Table 2

[Table 2]
- For accuracy evaluations other than GDFLex, please refer to prior works [22][23].
- GDFlex (72.8%) and GDFlex_top5 (80.8%) are obtained from the result_all.csv file, which is the output spreadsheet of Pub_GDFlex_exec("all", "interNoise"). On the next page, we explain the meaning of the columns in the spreadsheet.
-GDFlex_pick (86.8%) represents the accuracy when at least one of the six GDFLex variants (baseline, znormBias, intra, locMis, inter, interNoise) correctly detected the target. The results for each of the 250 datasets for each variant can be obtained from the result_all.csv file, which is output by the following command:

```
Pub_GDFlex_exec("all","baseline");
Pub_GDFlex_exec("all","znormBias");
Pub_GDFlex_exec("all","intra");
Pub_GDFlex_exec("all","locMis");
Pub_GDFlex_exec("all","inter");
Pub_GDFlex_exec("all","interNoise");
```

[Supplementary Information]
- The supplementary table below was derived by comparing the detection success rates of GDFlex, DAMP, and C22MP in the result_all.csv file generated by running Pub_GDFlex_execute("all", "interNoise").

Table 2

Method	Score	Method	Score
GDFlex_pick	86.8	Telemanom [11]	46.8
GDFlex_top5	80.8	MERLIN [19]	44.0
GDFlex	72.8	USAD [2]	27.6
C^{22}MP [23]	56.8	GANF [8]	24.0
DAMP [17]	55.6	LSTM-VAE [21]	19.8
NORMA [6]	47.4	TranAD [25]	19.0
MDI [3]	47.0	RRCF [10]	3.0

Supplementary table

Data	Data Count	Accuracy
C^{22}MP and DAMP Both Correct	129	96.9%
C^{22}MP Only Correct	13	76.9%
DAMP Only Correct	5	100%
Both Incorrect	103	40.8%

Spreadsheet (result_all.csv) and Execution Time Evaluation

- The result_all.csv file presents the success or failure results of anomaly detection for 250 datasets in the ML/UCR dataset. The first column contains the data ID.
- The 3rd, 8th, and 9th columns represent the success or failure results for GDFlex, DAMP, and C^{22}MP, respectively. The accuracy of each algorithm can be obtained by averaging the values in each column.
- The 6th column indicates the ranking of the score for the subsequence containing the correct answer, while the 5th column is set to 1 if it is included in the top-K. The average of this column represents the top-K accuracy.
- The 21st column shows the execution time for each dataset. From these execution times, the minimum time (0.7 sec), maximum time (1100 sec), and average time (71 sec) were calculated.
- For calculating the execution speed of 5000Hz per second in the ECG dataset, six files with data IDs ranging from 119 to 115 were used.

data ID ↓ GDFlex ↓ Top5 ↓ Ranking ↓ DAMP ↓ C^{22}MP ↓ Time ↓

data_id	spike_id	spikelet	inRange	top5	rank	damp	c22	anomaly_label_from	anomaly_label_to	window_label	spikelet_type	spikelet_from	spikelet_to	from_NN	to_NN	window_spikelet	distLengthNorm	numSpikelet	numSlidingWindow	time	total_length	testNumRate	adjust
1	81168	1	1	1	1	1	1	52000	52620	150	3	52115	52500	31631	32016	386	0.85497	1766	44647	55.98916	79795	1	NaN
2	56993	1	1	1	1	1	1	56600	56900	150	2	56590	57005	9668	10083	416	1.103953	1779	44853	51.45226	80001	0.881365	1
3	80073	1	1	1	1	1	1	46600	46900	140	0	46860	46893	20956	20989	34	1.013992	1767	44862	50.10473	80000	0.452827	NaN
4	5486	1	1	1	1	1	1	5400	5600	75	-2	5432	5592	2280	2440	161	1.388078	533	8427	2.167597	11000	0.423077	1
5	5391	1	1	1	1	1	1	5391	5392	20	-2	5390	5392	2406	2408	3	0.747031	691	4166	3.414245	8184	0.032766	NaN
246	303791	1	1	1	1	0	0	270800	271070	250	-3	270778	270933	87716	87871	156	0.884948	6162	199408	760.3078	299867	0.724544	NaN
247	121775	1	1	1	1	0	0	121900	121980	200	-2	121735	122113	15648	16026	379	1.163985	4857	149591	296.9652	200000	0.949531	1
248	6431	0	1	1	3	0	0	4702	4707	25	-2	6254	6435	664	845	182	1.067845	2151	6409	6.662975	8432	0.963716	NaN
249	8285	1	1	1	1	0	0	8285	8315	25	-2	8268	8302	2455	2489	35	0.764426	2674	7748	13.70504	10524	0.570798	NaN
250	12588	0	1	0	434	0	0	7290	7296	25	4	3860	3922	1753	1815	63	0.959683	2624	7494	10.75143	10468	0.822084	NaN
		0.728		0.808		0.536	0.568												55972.45	70.85711			

Supplementary table A

[Supplementary Information]
- The supplementary table below was derived by comparing the detection success rates of GDFlex, DAMP, and C22MP in the result_all.csv file generated by running Pub_GDFlex_execute("all", "interNoise").

Table A presents a comparison of the number of successes and failures between C22MP and DAMP on the ML/UCR dataset. Since GDFlex is based on adapted Euclidean distance, it generally succeeds in cases where DAMP performs well. However, there are four cases where both DAMP and C22MP succeed but GDFlex fails. The details are as follows:
- Failure to properly extract the waveform (ID241).
- Missing Localized Mismatch Bias (ID195).
- Failing to select the earliest occurrence among multiple similar anomalous patterns (ID223).
- Presence of subsequences with almost identical scores in base-scale (ID65 in Figure 16. left).

Supplementary table A: A detailed comparison of GDFlex, C22MP, and DAMP on the ML/UCR dataset.

Data	Data Count	Accuracy
C22MP and DAMP Both Correct	129	96.9%
C22MP Only Correct	13	76.9%
DAMP Only Correct	5	100%
Both Incorrect	103	40.8%

Supplementary Figure A.

```
cd ./src
dataIdStrList = {'065','067','210'...
;'065','067','210'};
RangeCell = {[8824,8842,308,326],[5572,5596,4709,4733],[70097,70201,34957,35061]...
;[7004,7028,2036,2060],[7013, 7037,2436,2460],[74901, 74998, 4429, 4526]}; ;
Pub_GDFlex_observation_Row2NN(dataIdStrList,RangeCell);
```

C22MP succeeds in three cases where both DAMP and GDFlex fail. Two involve intra-timescale anomalies that are indistinguishable at any scale using Euclidean distance (ID67 and ID210; Figure A, center and right). The third (ID226) was detected by GDFlex's baseline but became a false negative when inter-timescale subsequences were considered due to noise. In 41 cases, GDFlex outperforms both C22MP and DAMP, primarily due to challenges in selecting the optimal window size. DAMP struggles with noise in larger windows, while C22MP faces increased subsequence complexity, hindering feature extraction.

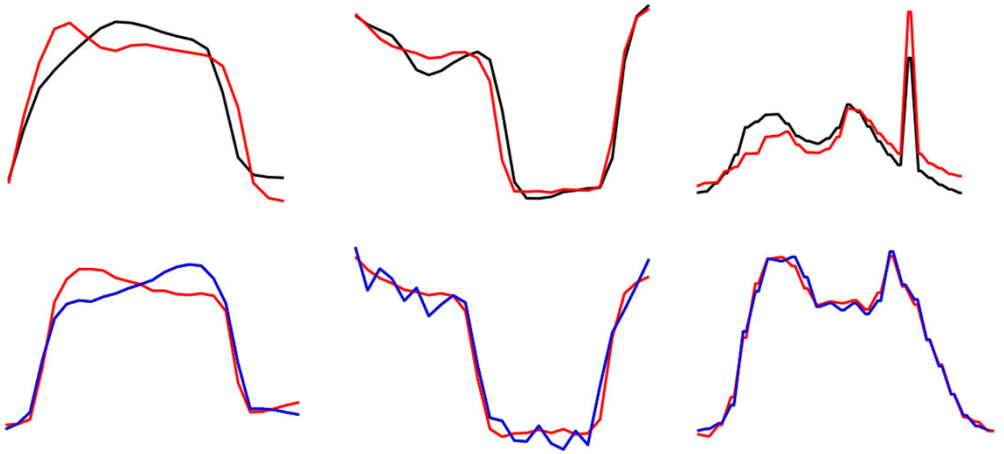

Figure A: In the Top row are subsequence pairs where GDFlex failed to detect anomalies, while in the Bottom row are discord pairs that include the anomaly Ground Truth. *left*) A snippet from the insect EPG dataset (ID65). Normal data (above) exhibits a discord score nearly identical to that of the anomaly (below). *middle*) A snippet from the insect EPG dataset (ID67). A small fluctuating anomaly (below) that is difficult to detect using Euclidean distance and requires features related to fluctuations. *right*) A snippet from the Italian power demand dataset (ID210). Similar to the middle case.

Fig. 16

- The results for each of the 250 datasets for each variant can be obtained from the result_all.csv file, which is output by the following command:

```
Pub_GDFlex_exec("all","baseline");
Pub_GDFlex_exec("all","znormBias");
Pub_GDFlex_exec("all","intra");
Pub_GDFlex_exec("all","locMis");
Pub_GDFlex_exec("all","inter");
Pub_GDFlex_exec("all","interNoise");
```

- Fig. 16 can be plotted using the following command with the accuracy rates from each result_all.csv file.

```
cd ./src
Name = 'evalAblation';
Pub_GDFlex_evalAblation(Name);
```

Method	Accuracy
baseline	52.8
znormBias	60.4
intra	66.0
locMis	68.8
inter	70.0
interNoise	72.8