

Table 4: Average ROC-AUC (over 10 random seeds) of 5 different graph embedding methods and 2 different outlier detectors over 5 “X&Non-X” type datasets. Each dataset has 2 down-sampled variants. ‘DC’ stands for downsampled class, which is also outlier class. Cell colored with Red, Green, Yellow represent: performance of both variants are worse than random, both variants are better than random, and performance flip scenario, respectively. Performance flip is widely observed. Among all cases, **67.3%** have performance gap ≥ 0.2 , **52.7%** cases have performance gap ≥ 0.3 , **30.9%** have performance gap ≥ 0.4 .

Methods	DD		PROTEINS		NCI1		Mutagenicity		AIDS	
	DC=0 “X”	DC=1 “Non-X”	DC=0 “X”	DC=1 “Non-X”	DC=0 “Non-X”	DC=1 “X”	DC=0 “X”	DC=1 “Non-X”	DC=0 “X”	DC=1 “Non-X”
WL-LOF	0.186	0.815	0.276	0.664	0.730	0.349	0.460	0.629	0.193	0.950
PK-LOF	0.194	0.824	0.389	0.557	0.678	0.366	0.480	0.613	0.387	0.896
WL-OCSVM	0.179	0.820	0.189	0.794	0.653	0.341	0.500	0.540	0.048	0.972
PK-OCSVM	0.222	0.809	0.244	0.751	0.593	0.429	0.517	0.541	0.175	0.880
OCGIN-5	0.327	0.720	0.370	0.681	0.643	0.467	0.503	0.650	0.200	0.922
Graph2Vec-LOF	0.680	0.362	0.644	0.414	0.594	0.588	0.495	0.616	0.919	0.424
FGSD-LOF	0.628	0.425	0.468	0.422	0.712	0.417	0.458	0.634	0.934	0.290
Graph2Vec-OCSVM	0.631	0.336	0.569	0.466	0.332	0.634	0.492	0.491	0.903	0.035
FGSD-OCSVM	0.384	0.781	0.385	0.711	0.545	0.550	0.366	0.664	0.979	0.743
Graph2Vec-IF	0.656	0.335	0.552	0.449	0.341	0.636	0.446	0.586	0.904	0.035
FGSD-IF	0.745	0.400	0.773	0.272	0.384	0.637	0.476	0.569	0.984	0.018

Table 5: Same configuration as Table 4 but over 5 “X&Y” type datasets. FGSD cannot run over REDDIT datasets. Performance flip is not observed for IMDB dataset across all methods. OCGIN has performance above random across all datasets. Performance flip is still widely observed for other methods. Among all cases, **30.6%** have performance gap ≥ 0.2 , **22.4%** cases have performance gap ≥ 0.3 , **12.2%** have performance gap ≥ 0.4 .

Methods	IMDB-BINARY		ENZYMES(c0&c1)		ENZYMES(c2&c3)		REDDIT-5K(c0&c1)		REDDIT-5K(c2&c3)	
	DC=0	DC=1	DC=0	DC=1	DC=2	DC=3	DC=0	DC=1	DC=2	DC=3
WL-LOF	0.603	0.651	0.518	0.519	0.758	0.399	0.261	0.734	0.189	0.810
PK-LOF	0.624	0.581	0.553	0.550	0.755	0.633	0.485	0.579	0.361	0.640
WL-OCSVM	0.524	0.571	0.598	0.385	0.607	0.462	0.268	0.739	0.180	0.821
PK-OCSVM	0.538	0.548	0.590	0.402	0.456	0.642	0.388	0.696	0.207	0.802
OCGIN-5	0.643	0.508	0.615	0.517	0.587	0.636	0.662	0.622	0.573	0.608
Graph2Vec-LOF	0.534	0.558	0.551	0.354	0.398	0.532	0.376	0.563	0.678	0.323
FGSD-LOF	0.606	0.505	0.644	0.412	0.449	0.608	-	-	-	-
Graph2Vec-OCSVM	0.526	0.551	0.565	0.419	0.492	0.649	0.465	0.528	0.679	0.329
FGSD-OCSVM	0.516	0.586	0.531	0.503	0.523	0.613	-	-	-	-
Graph2Vec-IF	0.516	0.562	0.572	0.346	0.410	0.604	0.505	0.545	0.695	0.326
FGSD-IF	0.522	0.617	0.537	0.456	0.300	0.708	-	-	-	-