

**Table 2.** Overall results across 16 methods for the offline pipeline

Variant	ROC AUC (↑)	Log Loss (↓)	Accuracy (↑)	Precision (↑)	Recall (↑)	SPD (~ 0)	EOD (~ 0)	Rank Perf (↓)	Rank Fair (↓)
<b>rep=0.5   lbl=0.0</b>									
none	<u>0.985</u>	0.193	<b>0.950</b>	<b>0.948</b>	<b>0.929</b>	-0.483	-0.124	3	4
reweight_auto	0.985	0.174	0.944	0.936	<u>0.925</u>	<u>-0.443</u>	<u>-0.069</u>	4	2
reweight_manual_A0.5_B1.5	0.985	<u>0.151</u>	0.940	0.938	0.913	-0.485	-0.141	2	5
mitigator_demographic_parity	0.919	0.377	0.759	0.655	0.860	<b>-0.008</b>	<b>0.063</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.986</b>	<b>0.146</b>	<u>0.945</u>	<u>0.942</u>	0.921	-0.458	-0.089	<b>1</b>	3
<b>rep=0.5   lbl=0.4</b>									
none	<u>0.978</u>	<u>0.302</u>	<b>0.937</b>	<b>0.920</b>	<u>0.918</u>	-0.663	-0.380	2	5
reweight_auto	0.974	0.339	0.925	0.887	<b>0.926</b>	-0.623	<u>-0.272</u>	4	2
reweight_manual_A0.5_B1.5	0.977	0.335	<u>0.930</u>	0.908	0.912	-0.661	-0.344	3	4
mitigator_demographic_parity	0.818	0.606	0.617	0.505	0.803	<b>0.077</b>	<b>0.038</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.979</b>	<b>0.179</b>	0.926	<u>0.918</u>	0.891	<u>-0.622</u>	-0.350	<b>1</b>	3
<b>rep=0.5   lbl=0.5</b>									
none	<u>0.984</u>	<b>0.159</b>	<b>0.943</b>	0.913	<b>0.947</b>	-0.666	-0.288	<b>1</b>	5
reweight_auto	0.981	0.198	0.930	<b>0.951</b>	0.871	<u>-0.604</u>	-0.310	4	3
reweight_manual_A0.5_B1.5	0.982	0.187	<u>0.942</u>	<u>0.948</u>	0.904	-0.641	-0.276	3	4
mitigator_demographic_parity	0.811	0.764	0.660	0.551	0.814	<b>0.000</b>	<b>0.095</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.984</b>	<u>0.160</u>	<u>0.942</u>	0.937	<u>0.916</u>	-0.630	<u>-0.255</u>	2	2
<b>rep=0.5   lbl=0.6</b>									
none	0.974	0.299	0.918	0.901	0.886	-0.682	-0.661	3	5
reweight_auto	0.968	0.345	0.915	0.867	<b>0.924</b>	<u>-0.656</u>	<b>-0.382</b>	4	2
reweight_manual_A0.5_B1.5	<u>0.975</u>	<u>0.253</u>	<u>0.920</u>	<b>0.914</b>	0.878	-0.680	<u>-0.617</u>	2	3
mitigator_demographic_parity	0.785	0.607	0.573	0.386	0.160	<b>0.152</b>	0.647	5	<b>1</b>
mitigator_equalized_odds	<b>0.976</b>	<b>0.200</b>	<b>0.922</b>	<u>0.904</u>	<u>0.895</u>	-0.677	-0.635	<b>1</b>	4
<b>rep=0.6   lbl=0.0</b>									
none	<b>0.980</b>	<b>0.180</b>	0.929	<b>0.925</b>	0.910	-0.429	-0.109	3	3
reweight_auto	0.976	0.252	0.923	0.915	0.908	<u>-0.407</u>	<u>-0.677</u>	4	2
reweight_manual_A0.5_B1.5	0.978	0.184	<b>0.934</b>	<u>0.915</u>	<b>0.934</b>	-0.444	-0.123	2	5
mitigator_demographic_parity	0.920	0.448	0.795	0.702	0.915	<b>-0.031</b>	<b>0.007</b>	5	<b>1</b>
mitigator_equalized_odds	<u>0.980</u>	<u>0.182</u>	<u>0.933</u>	0.915	<u>0.932</u>	-0.436	-0.105	<b>1</b>	4
<b>rep=0.6   lbl=0.4</b>									
none	0.975	<u>0.273</u>	0.917	<b>0.949</b>	0.869	-0.629	-0.553	3	5
reweight_auto	0.972	0.373	<u>0.924</u>	0.919	0.919	<u>-0.620</u>	-0.404	4	3
reweight_manual_A0.5_B1.5	<u>0.975</u>	0.276	0.921	<u>0.942</u>	0.888	-0.636	-0.487	2	4
mitigator_demographic_parity	0.835	0.833	0.699	0.617	<b>0.948</b>	<b>0.019</b>	<b>-0.003</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.979</b>	<b>0.184</b>	<b>0.928</b>	0.913	<u>0.936</u>	-0.643	<u>-0.365</u>	<b>1</b>	2
<b>rep=0.6   lbl=0.5</b>									
none	<u>0.982</u>	<u>0.220</u>	<b>0.939</b>	<u>0.975</u>	0.890	-0.592	<u>-0.430</u>	2	2
reweight_auto	0.976	0.229	0.936	0.964	0.893	-0.592	-0.433	3	3
reweight_manual_A0.5_B1.5	0.982	0.226	0.929	<b>0.982</b>	0.859	<u>-0.582</u>	-0.466	4	4
mitigator_demographic_parity	0.941	0.547	0.689	0.600	<b>0.947</b>	<b>0.081</b>	<b>-0.080</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.983</b>	<b>0.165</b>	<b>0.939</b>	0.950	<u>0.915</u>	-0.614	-0.456	<b>1</b>	5
<b>rep=0.6   lbl=0.6</b>									
none	<u>0.980</u>	<u>0.177</u>	<u>0.938</u>	<u>0.920</u>	0.952	-0.704	<u>-0.520</u>	2	3
reweight_auto	0.977	0.211	0.925	0.896	0.952	<u>-0.683</u>	<u>-0.520</u>	4	2
reweight_manual_A0.5_B1.5	0.979	0.181	0.932	0.901	<u>0.962</u>	-0.729	-0.530	3	5
mitigator_demographic_parity	0.840	0.980	0.678	0.598	<b>0.971</b>	<b>0.016</b>	<b>-0.073</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.982</b>	<b>0.174</b>	<b>0.939</b>	<b>0.920</b>	0.953	-0.705	-0.521	<b>1</b>	4
<b>rep=0.7   lbl=0.0</b>									
none	<u>0.977</u>	0.209	<b>0.934</b>	0.929	0.935	-0.429	-0.144	4	5
reweight_auto	0.976	<u>0.191</u>	0.931	<b>0.939</b>	0.917	<u>-0.421</u>	-0.123	3	3
reweight_manual_A0.5_B1.5	0.976	0.193	0.932	<u>0.934</u>	0.923	-0.425	-0.131	2	4
mitigator_demographic_parity	0.950	0.341	0.830	0.762	<b>0.942</b>	<b>-0.009</b>	<b>-0.007</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.978</b>	<b>0.187</b>	<b>0.934</b>	0.927	<u>0.937</u>	-0.427	<u>-0.110</u>	<b>1</b>	2
<b>rep=0.7   lbl=0.4</b>									
none	0.981	0.194	<b>0.940</b>	<u>0.938</u>	<u>0.949</u>	-0.629	-0.331	2	5
reweight_auto	0.979	<u>0.186</u>	0.935	0.936	0.942	<u>-0.592</u>	<u>-0.288</u>	4	2
reweight_manual_A0.5_B1.5	0.981	0.192	0.937	0.936	0.945	-0.623	-0.326	3	4
mitigator_demographic_parity	0.880	0.760	0.780	0.720	<b>0.954</b>	<b>-0.024</b>	<b>-0.091</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.982</b>	<b>0.169</b>	<b>0.940</b>	<b>0.947</b>	0.939	-0.617	-0.320	<b>1</b>	3
<b>rep=0.7   lbl=0.5</b>									
none	0.978	<b>0.186</b>	0.930	0.908	<u>0.967</u>	-0.654	-0.389	2	3
reweight_auto	0.973	0.231	0.932	<u>0.938</u>	0.934	<u>-0.645</u>	-0.475	4	5
reweight_manual_A0.5_B1.5	0.978	0.190	<u>0.933</u>	<b>0.946</b>	0.927	-0.654	-0.409	3	4
mitigator_demographic_parity	0.951	0.474	0.722	0.662	<b>0.973</b>	<b>0.098</b>	<b>-0.032</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.979</b>	<u>0.188</u>	<b>0.936</b>	0.929	0.952	-0.651	<u>-0.373</u>	<b>1</b>	2
<b>rep=0.7   lbl=0.6</b>									
none	0.979	<u>0.217</u>	0.916	0.904	0.943	-0.678	-0.419	2	4
reweight_auto	0.969	0.264	0.910	0.885	<b>0.955</b>	<u>-0.652</u>	<u>-0.363</u>	4	2
reweight_manual_A0.5_B1.5	<b>0.972</b>	0.236	<b>0.921</b>	<b>0.924</b>	0.928	-0.685	-0.472	3	5
mitigator_demographic_parity	0.848	0.710	0.770	0.716	<u>0.946</u>	<b>-0.078</b>	<b>-0.286</b>	5	<b>1</b>
mitigator_equalized_odds	<u>0.970</u>	<b>0.215</b>	<u>0.917</u>	<u>0.915</u>	0.931	-0.659	-0.407	<b>1</b>	3
<b>rep=0.8   lbl=0.0</b>									
none	0.966	0.551	0.917	0.921	<u>0.918</u>	-0.404	-0.107	5	4
reweight_auto	<u>0.968</u>	0.467	<b>0.924</b>	<b>0.936</b>	0.917	<u>-0.388</u>	<u>-0.106</u>	3	2
reweight_manual_A0.5_B1.5	0.967	0.474	0.918	0.928	0.914	-0.402	-0.127	4	5
mitigator_demographic_parity	0.948	<u>0.346</u>	0.892	0.866	<b>0.938</b>	<b>-0.162</b>	<b>-0.031</b>	2	<b>1</b>
mitigator_equalized_odds	<b>0.970</b>	<b>0.237</b>	<u>0.921</u>	<u>0.930</u>	0.917	-0.397	<u>-0.106</u>	<b>1</b>	3
<b>rep=0.8   lbl=0.4</b>									
none	<b>0.981</b>	<u>0.184</u>	0.941	<u>0.961</u>	0.937	-0.619	-0.412	2	4
reweight_auto	0.975	0.334	0.936	0.952	0.939	<u>-0.595</u>	-0.346	4	3
reweight_manual_A0.5_B1.5	0.980	0.264	<u>0.946</u>	<b>0.963</b>	0.945	-0.645	-0.489	3	5
mitigator_demographic_parity	0.872	0.587	0.831	0.794	<b>0.962</b>	<b>-0.006</b>	<b>-0.165</b>	5	<b>1</b>
mitigator_equalized_odds	0.980	<b>0.167</b>	<b>0.948</b>	0.951	<u>0.960</u>	-0.607	<u>-0.232</u>	<b>1</b>	2
<b>rep=0.8   lbl=0.5</b>									
none	<b>0.978</b>	<u>0.195</u>	<b>0.944</b>	0.942	<u>0.963</u>	-0.669	-0.750	2	5
reweight_auto	0.974	0.275	0.930	<u>0.948</u>	0.931	-0.651	-0.718	4	3
reweight_manual_A0.5_B1.5	0.975	0.205	0.939	<b>0.953</b>	0.942	-0.682	-0.729	3	4
mitigator_demographic_parity	0.885	0.536	0.828	0.789	<b>0.964</b>	<b>-0.044</b>	<b>-0.076</b>	5	<b>1</b>
mitigator_equalized_odds	<u>0.978</u>	<b>0.178</b>	<u>0.942</u>	0.941	0.961	<u>-0.648</u>	<u>-0.524</u>	<b>1</b>	2
<b>rep=0.8   lbl=0.6</b>									
none	0.971	0.227	<u>0.926</u>	<u>0.922</u>	0.959	-0.679	-0.686	2	5
reweight_auto	0.971	0.219	0.909	0.882	<b>0.981</b>	<u>-0.591</u>	<u>-0.418</u>	4	2
reweight_manual_A0.5_B1.5	<u>0.972</u>	<u>0.207</u>	<b>0.926</b>	<b>0.930</b>	0.951	-0.672	-0.605	<b>1</b>	4
mitigator_demographic_parity	0.922	0.427	0.828	0.796	<u>0.964</u>	<b>-0.082</b>	<b>-0.109</b>	5	<b>1</b>
mitigator_equalized_odds	<b>0.972</b>	<b>0.204</b>	0.916	0.915	0.951	-0.630	-0.532	3	3