

Anomaly detection in quasi-periodic energy consumption data series: a comparison of algorithms - Annex

Basic Statistics Results

Performance: Averages:

	Fridge 1				Fridge 2				Fridge 3			
Training Period	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold
1 month	0.109	0.790	0.192	0.415	0.146	0.864	0.250	0.592	0.029	0.974	0.057	0.636
3 weeks	0.103	0.744	0.182	0.230	0.147	0.863	0.251	1.039	0.029	0.974	0.057	0.440
2 weeks	0.111	0.804	0.195	0.333	0.288	0.857	0.431	unlimited	0.029	0.974	0.057	0.835

	Precision		Recall		F1	
	avg	std	avg	std	avg	std
Fridge1	0.108	0.004	0.779	0.031	0.190	0.007
Fridge2	0.194	0.082	0.861	0.004	0.311	0.104
Fridge3	0.029	0.000	0.974	0.000	0.057	0.000
Overall	0.110	0.082	0.871	0.086	0.186	0.122

AR Results

Performance:

		Fridge 1				Fridge 2				Fridge 3			
Training Period	Window size	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold
1 month	0.5p	0.781	0.758	0.769	18.028	0.671	0.817	0.737	13.082	0.970	0.805	0.880	26.066
3 weeks	0.5p	0.744	0.769	0.756	18.872	0.676	0.816	0.739	13.806	0.970	0.805	0.880	26.690
2 weeks	0.5p	0.805	0.719	0.760	20.886	0.669	0.821	0.737	13.233	0.972	0.807	0.882	27.069

Averages:

	Precision		Recall		F1	
	avg	std	avg	std	avg	std
Fridge 1	0.7766	0.0305	0.7488	0.0261	0.7618	0.0067
Fridge 2	0.6717	0.0035	0.8179	0.0027	0.7376	0.0012
Fridge 3	0.9710	0.0011	0.8054	0.0009	0.8805	0.0010
Overall	0.8064	0.1324	0.7907	0.0345	0.7933	0.0663

ARIMA Results
Performance:

		Fridge 1				Fridge 2				Fridge 2			
Training Period	Window size	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold
1 month	0.5p	0.516	0.194	0.282	11.064	0.187	0.975	0.314	0.025	0.364	0.102	0.160	17.285
3 weeks	0.5p	0.507	0.204	0.291	11.263	0.187	0.975	0.314	0.025	0.329	0.079	0.127	19.449
2 weeks	0.5p	0.148	0.572	0.235	2.412	0.187	0.975	0.314	0.025	0.199	0.065	0.098	19.624

Averages:

	Precision		Recall		F1	
	avg	std	avg	std	avg	std
Fridge 1	0.390	0.210	0.324	0.215	0.270	0.030
Fridge 2	0.187	0.000	0.975	0.000	0.314	0.000
Fridge 3	0.297	0.087	0.082	0.019	0.128	0.031
Overall	0.292	0.144	0.460	0.414	0.237	0.087

LOF Results

Performance:

Training period	Window size	Fridge 1				Fridge 2				Fridge 3			
		Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold
1 month	3p	0.474	0.813	0.599	-0.113	0.532	0.787	0.635	-0.310	0.597	0.970	0.739	0.463
1 month	2p	0.432	0.900	0.584	0.129	0.686	0.684	0.685	-0.272	0.823	0.953	0.883	0.869
1 month	1p	0.352	0.876	0.503	-0.258	0.492	0.881	0.632	-0.387	0.926	0.969	0.947	1.749
1 month	0.5p	0.440	0.594	0.505	1.171	0.240	0.836	0.373	-0.331	0.076	0.934	0.141	0.835
3 weeks	3p	0.325	0.926	0.481	-0.149	0.510	0.735	0.602	-0.298	0.637	0.967	0.768	0.541
3 weeks	2p	0.435	0.963	0.599	-0.111	0.618	0.734	0.671	-0.322	0.864	0.956	0.908	0.777
3 weeks	1p	0.380	0.936	0.540	-0.135	0.445	0.849	0.584	-0.380	0.907	0.970	0.937	1.578
3 weeks	0.5p	0.333	0.652	0.441	1.520	0.268	0.914	0.414	-0.166	0.182	0.925	0.304	0.509
2 weeks	3p	0.461	0.932	0.617	0.630	0.537	0.626	0.578	-0.311	0.619	0.964	0.754	0.527
2 weeks	2p	0.720	0.869	0.788	0.981	0.563	0.775	0.652	-0.322	0.786	0.933	0.854	0.926
2 weeks	1p	0.365	0.917	0.523	-0.215	0.499	0.861	0.632	-0.381	0.896	0.970	0.931	2.085
2 weeks	0.5p	0.281	0.724	0.404	1.515	0.272	0.924	0.420	-0.166	0.188	0.933	0.313	0.703

Averages:

	Precision		Recall		F1	
	avg	std	avg	std	avg	std
Fridge 1	0.417	0.113	0.842	0.121	0.549	0.100
Fridge 2	0.472	0.142	0.801	0.093	0.573	0.108
Fridge 3	0.625	0.310	0.954	0.018	0.707	0.286
Overall	0.504	0.220	0.865	0.108	0.609	0.194

OC SVM

Performance:

Training period	Window size	Fridge 1				Fridge 2				Fridge 3			
		Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold	Precision	Recall	F1	Threshold
1 month	3p	0.474	0.813	0.599	-0.113	0.532	0.787	0.635	-0.310	0.597	0.970	0.739	0.463
1 month	2p	0.432	0.900	0.584	0.129	0.686	0.684	0.685	-0.272	0.823	0.953	0.883	0.869
1 month	1p	0.352	0.876	0.503	-0.258	0.492	0.881	0.632	-0.387	0.926	0.969	0.947	1.749
1 month	0.5p	0.440	0.594	0.505	1.171	0.240	0.836	0.373	-0.331	0.076	0.934	0.141	0.835
3 weeks	3p	0.325	0.926	0.481	-0.149	0.510	0.735	0.602	-0.298	0.637	0.967	0.768	0.541
3 weeks	2p	0.435	0.963	0.599	-0.111	0.618	0.734	0.671	-0.322	0.864	0.956	0.908	0.777
3 weeks	1p	0.380	0.936	0.540	-0.135	0.445	0.849	0.584	-0.380	0.907	0.970	0.937	1.578
3 weeks	0.5p	0.333	0.652	0.441	1.520	0.268	0.914	0.414	-0.166	0.182	0.925	0.304	0.509
2 weeks	3p	0.461	0.932	0.617	0.630	0.537	0.626	0.578	-0.311	0.619	0.964	0.754	0.527
2 weeks	2p	0.720	0.869	0.788	0.981	0.563	0.775	0.652	-0.322	0.786	0.933	0.854	0.926
2 weeks	1p	0.365	0.917	0.523	-0.215	0.499	0.861	0.632	-0.381	0.896	0.970	0.931	2.085
2 weeks	0.5p	0.281	0.724	0.404	1.515	0.272	0.924	0.420	-0.166	0.188	0.933	0.313	0.703

Averages:

	Precision		Recall		F1	
	avg	std	avg	std	avg	std
Fridge 1	0.564	0.181	0.765	0.207	0.600	0.111
Fridge 2	0.595	0.120	0.875	0.087	0.702	0.097
Fridge 3	0.877	0.069	0.947	0.030	0.909	0.036
Overall	0.679	0.192	0.862	0.148	0.737	0.156

ISOF Results

GRU Results

LSTM Results

GRU-MS Results

LSTM-MS Results

GRU-AE Results

LSTM-AE Results