

ARSER Execution Times (seconds)						
		# Features				Average Fold Change
		100	1,000	10,000	100,000	
# Samples	10	3.1	14	144	3,240	11.7
		1.6	4.7	26	258	
	20	3.5	19	192	3,600	10.0
		2.6	6.6	35	336	
	40	8.4	57	570	7,200	14.5
		3.3	9.0	49	480	
	80	9.6	72	720	8,400	11.4
		4.3	11	72	720	

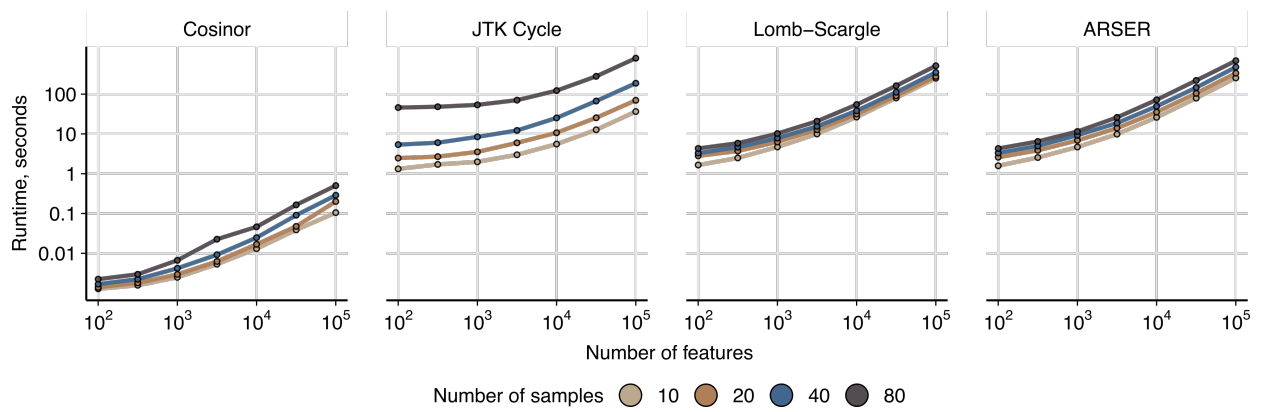
Original
Modified

JTK Cycle Execution Times (seconds)						
		# Features				Average Fold Change
		100	1,000	10,000	100,000	
# Samples	10	1.4	2.8	15	144	3.6
		1.3	2.0	5.5	37	
	20	2.2	5.5	33	312	4.0
		2.5	3.5	11	72	
	40	5.4	14	90	900	4.5
		5.4	8.4	25	186	
	80	48	84	426	3,960	4.5
		46	54	120	780	

Lomb-Scargle Execution Times (seconds)						
		# Features				Average Fold Change
		100	1,000	10,000	100,000	
# Samples	10	2.5	14	144	2,760	10.3
		1.7	4.7	26	252	
	20	3.3	17	162	2,940	9.7
		2.8	6.0	32	282	
	40	4.1	21	198	3,240	8.7
		3.3	7.8	38	348	
	80	5.9	30	294	4,080	7.5
		4.3	10	55	516	

Cosinor Execution Times (seconds)						
		# Features				Average Fold Change
		100	1,000	10,000	100,000	
# Samples	10	0.0054	0.031	0.29	3.30	29.1
		0.0013	0.0025	0.013	0.11	
	20	0.0056	0.032	0.32	2.88	14.8
		0.0014	0.0029	0.017	0.20	
	40	0.0060	0.037	0.31	3.24	11.3
		0.0017	0.0042	0.025	0.29	
	80	0.0066	0.041	0.38	5.16	10.0
		0.0022	0.0066	0.046	0.50	

**Supplementary Table S1. Performance improvements to rhythm detection algorithms.** ARSER, Lomb-Scargle, and JTK Cycle implementations are from R package MetaCycle version 1.1 and version 1.2 (contributed by the DiscoRhythm authors) for “original” and “modified”, respectively. Cosinor implementations are from R package HarmonicRegression version 1.0 and DiscoRhythm version 1.1.1 for “original” and “modified” implementations, respectively. To ensure all algorithms could be used, a period was chosen for each sample size such that samples span integers of the period (e.g., a sample size of N was assigned times from 1 to N and tested on a period of N). Performance tests were performed on a 2.66Ghz Intel Xeon (X5650) 6-core using R 3.6 and utilizing all available cores.



**Supplementary Fig. S1. Execution times of oscillation detection algorithms with varying number of samples and features.** Log-scale execution runtimes of each algorithm on datasets with increasing numbers of features (rows) and samples (columns) for the improved implementations of the algorithms.