TABLE VIII. Comparison of F1-Scores on Additional Datasets. Bold indicates the best performance. Asterisks in the row below STSMOTE denote statistical significance levels compared to all other methods (Holm-corrected Wilcoxon signed-rank test): $^*p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$.

Method	Shellcode ($N = 5$)				Shellcode ($N = 2$)				Bot ($N = 5$)				Bot ($N = 2$)			
	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM
No Aug.	0.0252	0.1090	0.0307	0.1600	0.0012	0.0060	0.0053	0.0292	0.5880	0.6423	0.0725	0.5935	0.2939	0.3069	0.0361	0.2369
RO	0.4323	0.3296	0.3038	0.3364	0.1660	0.0980	0.0615	0.0846	0.8943	0.7712	0.7200	0.8120	0.6064	0.5332	0.5279	0.4930
SMOTE	0.5533	0.4282	0.3260	0.5401	0.2320	0.1410	0.0762	0.2193	0.7977	0.7881	0.7355	0.8037	0.5335	0.5228	0.5152	0.5285
BSMOTE	0.1319	0.1818	0.1030	0.2196	0.0012	0.0060	0.0053	0.0292	0.8091	0.7743	0.6461	0.7664	0.3142	0.3354	0.0719	0.2526
ADASYN	0.5618	0.4501	0.3441	0.5647	0.2342	0.1412	0.0735	0.2232	0.8746	0.7916	0.7444	0.8340	0.5568	0.5107	0.4982	0.5164
CTGAN	0.0428	0.1275	0.1972	0.1870	0.0056	0.0188	0.0284	0.0621	0.6137	0.6959	0.7179	0.6726	0.3594	0.3979	0.4786	0.4392
TVAE	0.2655	0.2666	0.2484	0.1905	0.1217	0.0774	0.0628	0.0787	0.6596	0.7326	0.7755	0.7381	0.4211	0.4606	**0.5394**	0.4659
TabSyn	0.4985	0.3857	0.2959	0.4302	0.1556	0.0980	0.0702	0.0830	0.8727	0.7863	0.7288	0.8049	0.6009	0.5339	0.5130	0.4971
STSMOTE	**0.5821**	**0.5817**	**0.4853**	**0.6081**	**0.2591**	**0.2293**	**0.1757**	**0.2984**	**0.9222**	**0.8649**	**0.8488**	**0.8715**	**0.6403**	**0.5778**	0.5142	**0.5478**
(Sig.)	-	***	***	**	-	***	***	***	***	***	***	***	**	-	-	-

TABLE IX. Comparison of Average Rank on Additional Datasets. Bold indicates the best performance. Asterisks in the row below STSMOTE denote statistical significance levels compared to all other methods (Holm-corrected Wilcoxon signed-rank test): $^*p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$.

Method	Shellcode ($N = 5$)				Shellcode ($N = 2$)				Bot ($N = 5$)				Bot ($N = 2$)				Avg.
	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	
No Aug.	8.20	8.18	8.38	7.70	8.20	8.30	8.22	7.72	8.38	8.46	8.46	7.98	8.18	8.38	8.30	8.22	8.20
RO	5.04	5.52	4.60	5.36	4.18	4.32	4.34	5.70	3.02	5.04	5.98	4.88	2.88	3.00	3.46	5.08	4.53
SMOTE	2.70	2.80	3.92	2.88	2.44	3.08	3.90	2.34	5.22	4.06	4.90	4.48	4.24	4.04	3.98	3.30	3.64
BSMOTE	6.98	7.02	7.22	6.66	8.20	8.30	8.22	7.72	5.10	4.62	5.40	4.22	7.64	7.92	7.94	7.92	6.94
ADASYN	2.18	2.56	3.30	2.28	2.40	2.90	4.28	2.54	3.24	3.66	4.48	3.36	3.84	4.54	4.50	3.44	3.34
CTGAN	7.90	7.80	6.36	7.24	7.60	7.24	6.36	6.66	8.20	7.48	5.40	7.32	7.56	6.16	5.08	5.52	6.87
TVAE	6.20	5.56	5.00	7.08	5.32	5.02	4.02	5.70	7.16	6.26	3.68	6.50	5.82	5.06	**2.96**	4.68	5.38
TabSyn	3.96	4.44	4.78	4.16	4.74	4.52	4.22	5.38	3.38	4.34	5.26	4.74	3.30	3.48	4.54	4.36	4.35
STSMOTE	**1.84**	**1.12**	**1.44**	**1.64**	**1.92**	**1.32**	**1.44**	**1.24**	**1.30**	**1.08**	**1.44**	**1.52**	**1.54**	**2.42**	4.24	**2.48**	**1.75**
(Sig.)	-	***	***	**	-	***	***	***	***	***	***	***	**	-	-	-	

TABLE X. Raw p Value on Additional Datasets.

Method	Shellcode ($N = 5$)				Shellcode ($N = 2$)				Bot ($N = 5$)				Bot ($N = 2$)			
	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM	Cat	XGB	LGB	TabM
No Aug.	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	1.2e-7	6.0e-8	6.0e-8	6.0e-8	1.2e-5	6.0e-8
RO	1.2e-7	6.0e-8	3.3e-6	1.2e-7	2.0e-6	3.0e-7	3.3e-6	6.0e-8	1.4e-4	6.0e-8	1.8e-7	3.0e-7	1.8e-3	2.7e-2	6.3e-1	8.1e-5
SMOTE	3.0e-2	1.8e-7	2.7e-5	3.8e-4	1.2e-1	3.3e-6	8.8e-5	1.5e-5	6.0e-8	1.8e-7	4.2e-7	1.2e-7	3.0e-7	3.9e-3	9.7e-1	6.4e-2
BSMOTE	6.0e-7	1.2e-7	4.2e-7	3.0e-7	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	5.0e-5	1.2e-7	6.0e-8	2.9e-5	1.8e-5
ADASYN	6.3e-2	4.2e-7	8.8e-5	3.8e-3	1.0e-1	4.2e-6	4.5e-5	6.6e-6	6.0e-7	6.0e-8	1.2e-7	1.8e-4	5.2e-6	1.3e-3	5.8e-1	5.7e-2
CTGAN	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	6.0e-8	1.2e-7	2.0e-6	6.0e-8	6.0e-8	1.2e-7	3.0e-1	2.6e-4
TVAE	6.0e-8	6.0e-8	3.0e-7	6.0e-8	6.0e-8	6.0e-8	3.0e-7	6.0e-8	6.0e-8	6.0e-8	1.2e-5	6.0e-8	3.0e-7	8.8e-5	4.1e-1	5.1e-3
TabSyn	1.1e-6	6.0e-8	1.2e-7	1.5e-6	1.2e-7	1.8e-7	2.6e-6	6.0e-8	2.3e-4	6.0e-8	1.2e-7	8.2e-6	3.2e-4	3.3e-2	1.0e-0	8.3e-4