

Data Stream Lab2 : Benchmark of River and CapyMoa

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2025

Contents

River

Regression Benchmark

model	dataset	MAE	RMSE	R2	Memory (Mb)	Time (s)
Adaptive Model Rules	ChickWeights	24.194	37.217	0.725	0.047	5.971
Adaptive Model Rules	TrumpApproval	1.398	2.433	-1.024	0.114	13.385
Adaptive Random Forest	ChickWeights	26.323	41.228	0.663	1.121	44.735
Adaptive Random Forest	TrumpApproval	0.772	2.109	-0.521	1.438	57.998
Aggregated Mondrian Forest	ChickWeights	25.674	41.712	0.655	8.214	86.262
Aggregated Mondrian Forest	TrumpApproval	0.269	0.349	0.958	16.932	139.795
Bagging	ChickWeights	23.140	36.590	0.734	0.662	33.906
Bagging	TrumpApproval	0.900	2.235	-0.707	1.228	52.992
EWA	ChickWeights	121.818	141.004	-2.943	3.046	44.934
EWA	TrumpApproval	40.755	40.790	-567.663	5.258	106.919
Hoeffding Adaptive Tree	ChickWeights	23.019	36.895	0.730	0.039	10.300
Hoeffding Adaptive Tree	TrumpApproval	0.921	2.239	-0.714	0.138	11.764
Hoeffding Tree	ChickWeights	23.162	36.734	0.732	0.044	5.227
Hoeffding Tree	TrumpApproval	0.956	2.250	-0.730	0.149	8.138
Linear Regression	ChickWeights	23.759	37.038	0.728	0.004	2.180
Linear Regression	TrumpApproval	1.315	3.912	-4.230	0.005	2.378
Linear Regression l1	ChickWeights	23.758	37.078	0.727	0.004	1.964
Linear Regression l1	TrumpApproval	1.154	3.829	-4.010	0.005	6.076
Linear Regression l2	ChickWeights	25.274	38.589	0.705	0.004	2.624
Linear Regression l2	TrumpApproval	1.872	4.131	-4.831	0.005	2.968
Passive-Aggressive 1	ChickWeights	24.342	37.596	0.720	0.003	2.101
Passive-Aggressive 1	TrumpApproval	4.984	6.977	-15.635	0.004	3.177
Passive-Aggressive 2	ChickWeights	100.624	143.066	-3.059	0.003	3.102
Passive-Aggressive 2	TrumpApproval	31.093	34.626	-408.765	0.004	7.638
River MLP	ChickWeights	51.408	80.920	-0.299	0.012	22.993
River MLP	TrumpApproval	1.581	5.034	-7.661	0.013	29.241
Stochastic Gradient Tree	ChickWeights	68.759	80.358	-0.281	1.121	16.382
Stochastic Gradient Tree	TrumpApproval	9.430	17.938	-108.972	3.082	37.906
Streaming Random Patches	ChickWeights	24.536	39.560	0.690	0.448	60.239
Streaming Random Patches	TrumpApproval	0.663	2.118	-0.534	1.036	105.187
Mean predictor	ChickWeights	50.251	71.114	-0.003	0.000	0.800
Mean predictor	TrumpApproval	1.568	2.203	-0.658	0.000	2.787
k-NN	ChickWeights	24.577	38.978	0.699	2.870	28.081
k-NN	TrumpApproval	0.642	1.595	0.131	5.025	88.270

Binary Classification Benchmark

model	dataset	Accuracy	F1	Memory (Mb)	Time (s)
ADWIN Bagging	Bananas	0.61785	0.42910	0.32988	298.51809
ADWIN Bagging	Elec2	0.82797	0.78599	1.00984	2670.11050
ADWIN Bagging	Phishing	0.89351	0.87920	1.31008	263.64622
ADWIN Bagging	SMTP	0.99968	0.00000	0.16300	2708.60274
ALMA	Bananas	0.50642	0.48259	0.00291	26.36979
ALMA	Elec2	0.90643	0.88977	0.00430	286.24202
ALMA	Phishing	0.82560	0.81076	0.00451	10.61701
ALMA	SMTP	0.76499	0.00179	0.00307	475.58807
AdaBoost	Bananas	0.67786	0.64504	0.45316	279.26427
AdaBoost	Elec2	0.87769	0.85558	14.08779	3522.27902
AdaBoost	Phishing	0.87830	0.86355	0.87332	152.29699
AdaBoost	SMTP	0.99944	0.40449	1.33633	2233.85272
Adaptive Random Forest	Bananas	0.88375	0.86832	12.55643	987.75064
Adaptive Random Forest	Elec2	0.88846	0.86679	9.11008	4046.41616
Adaptive Random Forest	Phishing	0.91033	0.89892	3.58877	246.07005
Adaptive Random Forest	SMTP	0.99972	0.18182	0.16334	3206.33416
Aggregated Mondrian Forest	Bananas	0.88941	0.87425	17.23769	982.19820
Aggregated Mondrian Forest	Elec2	0.84990	0.81973	287.31452	6844.03022
Aggregated Mondrian Forest	Phishing	0.90472	0.89211	3.39106	177.09229
Aggregated Mondrian Forest	SMTP	0.99986	0.73469	0.21175	1974.08866
Bagging	Bananas	0.63484	0.46205	0.70294	379.66748
Bagging	Elec2	0.84359	0.80738	2.15785	4323.08799
Bagging	Phishing	0.89351	0.87920	1.38826	240.89353
Bagging	SMTP	0.99968	0.00000	0.20718	2750.54568
Hoeffding Adaptive Tree	Bananas	0.61653	0.42825	0.06185	53.70432
Hoeffding Adaptive Tree	Elec2	0.83591	0.80279	0.25229	791.45387
Hoeffding Adaptive Tree	Phishing	0.87430	0.85610	0.14297	37.97592
Hoeffding Adaptive Tree	SMTP	0.99968	0.00000	0.02400	746.36958
Hoeffding Tree	Bananas	0.64220	0.50340	0.05947	40.71092
Hoeffding Tree	Elec2	0.79563	0.75083	0.93847	436.74009
Hoeffding Tree	Phishing	0.87990	0.86059	0.13272	6.81175
Hoeffding Tree	SMTP	0.99968	0.00000	0.01705	443.17820

model	dataset	Accuracy	F1	Memory (Mb)	Time (s)
Leveraging Bagging	Bananas	0.82808	0.80243	3.22824	890.75302
Leveraging Bagging	Elec2	0.89605	0.87586	4.87016	6507.10477
Leveraging Bagging	Phishing	0.89432	0.87732	4.01141	563.08752
Leveraging Bagging	SMTP	0.99967	0.00000	0.16339	5929.73658
Logistic regression	Bananas	0.54321	0.19701	0.00424	28.30967
Logistic regression	Elec2	0.82214	0.77709	0.00537	304.35028
Logistic regression	Phishing	0.88720	0.87123	0.00556	5.43824
Logistic regression	SMTP	0.99977	0.42105	0.00438	482.94313
Naive Bayes	Bananas	0.61521	0.41391	0.01402	46.46144
Naive Bayes	Elec2	0.72874	0.60378	0.05104	545.08366
Naive Bayes	Phishing	0.88471	0.87143	0.05723	13.01302
Naive Bayes	SMTP	0.99348	0.04908	0.02014	1073.82227
Stacking	Bananas	0.87318	0.85610	19.65252	1723.44393
Stacking	Elec2	0.88970	0.86917	13.94852	8658.14792
Stacking	Phishing	0.89512	0.88272	8.81949	745.65916
Stacking	SMTP	0.99972	0.18182	4.82052	9961.47809
Streaming Random Patches	Bananas	0.87243	0.85399	10.27495	1301.24605
Streaming Random Patches	Elec2	0.88753	0.86501	62.73184	8294.74056
Streaming Random Patches	Phishing	0.91273	0.90136	6.44808	489.21420
Streaming Random Patches	SMTP	0.99967	0.00000	0.17598	6239.16611
Voting	Bananas	0.87262	0.84916	4.56825	977.48401
Voting	Elec2	0.84366	0.79799	5.78335	4589.96595
Voting	Phishing	0.89672	0.88451	4.80987	500.96184
Voting	SMTP	0.99979	0.52381	4.53647	6947.06729
Vowpal Wabbit logistic regression	Bananas	0.55132	0.00000	0.00065	27.75487
Vowpal Wabbit logistic regression	Elec2	0.69748	0.45959	0.00065	313.46528
Vowpal Wabbit logistic regression	Phishing	0.77360	0.66978	0.00065	4.56156
Vowpal Wabbit logistic regression	SMTP	0.99970	0.12121	0.00065	518.34222
[baseline] Last Class	Bananas	0.50953	0.45296	0.00051	8.96762
[baseline] Last Class	Elec2	0.85330	0.82723	0.00051	126.52773
[baseline] Last Class	Phishing	0.51561	0.44749	0.00051	2.31494
[baseline] Last Class	SMTP	0.99960	0.36667	0.00051	201.96817
k-Nearest Neighbors	Bananas	0.88507	0.87084	4.49813	878.25320
k-Nearest Neighbors	Elec2	0.85295	0.82342	4.75199	4438.65554
k-Nearest Neighbors	Phishing	0.88231	0.86792	4.64955	548.10879
k-Nearest Neighbors	SMTP	0.99984	0.71698	4.52085	6470.55975
sklearn SGDClassifier	Bananas	0.54642	0.20503	0.00558	318.40292
sklearn SGDClassifier	Elec2	0.81910	0.77289	0.00680	1814.45775
sklearn SGDClassifier	Phishing	0.88960	0.87612	0.00702	67.72689
sklearn SGDClassifier	SMTP	0.99971	0.36364	0.00574	2689.23238

Multiclass Classification Benchmark

model	dataset	Memory (Mb)	Time (s)	Accuracy	MicroF1	MacroF1
ADWIN Bagging	ImageSegments	4.11431	510.958	0.771763	0.771763	0.756927
ADWIN Bagging	Keystroke	45.3838	7293.00	0.823129	0.823129	0.824174
AdaBoost	ImageSegments	4.09839	507.469	0.804677	0.804677	0.797770
AdaBoost	Keystroke	196.336	9649.09	0.832198	0.832198	0.833978
AR Forest	ImageSegments	3.11780	187.997	0.783456	0.783456	0.778074
AR Forest	Keystroke	0.592256	743.121	0.979607	0.979607	0.979607
AG Forest	ImageSegments	17.0502	568.854	0.901689	0.901689	0.900381
AG Forest	Keystroke	338.139	7275.98	0.881073	0.881073	0.879928
Bagging	ImageSegments	4.15507	616.265	0.776960	0.776960	0.764564
Bagging	Keystroke	50.3446	10986.2	0.669739	0.669739	0.669981
HA Tree	ImageSegments	0.423800	61.0754	0.774794	0.774794	0.763617
HA Tree	Keystroke	0.724505	1389.69	0.722290	0.722290	0.720849
Hoeffding Tree	ImageSegments	0.417158	40.4303	0.776094	0.776094	0.763137
Hoeffding Tree	Keystroke	5.09445	1113.73	0.648218	0.648218	0.647249
Leveraging Bagging	ImageSegments	4.10050	1214.80	0.778259	0.778259	0.766016
Leveraging Bagging	Keystroke	8.15640	6162.08	0.952694	0.952694	0.952879
Naive Bayes	ImageSegments	0.390004	37.0771	0.731919	0.731919	0.730419
Naive Bayes	Keystroke	4.86901	608.637	0.652532	0.652532	0.651577
Stacking	ImageSegments	8.36880	771.316	0.850152	0.850152	0.847608
Stacking	Keystroke	17.3105	6847.49	0.982205	0.982205	0.982205
SRP	ImageSegments	7.61923	1182.53	0.759203	0.759203	0.753394
SRP	Keystroke	27.7054	5203.87	0.966175	0.966175	0.966193
Voting	ImageSegments	6.07661	480.207	0.807276	0.807276	0.799632
Voting	Keystroke	16.4103	5750.52	0.778028	0.778028	0.783038
[baseline] Last Class	ImageSegments	0.00136948	4.50779	0.148116	0.148116	0.148116
[baseline] Last Class	Keystroke	0.00504208	46.2865	0.997549	0.997549	0.997549
k-Nearest Neighbors	ImageSegments	5.25567	377.365	0.879602	0.879602	0.878164
k-Nearest Neighbors	Keystroke	6.30135	3171.65	0.911221	0.911221	0.911144

- AG Forest : Aggregated Mondrian Forest
- SRP : Streaming Random Patches
- AR Forest : Adaptive Random Forest
- HA Tree : Hoeffding Adaptive Tree

CapyMoa

Regression Benchmark

model	dataset	MAE	RMSE	R^2	Memory
CapyMoa ARFFIMTDD	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa ARFFIMTDD	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Adaptive Random Forest Regressor	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Adaptive Random Forest Regressor	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa FIMTDD	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa FIMTDD	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Fading Target Mean	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Fading Target Mean	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa KNN Regressor	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa KNN Regressor	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa No Change	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa No Change	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa ORTO	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa ORTO	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Passive Aggressive Regressor	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Passive Aggressive Regressor	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa SGD Regressor	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa SGD Regressor	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa SOKNL	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa SOKNL	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa SOKNLBT	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa SOKNLBT	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Shrubs Regressor	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Shrubs Regressor	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Streaming Gradient Boosted Regression	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Streaming Gradient Boosted Regression	TrumpApproval	3.03954	3.79278	-3.91647	0.0570
CapyMoa Target Mean	ChickWeights	80.9862	107.597	-1.29592	0.0158
CapyMoa Target Mean	TrumpApproval	3.03954	3.79278	-3.91647	0.0570

Binary Classification Benchmark

model	dataset	Memory (Mb)	Time (s)	Accuracy	F1
CapyMoa Adaptive Random Forest	Bananas	0.00123024	1.66004	0.551321	0.00335289
CapyMoa Adaptive Random Forest	Elec2	0.00160694	18.5438	0.575322	0.00248821
CapyMoa Adaptive Random Forest	Phishing	0.00174141	0.621740	0.554400	0.0793388
CapyMoa Adaptive Random Forest	SMTP	0.00134182	32.5533	0.999685	0.0
CapyMoa Hoeffding Adaptive Tree	Bananas	0.00123024	1.73779	0.551321	0.00335289
CapyMoa Hoeffding Adaptive Tree	Elec2	0.00160694	19.7983	0.575322	0.00248821
CapyMoa Hoeffding Adaptive Tree	Phishing	0.00174141	0.642885	0.554400	0.0793388
CapyMoa Hoeffding Adaptive Tree	SMTP	0.00134182	37.9422	0.999685	0.0
CapyMoa Hoeffding Tree	Bananas	0.00123024	3.30920	0.551321	0.00335289
CapyMoa Hoeffding Tree	Elec2	0.00160694	24.3103	0.575322	0.00248821
CapyMoa Hoeffding Tree	Phishing	0.00174141	0.650951	0.554400	0.0793388
CapyMoa Hoeffding Tree	SMTP	0.00134182	34.6920	0.999685	0.0
CapyMoa Leveraging Bagging	Bananas	0.00123024	1.65763	0.551321	0.00335289
CapyMoa Leveraging Bagging	Elec2	0.00160694	18.9051	0.575322	0.00248821
CapyMoa Leveraging Bagging	Phishing	0.00174141	0.598805	0.554400	0.0793388
CapyMoa Leveraging Bagging	SMTP	0.00134182	32.9348	0.999685	0.0
CapyMoa Online Bagging	Bananas	0.00123024	1.65158	0.551321	0.00335289
CapyMoa Online Bagging	Elec2	0.00160694	18.7052	0.575322	0.00248821
CapyMoa Online Bagging	Phishing	0.00174141	0.612459	0.554400	0.0793388
CapyMoa Online Bagging	SMTP	0.00134182	32.6871	0.999685	0.0

Multiclass Classification Benchmark

model	dataset	Memory (Mb)	Time (s)	Accuracy	MicroF1	MacroF1
CapyMoa Adaptive Random Forest	ImageSegments	0.00291538	1.70487	0.125974	0.125974	0.125974
CapyMoa Adaptive Random Forest	Keystroke	0.00883865	25.5420	0.0195588	0.0195588	0.0195588
CapyMoa Leveraging Bagging	ImageSegments	0.00291538	1.74774	0.125974	0.125974	0.125974
CapyMoa Leveraging Bagging	Keystroke	0.00883865	25.4041	0.0195588	0.0195588	0.0195588
CapyMoa Naive Bayes	ImageSegments	0.00291538	1.79062	0.125974	0.125974	0.125974
CapyMoa Naive Bayes	Keystroke	0.00883865	24.4344	0.0195588	0.0195588	0.0195588
CapyMoa Online Bagging	ImageSegments	0.00291538	1.68916	0.125974	0.125974	0.125974
CapyMoa Online Bagging	Keystroke	0.00883865	29.4223	0.0195588	0.0195588	0.0195588