

Probabilistic combination of classification rules and its application to medical diagnosis

Electronic Supplementary Material

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Appendix: Detailed results of the experiments

Table A1: Detailed test results for **CSR** vs. the considered methods for *Gmean* on benchmark datasets.

Dataset	CSR	AB	BAG	SBAG	SBoost	CSVM	C45	NN	NB	RIPPER	IR	CFAR	SGERD	ART
abalone19	0.697	0.000	0.000	0.386	0.176	0.763	0.424	0.395	0.000	0.304	0.000	0.000	0.000	0.000
abalone9-18	0.729	0.585	0.528	0.733	0.767	0.876	0.612	0.704	0.516	0.757	0.403	0.000	0.000	0.372
car-2class	0.967	0.977	0.955	0.949	0.982	0.822	0.961	0.748	0.917	0.953	0.667	0.000	0.667	0.961
ecoli-0-1-3-7vs2-6	0.842	0.844	0.653	0.825	0.833	0.845	0.826	0.721	0.653	0.830	0.000	0.844	0.841	0.647
ecoli-0vs1	0.977	0.973	0.983	0.977	0.973	0.967	0.983	0.983	0.977	0.970	0.974	0.964	0.980	0.967
ecoli1	0.897	0.835	0.824	0.901	0.894	0.903	0.911	0.824	0.857	0.878	0.829	0.702	0.360	0.844
ecoli2	0.896	0.854	0.865	0.890	0.900	0.000	0.888	0.755	0.854	0.850	0.679	0.791	0.000	0.763
ecoli3	0.851	0.756	0.759	0.872	0.844	0.789	0.830	0.689	0.839	0.827	0.689	0.000	0.000	0.528
ecoli4	0.901	0.830	0.802	0.932	0.958	0.933	0.861	0.695	0.805	0.830	0.854	0.000	0.229	0.844
glass-0123vs456	0.920	0.858	0.898	0.934	0.923	0.832	0.878	0.918	0.872	0.851	0.881	0.794	0.830	0.868
glass-016vs5	0.941	0.877	0.874	0.856	0.927	0.000	0.989	0.888	0.899	0.735	0.000	0.000	0.000	0.929
glass0	0.823	0.807	0.825	0.827	0.813	0.168	0.820	0.642	0.799	0.768	0.615	0.586	0.203	0.755
glass1	0.651	0.782	0.728	0.748	0.794	0.601	0.714	0.586	0.644	0.726	0.682	0.634	0.160	0.539
glass4	0.838	0.775	0.775	0.878	0.922	0.924	0.852	0.861	0.545	0.901	0.277	0.000	0.392	0.763
glass5	0.947	0.941	0.813	0.858	0.980	0.973	0.936	0.858	0.908	0.873	0.000	0.000	0.000	0.573
glass6	0.906	0.862	0.842	0.924	0.857	0.862	0.885	0.916	0.908	0.874	0.803	0.715	0.912	0.908
haberman1mb	0.633	0.499	0.458	0.658	0.648	0.311	0.527	0.565	0.402	0.589	0.325	0.523	0.314	0.000
iris0	1.000	0.990	0.980	0.980	0.990	1.000	0.990	1.000	1.000	0.980	1.000	1.000	0.995	0.990
new-thyroid1	0.969	0.968	0.936	0.983	0.992	0.968	0.975	0.819	0.968	0.960	0.786	0.866	0.662	0.905
new-thyroid2	0.989	0.951	0.918	0.966	0.963	0.983	0.980	0.881	0.941	0.936	0.802	0.879	0.737	0.936
page-blocks-1-3vs4	0.981	0.961	0.998	0.988	0.995	0.842	0.981	0.923	0.955	0.980	0.626	0.460	0.471	0.980
page-blocks0	0.905	0.927	0.922	0.956	0.935	0.925	0.945	0.699	0.894	0.931	0.594	0.042	0.446	0.701
pima1mb	0.725	0.672	0.691	0.717	0.726	0.724	0.712	0.731	0.682	0.709	0.611	0.527	0.578	0.000
shuttle-c0-vs-c4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.830	1.000	1.000	1.000	0.128	1.000	0.996
shuttle-c2-vs-c4	1.000	0.913	0.816	1.000	1.000	1.000	1.000	0.883	1.000	0.913	0.000	0.000	0.408	0.988
vowel0	0.913	0.970	0.964	0.982	0.990	0.833	0.942	0.750	0.885	0.915	0.726	0.000	0.740	0.841
wisconsin1mb	0.976	0.966	0.958	0.972	0.965	0.972	0.964	0.962	0.974	0.960	0.000	0.960	0.923	0.947
yeast-05679vs4	0.782	0.645	0.620	0.820	0.773	0.000	0.703	0.681	0.411	0.769	0.518	0.000	0.244	0.242
yeast-1289vs7	0.481	0.446	0.315	0.577	0.567	0.000	0.632	0.433	0.407	0.639	0.000	0.000	0.000	0.181
yeast-1vs7	0.620	0.512	0.445	0.675	0.661	0.000	0.528	0.528	0.364	0.718	0.000	0.000	0.183	0.000
yeast-2vs4	0.925	0.842	0.841	0.897	0.896	0.000	0.887	0.396	0.856	0.876	0.721	0.000	0.399	0.701
yeast-2vs8	0.741	0.670	0.000	0.817	0.733	0.735	0.838	0.672	0.741	0.725	0.000	0.741	0.741	0.516
yeast1	0.686	0.618	0.675	0.701	0.720	0.669	0.667	0.645	0.641	0.690	0.410	0.558	0.244	0.000
yeast3	0.909	0.786	0.861	0.933	0.873	0.895	0.911	0.661	0.845	0.890	0.650	0.078	0.348	0.884
yeast4	0.839	0.501	0.484	0.794	0.673	0.814	0.689	0.668	0.532	0.655	0.000	0.000	0.000	0.000
yeast5	0.938	0.837	0.850	0.986	0.921	0.965	0.932	0.690	0.916	0.873	0.151	0.000	0.000	0.000
yeast6	0.871	0.714	0.715	0.826	0.783	0.876	0.794	0.566	0.824	0.728	0.000	0.000	0.000	0.629
Mean	0.856	0.782	0.745	0.857	0.847	0.697	0.837	0.740	0.763	0.821	0.467	0.346	0.406	0.608
Std. Dev.	0.128	0.205	0.248	0.135	0.163	0.355	0.152	0.149	0.230	0.139	0.357	0.384	0.346	0.365

Table A2: Detailed test results for **CSR** vs. the considered methods for $Gmean$ on medical datasets.

Dataset	CSR	AB	BAG	SBAG	SBoost	CSVM	C45	NN	NB	RIPPER	IR	CFAR	SGERD	ART
breast cancer	0.670	0.425	0.439	0.399	0.543	0.565	0.459	0.617	0.620	0.603	0.390	0.000	0.543	0.000
breast wisconsin	0.949	0.951	0.947	0.958	0.960	0.960	0.929	0.941	0.973	0.939	0.912	0.765	0.935	0.935
diabetes	0.764	0.687	0.708	0.743	0.737	0.747	0.732	0.668	0.742	0.740	0.603	0.220	0.627	0.537
hepatitis	0.871	0.809	0.725	0.769	0.773	0.705	0.739	0.836	0.819	0.740	0.519	0.708	0.639	0.761
indian liver	0.697	0.549	0.541	0.703	0.709	0.328	0.663	0.673	0.702	0.674	0.190	0.000	0.174	0.000
liver disorders	0.392	0.585	0.555	0.554	0.579	0.726	0.542	0.472	0.579	0.573	0.578	0.331	0.482	0.000
post operative patient	0.469	0.266	0.196	0.486	0.318	0.199	0.312	0.431	0.280	0.410	0.639	0.452	0.680	0.000
oncology	0.675	0.649	0.653	0.678	0.692	0.662	0.680	0.669	0.677	0.440	0.000	0.000	0.211	0.000
Mean	0.711	0.615	0.596	0.686	0.664	0.612	0.632	0.664	0.674	0.640	0.479	0.309	0.536	0.279
Std. Dev.	0.152	0.214	0.222	0.146	0.189	0.244	0.190	0.169	0.201	0.173	0.283	0.312	0.250	0.400

Table A3: Detailed test results for **CSR** vs. the considered methods for AUC on benchmark datasets.

Dataset	CSR	AB	BAG	SBAG	SBoost	CSVM	C45	NN	NB	RIPPER	IR	CFAR	SGERD	ART
abalone0	0.715	0.499	0.590	0.554	0.599	0.763	0.573	0.412	0.590	0.540	0.500	0.500	0.500	0.499
abalone9-18	0.737	0.665	0.640	0.747	0.782	0.876	0.672	0.714	0.616	0.776	0.579	0.500	0.500	0.565
car-2class	0.967	0.977	0.955	0.949	0.982	0.826	0.962	0.768	0.918	0.953	0.674	0.500	0.674	0.961
ecoli-0-1-3-7vs2-6	0.853	0.855	0.712	0.833	0.843	0.857	0.835	0.731	0.712	0.859	0.500	0.855	0.852	0.703
ecoli-0vs1	0.977	0.973	0.984	0.977	0.973	0.968	0.984	0.984	0.977	0.970	0.974	0.964	0.980	0.967
ecoli1	0.899	0.840	0.831	0.902	0.895	0.906	0.911	0.834	0.857	0.878	0.829	0.730	0.558	0.846
ecoli2	0.897	0.861	0.871	0.891	0.902	0.500	0.889	0.781	0.858	0.855	0.711	0.806	0.496	0.781
ecoli3	0.851	0.777	0.780	0.872	0.848	0.792	0.833	0.693	0.840	0.832	0.731	0.500	0.495	0.631
ecoli4	0.903	0.842	0.820	0.933	0.958	0.953	0.864	0.695	0.823	0.842	0.861	0.498	0.526	0.830
glass-0123vs456	0.920	0.864	0.900	0.934	0.923	0.844	0.879	0.918	0.877	0.853	0.882	0.811	0.837	0.869
glass-010vs5	0.943	0.883	0.880	0.860	0.927	0.500	0.989	0.894	0.899	0.763	0.500	0.500	0.500	0.930
glass0	0.833	0.809	0.827	0.828	0.813	0.507	0.821	0.687	0.799	0.768	0.655	0.593	0.504	0.756
glass1	0.674	0.787	0.741	0.752	0.796	0.626	0.715	0.595	0.675	0.726	0.705	0.661	0.491	0.579
glass4	0.842	0.795	0.795	0.878	0.922	0.924	0.855	0.871	0.636	0.903	0.538	0.498	0.577	0.780
glass5	0.949	0.942	0.828	0.862	0.980	0.973	0.937	0.868	0.908	0.879	0.500	0.498	0.500	0.639
glass6	0.907	0.868	0.851	0.924	0.863	0.868	0.887	0.916	0.909	0.878	0.819	0.733	0.915	0.909
haberman1mb	0.646	0.580	0.564	0.663	0.648	0.540	0.575	0.577	0.533	0.626	0.531	0.564	0.537	0.500
iris0	1.000	0.990	0.980	0.980	0.990	1.000	0.990	1.000	1.000	0.980	1.000	1.000	0.995	0.990
new-thyroid1	0.969	0.969	0.937	0.983	0.992	0.969	0.975	0.820	0.969	0.960	0.806	0.872	0.718	0.909
new-thyroid2	0.989	0.952	0.920	0.966	0.963	0.983	0.980	0.881	0.943	0.957	0.812	0.883	0.771	0.937
page-blocks-1-3 vs 4	0.981	0.992	0.998	0.988	0.995	0.854	0.981	0.920	0.956	0.980	0.695	0.600	0.611	0.980
page-block0	0.905	0.920	0.925	0.956	0.936	0.925	0.946	0.701	0.895	0.932	0.672	0.501	0.509	0.744
pima1mb	0.725	0.686	0.701	0.719	0.727	0.729	0.713	0.734	0.690	0.710	0.655	0.614	0.643	0.500
shuttle-c0-vs-c4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.830	1.000	1.000	1.000	0.508	1.000	0.996
shuttle-c2-vs-c4	1.000	0.917	0.833	1.000	1.000	1.000	1.000	0.890	1.000	0.917	0.500	0.496	0.583	0.988
vowel0	0.914	0.971	0.964	0.982	0.990	0.846	0.942	0.764	0.890	0.918	0.761	0.500	0.771	0.851
wisconsin1mb	0.976	0.966	0.958	0.972	0.965	0.972	0.964	0.962	0.974	0.960	0.500	0.960	0.925	0.948
yeast-05679 vs 4	0.786	0.698	0.687	0.822	0.785	0.500	0.724	0.708	0.567	0.781	0.627	0.500	0.528	0.525
yeast-1289vs7	0.613	0.596	0.547	0.637	0.649	0.500	0.677	0.435	0.580	0.688	0.500	0.500	0.500	0.507
yeast-1vs7	0.635	0.625	0.594	0.694	0.702	0.500	0.614	0.532	0.564	0.738	0.499	0.499	0.517	0.498
yeast-2vs4	0.925	0.851	0.850	0.897	0.898	0.500	0.888	0.598	0.864	0.879	0.756	0.499	0.578	0.737
yeast-2vs8	0.774	0.724	0.500	0.827	0.763	0.766	0.865	0.682	0.774	0.753	0.500	0.774	0.774	0.548
yeast1	0.698	0.647	0.701	0.707	0.723	0.675	0.678	0.653	0.676	0.690	0.568	0.588	0.520	0.500
yeast3	0.909	0.803	0.867	0.933	0.877	0.895	0.912	0.696	0.854	0.891	0.703	0.503	0.553	0.886
yeast4	0.839	0.620	0.616	0.803	0.716	0.816	0.721	0.690	0.629	0.702	0.500	0.500	0.500	0.500
yeast5	0.938	0.849	0.861	0.986	0.923	0.966	0.933	0.712	0.918	0.879	0.510	0.500	0.500	0.500
yeast6	0.871	0.733	0.755	0.834	0.802	0.876	0.808	0.567	0.833	0.759	0.500	0.500	0.500	0.695
Mean	0.864	0.820	0.802	0.866	0.864	0.797	0.851	0.749	0.809	0.836	0.664	0.622	0.636	0.744
Std. Dev.	0.114	0.135	0.145	0.115	0.122	0.178	0.128	0.146	0.149	0.111	0.158	0.166	0.167	0.184

Table A4: Detailed test results for **CSR** vs. considered methods for AUC on medical datasets.

Dataset	CSR	AB	BAG	SBAG	SBoost	CSVM	C45	NN	NB	RIPPER	IR	CFAR	SGERD	ART
breast cancer	0.670	0.489	0.561	0.616	0.568	0.620	0.532	0.618	0.654	0.605	0.519	0.500	0.629	0.500
breast wisconsin	0.949	0.952	0.947	0.958	0.960	0.960	0.929	0.941	0.973	0.939	0.912	0.791	0.936	0.936
diabetes	0.765	0.696	0.720	0.745	0.737	0.757	0.732	0.678	0.744	0.740	0.657	0.522	0.681	0.582
hepatitis	0.872	0.815	0.749	0.769	0.783	0.733	0.740	0.837	0.822	0.742	0.620	0.737	0.694	0.776
indian liver	0.701	0.595	0.594	0.705	0.710	0.530	0.681	0.678	0.702	0.688	0.518	0.500	0.494	0.500
liver disorders	0.393	0.592	0.579	0.554	0.581	0.728	0.556	0.481	0.587	0.573	0.608	0.533	0.551	0.500
pos toperative patient	0.564	0.466	0.483	0.487	0.347	0.498	0.335	0.451	0.511	0.547	0.677	0.568	0.701	0.500
oncology	0.701	0.677	0.685	0.692	0.698	0.672	0.681	0.671	0.698	0.445	0.500	0.500	0.493	0.439
Mean	0.727	0.660	0.665	0.691	0.673	0.687	0.648	0.669	0.712	0.660	0.626	0.582	0.647	0.592
Std. Dev.	0.131	0.163	0.145	0.145	0.180	0.145	0.176	0.164	0.142	0.152	0.134	0.116	0.145	0.173

Table A5: Detailed test results for **CSR** vs. considered methods for *Precision* (in table denoted by **P**) and *Recall* (in table denoted by **R**) on benchmark datasets.

Dataset	CSR		AB		BAG		SBAG		SBoost		CSVM		C45		NN		NB		RIPPER		IR		CFAR		SGERD		ART		
	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	
abalone19	0.015	0.875	0.000	0.000	0.000	0.000	0.025	0.156	0.017	0.031	0.025	0.750	0.034	0.188	0.006	0.531	0.000	0.052	0.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
abalone9-18	0.203	0.628	0.536	0.349	1.000	0.279	0.255	0.605	0.380	0.628	0.333	0.860	0.321	0.395	0.114	0.837	0.273	0.279	0.419	0.605	0.700	0.163	0.000	0.000	0.000	0.000	0.000	0.500	0.140
car-2class	0.995	0.945	0.965	0.969	0.900	0.956	0.831	0.985	0.948	0.986	0.782	0.741	0.854	0.996	0.497	0.946	0.906	0.875	0.862	0.973	0.519	0.577	0.000	0.000	0.000	0.519	0.577	0.868	0.986
ecoli-0-1-3-7vs-2-6	0.714	0.714	0.833	0.714	0.750	0.429	0.278	0.714	0.385	0.714	1.000	0.714	0.294	0.714	0.053	0.857	0.750	0.429	0.333	0.714	0.000	0.000	0.833	0.714	0.625	0.714	0.333	0.429	
ecoli-0vs-1	0.987	0.961	0.949	0.974	0.987	0.974	0.962	0.974	0.949	0.974	1.000	0.935	0.987	0.974	0.987	0.974	0.987	0.961	0.938	0.974	1.000	0.948	0.986	0.935	1.000	0.961	0.949	0.961	
ecoli1	0.638	0.961	0.753	0.753	0.767	0.727	0.679	0.935	0.761	0.870	0.641	0.974	0.732	0.922	0.493	0.961	0.641	0.857	0.717	0.857	0.620	0.805	0.683	0.532	0.714	0.132	0.566	0.896	
ecoli2	0.639	0.885	0.830	0.750	0.833	0.769	0.710	0.846	0.786	0.846	0.000	0.000	0.643	0.865	0.300	0.981	0.727	0.769	0.702	0.769	0.542	0.500	0.739	0.654	0.000	0.000	0.681	0.615	
ecoli3	0.433	0.829	0.600	0.600	0.636	0.600	0.469	0.857	0.540	0.771	0.391	0.714	0.458	0.771	0.189	0.771	0.438	0.800	0.520	0.743	0.708	0.486	0.000	0.000	0.000	0.000	0.588	0.286	
ecoli4	0.548	0.850	0.737	0.700	0.813	0.650	0.621	0.900	0.633	0.950	0.576	0.950	0.410	0.800	0.125	0.700	0.929	0.650	0.737	0.700	0.625	0.750	0.000	0.000	1.000	0.000	0.553	0.484	0.750
glass-0123vs456	0.821	0.902	0.867	0.765	0.860	0.843	0.800	0.941	0.836	0.902	0.923	0.706	0.754	0.843	0.770	0.922	0.889	0.784	0.719	0.804	0.768	0.843	0.892	0.647	0.795	0.729	0.750	0.824	
glass-01vs5	0.510	1.000	0.778	0.778	0.700	0.778	0.412	0.778	0.571	0.889	0.000	0.000	0.692	1.000	0.196	1.000	0.333	0.889	0.500	0.556	0.000	0.000	0.000	0.000	0.000	0.000	0.615	0.889	
glass0	0.615	0.957	0.726	0.757	0.761	0.771	0.663	0.871	0.705	0.786	0.500	0.029	0.649	0.871	0.448	0.929	0.659	0.800	0.614	0.771	0.658	0.429	0.400	0.686	0.375	0.043	0.633	0.714	
glass1	0.644	0.500	0.757	0.697	0.730	0.605	0.689	0.671	0.737	0.737	0.445	0.803	0.589	0.697	0.441	0.697	0.679	0.474	0.582	0.750	0.714	0.326	0.632	0.474	0.250	0.027	0.491	0.368	
glass4	0.200	0.923	0.615	0.615	0.615	0.615	0.379	0.846	0.429	0.923	0.444	0.923	0.218	0.923	0.200	1.000	0.364	0.308	0.579	0.846	1.000	0.077	0.000	0.000	1.000	0.154	0.421	0.615	
glass5	0.300	1.000	0.889	0.889	0.750	0.667	0.389	0.778	0.529	1.000	0.450	1.000	0.727	0.889	0.143	1.000	0.348	0.889	0.636	0.778	0.000	0.000	0.000	0.000	0.000	0.500	0.333	0.862	
glass6	0.735	0.862	0.846	0.759	0.840	0.724	0.743	0.897	0.786	0.759	0.846	0.759	0.706	0.828	0.684	0.897	0.758	0.862	0.767	0.793	0.864	0.655	0.882	0.517	0.880	0.846	0.758	0.862	
haberman1nb	0.452	0.519	0.451	0.284	0.442	0.235	0.452	0.580	0.405	0.630	0.667	0.099	0.307	0.802	0.352	0.457	0.483	0.173	0.340	0.840	0.450	0.111	0.301	0.778	0.571	0.101	0.000	0.000	
iris0	1.000	1.000	1.000	0.980	1.000	0.960	1.000	0.960	1.000	0.980	1.000	1.000	1.000	0.980	1.000	1.000	1.000	1.000	1.000	0.960	1.000	1.000	1.000	1.000	1.000	0.980	1.000	0.962	1.000
new-thyroid1	0.850	0.971	0.971	0.943	0.939	0.886	0.854	1.000	0.921	1.000	0.971	0.943	0.895	0.971	0.435	0.857	0.971	0.943	0.892	0.943	0.880	0.629	0.844	0.771	0.938	0.441	0.935	0.829	
new-thyroid2	0.897	1.000	0.941	0.914	0.909	0.857	0.829	0.971	0.810	0.971	0.971	0.971	0.944	0.971	0.638	0.857	1.000	0.886	0.939	0.886	0.686	0.686	0.824	0.800	1.000	0.543	0.939	0.886	
page-blocks-1-3_vs_4	0.622	1.000	0.929	0.929	0.933	1.000	0.718	1.000	0.875	1.000	0.870	0.714	0.964	0.964	0.413	0.929	0.418	1.000	0.931	0.964	0.917	0.393	0.500	0.214	1.000	0.222	0.931	0.964	
page-blocks0	0.553	0.893	0.871	0.873	0.897	0.860	0.694	0.961	0.735	0.909	0.538	0.943	0.779	0.921	0.230	0.649	0.624	0.848	0.793	0.891	0.738	0.358	1.000	0.002	0.933	0.199	0.891	0.496	
pin1nb	0.586	0.724	0.629	0.545	0.634	0.582	0.606	0.672	0.611	0.690	0.648	0.646	0.560	0.755	0.565	0.799	0.607	0.582	0.551	0.746	0.675	0.418	0.696	0.299	0.722	0.361	0.000	0.000	
shuttle-c0-vs-c4	1.000	1.000	0.992	1.000	0.992	1.000	0.992	1.000	1.000	1.000	1.000	1.000	0.992	1.000	0.287	0.805	1.000	1.000	0.992	1.000	1.000	1.000	0.016	1.000	1.000	1.000	0.992	1.000	0.992
shuttle-c2-vs-c4	1.000	1.000	1.000	0.833	1.000	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.182	1.000	1.000	1.000	1.000	0.833	0.000	0.000	0.000	0.000	1.000	0.167	0.667	1.000	
vowel0	0.690	0.867	0.966	0.944	0.955	0.933	0.880	0.978	0.918	0.989	0.900	0.700	0.774	0.911	0.192	0.911	0.800	0.800	0.916	0.844	0.814	0.533	0.000	0.000	0.806	0.556	0.783	0.722	
wisconsin1nb	0.951	0.979	0.950	0.958	0.938	0.950	0.943	0.975	0.943	0.962	0.951	0.971	0.911	0.979	0.946	0.954	0.944	0.979	0.907	0.975	0.000	0.000	0.954	0.946	0.957	0.870	0.937	0.929	
yeast-05679vs4	0.360	0.706	0.564	0.431	0.690	0.392	0.402	0.765	0.471	0.647	0.000	0.000	0.368	0.549	0.165	0.902	0.310	0.176	0.446	0.647	0.583	0.275	0.000	0.000	0.600	0.060	0.429	0.059	
yeast-1289vs7	0.500	0.233	0.462	0.200	0.375	0.100	0.115	0.367	0.233	0.333	0.000	0.000	0.151	0.433	0.025	0.467	0.417	0.167	0.200	0.433	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.033
yeast-1vs7	0.132	0.500	0.533	0.267	0.545	0.200	0.205	0.533	0.341	0.467	0.000	0.000	0.225	0.300	0.073	0.600	0.667	0.133	0.304	0.567	0.000	0.000	0.000	0.000	1.000	0.033	0.000	0.000	
yeast-2vs4	0.588	0.922	0.771	0.725	0.755	0.725	0.523	0.882	0.662	0.843	0.000	0.000	0.581	0.843	0.136	0.647	0.826	0.745	0.661	0.804	0.771	0.529	0.000	0.000	0.800	0.160	0.605	0.510	
yeast-2vs8	0.917	0.550	0.900	0.450	0.000	0.000	0.400	0.700	0.500	0.550	0.579	0.550	0.625	0.750	0.074	0.800	0.917	0.550	0.355	0.550	0.000	0.000	0.917	0.550	0.917	0.550	0.500	0.100	
yeast1	0.573	0.569	0.533	0.457	0.653	0.513	0.557	0.613	0.561	0.655	0.501	0.587	0.423	0.800	0.405	0.760	0.631	0.462	0.469	0.704	0.652	0.175	0.345	0.774	0.553	0.061	0.000	0.000	
yeast3	0.526	0.920	0.707	0.638	0.740	0.767	0.651	0.926	0.691	0.798	0.525	0.890	0.646	0.883	0.178	0.914	0.810	0.730	0.619	0.847	0.651	0.436	0.500	0.006	0.476	0.123	0.700	0.816	
yeast4	0.168	0.824	0.571	0.255	0.706	0.255	0.232	0.686	0.308	0.471	0.170	0.765	0.210	0.510	0.060	0.863	0.224	0.294	0.253	0.451	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
yeast5	0.460	0.909	0.775	0.705	0.780	0.727	0.518	1.000	0.603	0.864	0.308	1.000	0.574	0.886	0.055	0.886	0.481	0.864	0.630	0.773	0.200	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000
yeast6	0.153	0.857	0.581	0.514	0.720	0.514	0.275	0.714	0.386	0.629	0.164	0.857	0.280	0.657	0.030	0.600	0.263	0.714	0.352	0.543	0.000	0.000	0.000	0.000	0.000	0.000	0.483	0.400	
Mean	0.589	0.831	0.745	0.673	0.744	0.635	0.588	0.812	0.648	0.788	0.544	0.662	0.602	0.798	0.326	0.829	0.651	0.667	0.628	0.755	0.506	0.360	0.403	0.306	0.579	0.289	0.539	0.524	
Std. Dev.	0.277	0.184	0.215	0.253	0.233	0.283	0.262	0.192	0.242	0.215	0.353	0.360	0.272	0.205	0.275	0.153	0.269	0.293	0.248	0.184	0.364	0.327	0.407	0.360	0.399	0.333	0.329	0.375	

Table A6: Detailed test results for **CSR** vs. considered methods for *Precision* (in table denoted by **P**) and *Recall* (in table denoted by **R**) on medical datasets.

Dataset	CSR		AB		Bag		SBag		SBoost		CSVM		C45		NN		NB		RIPPER		1R		CFAR		SGERD		ART	
	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R
breastcancer	0.434	0.659	0.280	0.247	0.500	0.212	0.455	0.471	0.391	0.400	0.315	0.365	0.541	0.800	0.397	0.659	0.576	0.447	0.405	0.553	0.349	0.176	0.000	0.000	0.706	0.312	0.000	0.000
breast w/o consin	0.945	0.921	0.941	0.934	0.933	0.929	0.927	0.954	0.935	0.954	0.857	0.946	0.900	0.942	0.881	0.950	0.940	0.979	0.917	0.921	0.888	0.884	0.979	0.589	0.950	0.897	0.921	0.913
diabetes	0.663	0.728	0.622	0.582	0.674	0.593	0.639	0.701	0.616	0.713	0.596	0.634	0.496	0.728	0.493	0.795	0.647	0.690	0.589	0.769	0.721	0.396	0.867	0.049	0.775	0.416	0.497	0.358
hepatitis	0.592	0.906	0.676	0.719	0.692	0.563	0.480	0.750	0.656	0.656	0.403	0.331	0.533	0.781	0.563	0.844	0.649	0.750	0.468	0.688	0.643	0.281	0.708	0.531	0.733	0.423	0.690	0.625
indian liver	0.457	0.766	0.455	0.365	0.468	0.347	0.464	0.766	0.482	0.737	0.414	0.114	0.510	0.838	0.431	0.760	0.471	0.737	0.425	0.826	1.000	0.036	0.000	0.000	0.217	0.032	0.000	0.000
liver disorders	0.523	0.552	0.533	0.503	0.541	0.414	0.476	0.538	0.495	0.628	0.465	0.676	0.462	0.683	0.405	0.572	0.530	0.490	0.491	0.586	0.598	0.421	0.438	0.952	0.532	0.283	0.000	0.000
postoperative patient	0.429	0.250	0.167	0.083	0.167	0.042	0.256	0.458	0.128	0.208	0.175	0.042	0.688	0.458	0.237	0.583	0.333	0.083	0.411	0.910	0.743	0.452	0.424	0.912	0.719	0.531	0.000	0.000
onko	0.745	0.512	0.697	0.485	0.732	0.479	0.668	0.556	0.644	0.605	0.588	0.559	0.479	0.644	0.582	0.619	0.712	0.529	0.220	0.375	0.000	0.000	0.000	0.000	0.200	0.048	0.000	0.000
Mean	0.598	0.662	0.546	0.490	0.588	0.447	0.546	0.649	0.543	0.613	0.477	0.483	0.526	0.734	0.499	0.723	0.607	0.588	0.491	0.703	0.618	0.331	0.427	0.379	0.604	0.368	0.263	0.237
Std. Dev.	0.180	0.222	0.246	0.267	0.227	0.267	0.199	0.173	0.234	0.225	0.206	0.299	0.070	0.145	0.189	0.136	0.180	0.267	0.201	0.190	0.316	0.282	0.401	0.417	0.269	0.277	0.381	0.339

Table A7: Detailed results for **CSR** and methods considered in the experiments for average execution time of five folds (expressed in miliseconds). We have used the KEEL implementation of methods to estimate the time.

Dataset	CSR	AB	BAG	SBAG	SBoost	CSVM	C45	NN	NB	RIPPER	IR	CFAR	SGERD	ART
abalone19	8960	10272	9076	29950	63957	5004	987	720	804	5273	3669	9641	1348	1085
abalone9-18	2574	2311	2168	4658	7626	1939	448	469	177	1856	496	4870	424	630
car-2class	2006	2812	2804	6208	12233	1971	477	823	303	2253	724	992	503	961
ecoli-0-1-3-7vs2-6	847	413	768	1192	1307	939	212	477	88	181	156	793	196	146
ecoli-0vs1	644	496	722	1762	2629	690	109	384	92	237	196	1813	402	221
ecoli1	976	1144	1103	2731	2675	757	130	370	92	415	197	1048	452	240
ecoli2	1041	975	926	2442	3269	782	167	385	95	296	187	1984	278	194
ecoli3	1122	921	927	1955	3044	698	138	362	97	281	222	1142	231	412
ecoli4	1087	753	876	2058	2976	700	145	366	98	574	951	26093	1067	668
glass-0123vs456	696	862	869	1315	1927	929	271	621	76	434	212	4674	212	169
glass-016vs5	745	345	711	1566	2114	689	104	408	84	281	178	3541	174	141
glass0	657	985	1044	1455	2713	805	168	415	78	340	247	3769	259	278
glass1	779	1060	1034	1336	1899	1307	375	727	82	605	437	5582	440	433
glass4	813	467	827	1647	2378	765	118	345	90	218	178	1098	209	206
glass5	810	450	824	1635	2380	796	115	399	81	228	194	4783	187	134
glass6	894	799	1207	2371	4841	775	135	399	85	203	206	9965	228	137
haberman1mb	469	385	670	1135	1539	568	112	356	72	387	125	172	156	119
iris0	419	114	354	608	1002	403	59	384	39	84	103	284	169	94
new-thyroid1	457	522	597	1319	1790	488	87	377	61	143	137	836	200	115
new-thyroid2	456	389	634	2583	3740	484	104	338	74	178	131	440	212	122
page-blocks13vs4	1415	739	1353	2850	4325	1062	268	519	220	19354	58740	28367	2914	3841
page-blocks0	9605	27315	30519	46360	110148	5765	4191	800	1147	393	424	6558	303	293
pima1mb	1618	2594	2659	3833	5739	2232	527	487	301	1354	546	1472	640	733
shuttle-c0-vs-c4	2686	867	3721	8880	16808	2234	516	388	416	446	209	1332	315	346
shuttle-c2-vs-c4	628	126	467	903	1159	493	73	408	66	137	119	8602	150	109
vowel0	58700	859	3783	7804	12128	1769	523	672	274	1516	1904	6848	590	652
wisconsin1mb	2480	2008	2096	8541	12072	1669	729	793	167	587	415	3572	870	412
yeast-05679vs4	2358	1516	1512	3179	4758	1169	287	408	183	630	483	3947	378	418
yeast-1289vs7	1201	1324	1258	2797	4380	1097	223	398	121	961	399	3304	450	671
yeast-1vs7	3428	2790	2442	6353	10503	2093	489	521	205	200	197	4855	193	203
yeast-2vs4	2318	1422	1764	3073	7047	1172	306	609	182	699	381	5576	484	293
yeast-2vs8	1799	1333	1377	2935	4705	908	235	402	130	477	234	2487	287	268
yeast1	4063	4689	5079	7736	14785	2402	539	680	256	3017	749	3170	615	1485
yeast3	4890	4554	3991	9486	15083	2295	495	655	430	1261	742	5725	543	668
yeast4	4523	4125	3550	9005	14825	1679	478	682	318	2306	686	3922	518	814
yeast5	4482	3550	3199	8204	13477	1637	465	644	299	746	708	3750	543	711
yeast6	4422	3744	3448	8667	14708	1726	494	656	303	849	680	3934	521	730
breastcancer	2206	1041	1010	1554	2224	1635	173	383	284	525	244	702	218	721
breast-wisconsin	4448	1457	1547	2476	4526	4958	304	652	345	721	449	4509	471	474
diabetes	4084	1597	1628	2523	4651	5045	339	459	451	1875	365	1345	471	1023
hepatitis	1347	399	618	941	1262	725	93	246	103	200	125	7891	153	319
indian liver	4041	1176	1222	2139	3484	3372	303	431	252	1323	249	7064	699	3834
liver disorders	834	756	909	1180	1697	1309	144	615	144	574	178	184	312	209
post-operative patient	673	403	443	659	797	600	66	386	78	300	100	643	162	290
oncology	1672	1083	1145	2372	4372	2393	277	858	253	4153	253	534	478	430
Mean	3475	2181	2420	4986	9242	1625	380	522	214	1313	1745	4529	458	588