ± 0.81	84.52 ± 0.90	86.69 ± 1.08	86.45 ± 0.80
shaking hands with	96.72 ± 0.38	93.36 ± 0.77	94.74 ± 0.74	96.55 ± 0.37	96.55 ± 0.47
talking with	80.00 ± 1.09	77.87 ± 0.87	78.68 ± 1.12	79.34 ± 1.21	81.91 ± 0.91
arguing with	83.97 ± 1.00	85.09 ± 0.83	84.22 ± 0.98	84.74 ± 0.89	85.00 ± 0.75
walking with	92.95 ± 0.77	92.05 ± 0.69	90.11 ± 1.22	93.30 ± 0.69	93.75 ± 0.75
running with	90.75 ± 0.79	90.25 ± 0.70	88.92 ± 0.81	91.25 ± 0.88	91.08 ± 0.64
crawling with	83.57 ± 1.54	83.69 ± 1.30	84.05 ± 1.46	82.50 ± 1.36	84.76 ± 1.51
jumping with	82.88 ± 1.45	81.54 ± 1.48	81.54 ± 1.23	81.54 ± 1.58	82.88 ± 1.40
walking to	80.09 ± 1.00	80.00 ± 1.33	77.77 ± 1.28	80.09 ± 1.17	81.52 ± 0.92
running to	77.03 ± 1.00	78.12 ± 0.98	76.48 ± 1.17	77.66 ± 1.23	77.66 ± 1.03
crawling to	80.80 ± 0.94	76.96 ± 1.18	77.68 ± 1.28	82.50 ± 0.85	82.41 ± 0.79
jumping to	81.21 ± 0.92	81.03 ± 0.92	81.38 ± 0.95	81.38 ± 1.11	81.81 ± 1.04
walking away from	77.18 ± 1.12	76.05 ± 1.35	74.19 ± 1.12	78.15 ± 1.10	77.98 ± 0.97
running away from	85.89 ± 0.85	83.12 ± 1.55	82.68 ± 1.15	85.54 ± 0.75	85.71 ± 0.92
crawling away from	77.61 ± 0.97	75.11 ± 1.52	75.68 ± 1.37	77.84 ± 1.12	80.11 ± 0.91
jumping away from	83.91 ± 0.83	80.23 ± 1.02	82.34 ± 0.84	84.30 ± 0.87	85.23 ± 0.93
walking after	84.20 ± 0.97	84.10 ± 0.98	82.80 ± 1.22	85.10 ± 1.00	86.50 ± 0.85
running after	81.44 ± 1.07	82.12 ± 1.17	80.53 ± 1.05	82.35 ± 1.14	83.56 ± 0.81
crawling after	85.24 ± 1.16	85.36 ± 1.23	84.88 ± 1.06	86.31 ± 1.14	85.12 ± 1.18
jumping after	83.50 ± 0.79	84.58 ± 0.89	83.92 ± 0.73	84.17 ± 1.03	85.58 ± 0.68
walking past	80.07 ± 0.89	76.91 ± 1.12	75.51 ± 1.06	80.00 ± 1.01	80.59 ± 1.05
running past	74.22 ± 1.08	75.00 ± 1.01	74.61 ± 1.07	74.22 ± 1.05	75.62 ± 0.81
crawling past	77.86 ± 1.35	77.50 ± 1.10	76.90 ± 1.36	77.74 ± 1.33	78.10 ± 0.95
jumping past	77.96 ± 1.57	75.46 ± 1.61	76.67 ± 1.64	78.24 ± 1.57	78.61 ± 1.50
standing next to	85.33 ± 0.96	85.11 ± 1.07	83.15 ± 1.06	84.24 ± 0.99	86.63 ± 1.03
sitting next to	82.97 ± 1.04	82.50 ± 1.07	82.66 ± 1.02	83.59 ± 1.13	83.98 ± 1.07
lying next to	70.43 ± 1.50	74.83 ± 0.99	71.64 ± 0.84	73.19 ± 1.16	74.66 ± 1.05
crouching next to	79.22 ± 1.38	76.72 ± 1.52	75.62 ± 1.26	80.00 ± 1.05	80.62 ± 0.93
standing in front of	71.43 ± 0.97	69.57 ± 1.11	69.86 ± 1.53	71.00 ± 1.17	71.43 ± 0.92
sitting in front of	77.35 ± 0.98	77.20 ± 1.06	76.97 ± 0.94	78.41 ± 1.02	78.64 ± 1.08
lying in front of	81.64 ± 0.97	80.26 ± 1.42	80.86 ± 1.07	82.07 ± 1.01	81.64 ± 1.10
crouching in front of	86.59 ± 0.96	79.55 ± 1.53	82.50 ± 1.29	86.36 ± 1.02	86.70 ± 1.16
standing behind	70.86 ± 1.41	68.19 ± 1.44	69.74 ± 1.08	72.07 ± 1.38	72.33 ± 1.11
sitting behind	88.63 ± 0.63	87.18 ± 0.68	86.45 ± 0.69	88.63 ± 0.50	88.87 ± 0.61
lying behind	81.82 ± 0.97	83.33 ± 1.15	83.11 ± 0.91	82.80 ± 0.81	83.33 ± 1.10
crouching behind	77.13 ± 0.73	75.46 ± 1.01	74.44 ± 1.18	77.13 ± 0.66	78.15 ± 0.61
standing with	77.58 ± 1.15	79.60 ± 1.36	76.21 ± 1.28	78.55 ± 0.95	80.48 ± 1.24
sitting with	81.07 ± 1.07	80.71 ± 1.43	77.98 ± 1.19	79.76 ± 1.10	80.36 ± 1.18
lying with	69.67 ± 1.30	71.58 ± 1.35	69.83 ± 1.48	71.67 ± 1.33	71.42 ± 1.31
crouching with	81.52 ± 1.16	82.72 ± 1.05	81.30 ± 1.02	81.30 ± 0.99	81.74 ± 1.17
avg. acc.	80.61	80.03	79.52	80.93	81.58

Table 2. Learning image classifiers with the mistakes of clip art classifiers (**instance-level setting**). In this setting of cross-dataset learning, we pair one clip art illustration with each training image as privileged information. The best result is highlighted in **boldface** with an extra **blue** for our SVM MMD.

References

- [1] V. Vapnik and A. Vashist. A new learning paradigm: Learning using privileged information. *Neural Networks*, pages 544–557, 2009. [2](#)
- [2] J. Yang, R. Yan, and A. G. Hauptmann. Cross-domain video concept detection using adaptive SVMs. In *ACM MM*, 2007. [1](#), [2](#)