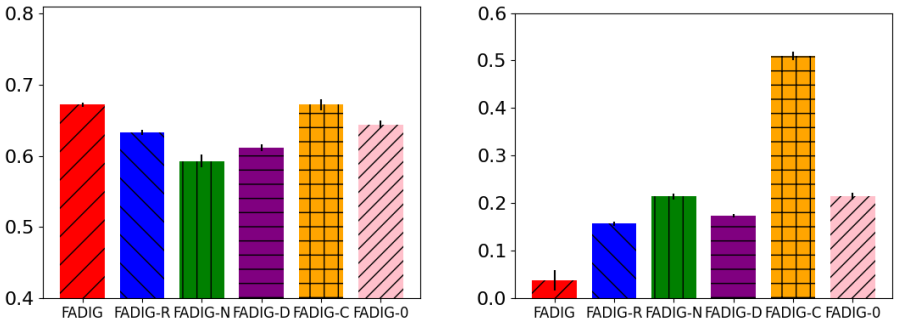
Table 1: Performance on image datasets. The best score is marked in bold. We add a fair autoencoder baseline VFAE as suggested by reviewer bunP.

Methods	MNIST-USPS (K=1200)				MNIST-Invert (K=500)			
	Recall@K	ROCAUC	Rec Diff	Time(s)	Recall@K	ROCAUC	Rec Diff	Time(s)
FairOD	12.35±1.13	50.00±0.28	11.56±0.64	29.57	7.52±0.74	50.40±0.20	8.26±1.27	20.25
DCFOD	12.63±0.33	50.09±0.27	8.99±0.83	710.33	6.95±0.91	50.54±0.54	**7.23±2.02**	1277.31
FairSVDD	15.62±1.52	58.33±1.18	13.75±2.56	768.79	12.41±0.76	49.67±3.98	12.46±2.12	843.12
VFAE	17.43±0.25	50.49±0.38	23.80±0.34	50.07	10.99±0.67	56.15±1.61	10.54±1.74	63.46
MCM	39.75±0.23	78.80±1.02	55.81±0.80	417.09	25.35±0.56	80.96±0.49	80.13±1.41	752.36
NSNMF	39.16±0.84	65.38±0.58	62.90±3.84	28.53	51.79±0.61	74.21±0.34	51.07±1.79	18.97
Recontrast	64.29±3.18	83.46±3.77	41.16±5.63	116.75	64.22±1.60	85.13±5.19	56.50±11.23	117.15
FADIG	**67.19±0.33**	**91.28±0.46**	**3.77±2.18**	121.97	**71.82±0.63**	**97.99±0.07**	9.78±3.10	60.42

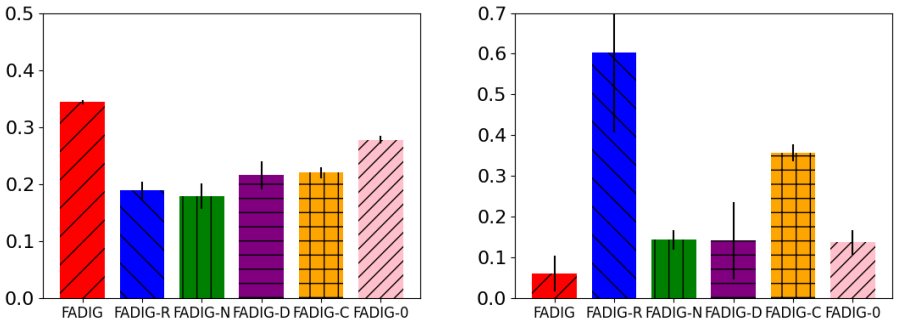
Table 2: Performance on **large** tabular datasets. The best score is marked in bold. We add a fair autoencoder baseline VFAE and a large tabular dataset ACSIncome as suggested by reviewer bunP. For imbalanced anomaly detection setting, we do random sampling in ACSIncome. The resulting dataset has 64794 unprotected samples where 9580 in them are anomalies, and 13778 protected samples where 1222 in them are anomalies. The sensitive attribute is sex and the label is income.

Methods	ACSIncome(K=12000)				CelebA (K=5000)			
	Recall@K	ROCAUC	Rec Diff	Time(s)	Recall@K	ROCAUC	Rec Diff	Time(s)
FairOD	8.43±0.21	46.92±0.21	6.52±1.02	215.67	8.93±0.14	49.94±0.12	**0.68±0.56**	78.92
DCFOD	8.68±0.72	47.04±0.32	9.16±0.84	2106.37	9.66±0.69	49.92±0.14	7.83±1.26	2517.68
FairSVDD	10.37±1.92	57.04±4.58	8.61±1.33	759.30	10.19±0.50	58.40±1.02	10.95±1.93	243.17
VFAE	9.54±0.82	54.41±0.96	12.17±1.48	396.71	8.62±0.07	48.11±0.49	10.00±0.09	45.09
MCM	10.97±0.20	58.05±0.81	13.78±2.21	1143.96	11.03±0.38	46.23±3.46	26.15±9.31	640.12
NSNMF	11.53±0.46	58.91±0.29	19.08±5.46	367.85	10.91±0.54	50.45±0.30	8.04±1.33	1927.55
FADIG	**12.47±0.41**	**60.52±0.59**	**5.47±3.12**	389.05	**11.96±0.49**	**59.43±0.42**	4.72±1.26	48.93



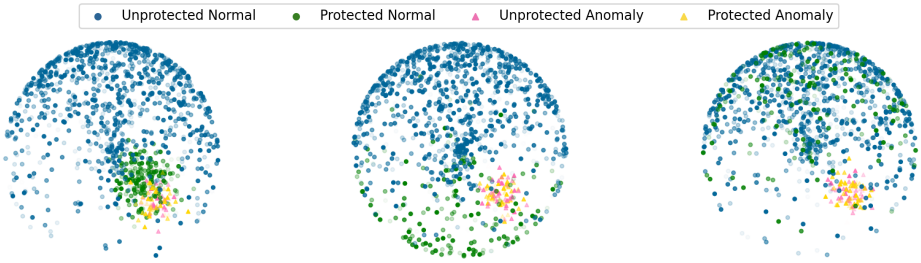
(a) Recall@1200 (b) Recall Difference

Figure 1: **For Reviewer nRHp.** Ablation Study on MNIST-USPS dataset. FADIG-0 is the added baseline by setting $\alpha = 0$.



(a) Recall@350 (b) Recall Difference

Figure 2: **For Reviewer nRHp.** Ablation Study on COMPAS dataset. FADIG-0 is the added baseline by setting $\alpha = 0$.



(a) Failure of AD.

(b) Uniformity without fairness.

(c) FADIG: proper uniformity with fairness.

Figure 3: **For Reviewer u6ig.** Illustrations of uniformity. The blue and green circles denote normal examples from the unprotected group and protected group respectively. The pink and yellow triangles denote anomalies from the unprotected group and protected group respectively. The three subfigures illustrate three different projections from the same data set. With projection (a), many existing AD methods overly flag the examples from the protected groups (green circles) as anomalies (triangles). In projection (b), traditional contrastive regularization methods encourage uniformity but do not consider group fairness. In (c), our FADIG ensures group fairness while maintaining proper uniformity.