

Table S1. Round-1 performance comparison among models (AlexNet, ResNet-50, MobileNet, and EfficientNet) that were trained on 90% Base and tested on samples with decreasing similarities (Level 1, Inbox, Outbox) for both 2-class and 3-class classifications.

Round 1		2 – Classes			3 – Classes		
Network	(%)	Level 1	Inbox	Outbox	Level 1	Inbox	Outbox
AlexNet	Accuracy	100	98.88	58.49	99.24	83.52	47.07
	AUC	100	99.89	63.86	100	100	59.63
	Specificity	100	99.17	60.61	98.90	76.11	32.83
	Sensitivity	100	98.28	55.16	100	98.85	69.44
	Precision	100	98.28	47.12	97.62	66.67	39.68
ResNet – 50	Accuracy	100	99.63	65.12	99.24	82.77	60.65
	AUC	100	100	75.10	100	99.98	84.06
	Specificity	100	100	73.74	98.90	74.44	43.69
	Sensitivity	100	98.85	51.59	100	100	87.30
	Precision	100	100	55.56	97.62	65.41	49.66
MobileNet	Accuracy	99.24	96.63	60.19	97.73	73.40	45.8
	AUC	99.76	99.68	67.58	100	99.02	70.53
	Specificity	100	99.44	51.26	96.70	65.28	26.26
	Sensitivity	97.56	90.80	74.21	100	90.23	76.59
	Precision	100	98.75	49.21	93.18	55.67	39.79
EfficientNet	Accuracy	96.97	91.20	61.27	90.15	70.22	41.98
	AUC	100	95.98	67.12	99.57	96.12	66.38
	Specificity	100	97.22	61.87	89.01	63.06	29.55
	Sensitivity	90.24	78.74	60.32	92.68	85.06	61.51
	Precision	100	93.20	50.17	79.17	52.67	35.71

Table S2. Round-2 performance comparison among models (AlexNet, ResNet-50, MobileNet, and EfficientNet) that were trained on (90% Base plus Th1, Th2) and tested on samples with decreasing similarities (Level 1, Inbox, Outbox) for both 2-class and 3-class classifications.

Round 2		2 – Classes			3 – Classes		
Network	(%)	Level 1	Inbox	Outbox	Level 1	Inbox	Outbox
AlexNet	Accuracy	98.60	98.69	68.06	99.30	80.15	54.01
	AUC	99.98	99.94	79.55	100	99.97	78.42
	Specificity	98.90	99.17	61.36	98.90	71.67	35.10
	Sensitivity	98.08	97.70	78.57	100	97.70	83.73
	Precision	98.08	98.27	56.41	98.11	62.50	45.09
ResNet – 50	Accuracy	99.30	99.44	65.90	100	91.01	58.18
	AUC	100	99.99	84.50	100	99.99	82.13
	Specificity	98.90	100	53.54	100	86.67	44.70
	Sensitivity	100	98.28	85.32	100	100	79.37
	Precision	98.11	100	53.88	100	78.38	47.73
MobileNet	Accuracy	97.90	95.88	71.14	95.10	77.34	54.48
	AUC	99.89	99.33	83.96	100	99.40	79.35
	Specificity	98.90	99.44	62.12	92.31	68.33	36.11
	Sensitivity	96.15	88.51	85.32	100	95.98	83.33
	Precision	98.04	98.72	58.90	88.14	59.43	45.36
EfficientNet	Accuracy	97.90	93.07	61.88	93.0	68.73	56.33
	AUC	99.87	98.19	71.12	99.81	97.06	77.21
	Specificity	97.80	96.94	58.08	91.21	61.39	48.48
	Sensitivity	98.81	85.06	67.86	96.15	83.91	68.65
	Precision	96.23	93.08	50.74	86.21	51.23	45.89

Table S3. Round-3A performance comparison among models (AlexNet, ResNet-50, MobileNet, and EfficientNet) that were trained on (90% Base, Th1,2, and 25% Outbox) and tested on samples with decreasing similarities (Level 1, Inbox, Outbox) for both 2-class and 3-class classifications.

Round 3A		2 – Classes			3 – Classes		
Network	(%)	Level 1	Inbox	Outbox	Level 1	Inbox	Outbox
AlexNet	Accuracy	98.73	98.13	97.38	98.09	85.77	93.06
	AUC	99.95	99.96	99.61	98.90	99.97	98.84
	Specificity	100	100	98.48	98.99	80.56	91.67
	Sensitivity	96.55	94.25	95.63	96.55	96.55	95.24
	Precision	100	100	97.57	98.25	70.59	87.91
ResNet – 50	Accuracy	99.36	99.63	97.84	97.45	84.83	95.06
	AUC	99.69	100.	99.51	99.95	99.96	98.69
	Specificity	100	100	100	96.97	78.33	96.21
	Sensitivity	98.28	98.85	94.44	98.28	98.28	93.25
	Precision	100	100	100	95.00	68.67	94.00
MobileNet	Accuracy	98.10	97.57	94.14	94.27	78.28	87.35
	AUC	99.81	99.57	98.61	99.53	99.49	98.59
	Specificity	100	99.72	94.70	94.95	71.39	83.84
	Sensitivity	83	93.10	93.25	93.10	92.53	92.86
	Precision	100	99.39	91.80	91.53	60.98	78.52
EfficientNet	Accuracy	93.63	90.64	87.50	84.18	68.73	80.09
	AUC	98.87	96.16	95.39	99.37	97.61	95.99
	Specificity	93.94	95.28	84.85	83.84	61.67	80.05
	Sensitivity	93.10	81.03	91.67	84.48	83.33	80.16
	Precision	90.00	89.24	79.38	75.39	51.24	71.89

Table 4. Round-3B performance comparison among models (AlexNet, ResNet-50, MobileNet, and EfficientNet) that were trained on (90% Base, Th1,2, and 50% Outbox) and tested on samples with decreasing similarities (Level 1, Inbox, Outbox) for both 2-class and 3-class classifications.

Round 3B		2 – Classes			3 – Classes		
Network	(%)	Level 1	Inbox	Outbox	Level 1	Inbox	Outbox
AlexNet	Accuracy	99.36	97.75	99.07	92.99	78.46	94.14
	AUC	99.97	99.98	99.88	99.13	99.87	99.48
	Specificity	100	100	99.49	89.90	71.11	91.92
	Sensitivity	98.28	93.10	98.41	98.28	93.68	97.62
	Precision	100	100	99.20	85.07	61.05	88.49
ResNet – 50	Accuracy	100	97.94	99.85	99.36	88.20	97.38
	AUC	100	99.97	100	100	99.99	99.98
	Specificity	100	100	100	98.99	83.28	95.96
	Sensitivity	100	93.68	99.60	100	98.28	99.60
	Precision	100	100	100	98.31	74.03	94.01
MobileNet	Accuracy	98.73	95.69	98.15	99.24	76.78	95.06
	AUC	99.81	99.36	99.75	99.76	97.81	99.91
	Specificity	98.99	98.61	98.23	100	72.22	93.18
	Sensitivity	98.28	89.66	98.02	97.56	86.21	98.02
	Precision	98.28	96.89	97.24	100	60.00	90.15
EfficientNet	Accuracy	96.18	91.76	95.68	89.81	68.35	90.28
	AUC	99.41	95.48	99.22	99.10	96.08	99.39
	Specificity	97.98	96.67	96.97	86.87	60.56	87.63
	Sensitivity	93.10	81.61	93.65	94.83	84.48	94.44
	Precision	96.43	92.21	95.16	80.88	50.87	82.93

Table 5. Round-3C performance comparison among models (AlexNet, ResNet-50, MobileNet, and EfficientNet) that were trained on (90% Base, Th1,2, and 75% Outbox) and tested on samples with decreasing similarities (Level 1, Inbox, Outbox) for both 2-class and 3-class classifications.

Round 3C		2 – Classes			3 – Classes		
Network	(%)	Level 1	Inbox	Outbox	Level 1	Inbox	Outbox
AlexNet	Accuracy	99.36	98.50	99.69	100	87.27	98.46
	AUC	100	99.96	100	100	99.97	100
	Specificity	100	99.72	99.49	100	82.22	97.73
	Sensitivity	98.28	95.98	100	100	97.70	99.60
	Precision	100	99.40	99.21	100	72.65	96.54
ResNet – 50	Accuracy	99.36	98.69	98.77	98.73	84.46	98.92
	AUC	100	100	99.97	100	99.99	100
	Specificity	100	100	99.24	97.98	79.44	98.23
	Sensitivity	98.28	95.98	98.02	100	94.83	100
	Precision	100	100	98.80	96.67	69.04	97.30
MobileNet	Accuracy	100	95.51	98.30	96.18	75.09	96.91
	AUC	100	99.19	99.91	100	99.64	99.96
	Specificity	100	98.89	98.23	93.94	67.78	95.45
	Sensitivity	100	88.51	98.41	100	90.23	99.21
	Precision	100	97.47	97.25	90.63	57.51	93.28
EfficientNet	Accuracy	98.10	89.14	97.99	89.10	65.92	95.06
	AUC	99.55	95.81	99.93	99.91	95.05	99.94
	Specificity	98.99	97.22	97.98	85.86	59.17	92.68
	Sensitivity	96.55	72.41	98.02	96.52	79.89	98.81
	Precision	98.25	92.65	96.86	80	48.60	89.57