Supplementary Material: A Framework to Evaluate Early Time-Series Classification Algorithms

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A Barplots of Results per Dataset

In this section we present the barplots with the results from our evaluation.

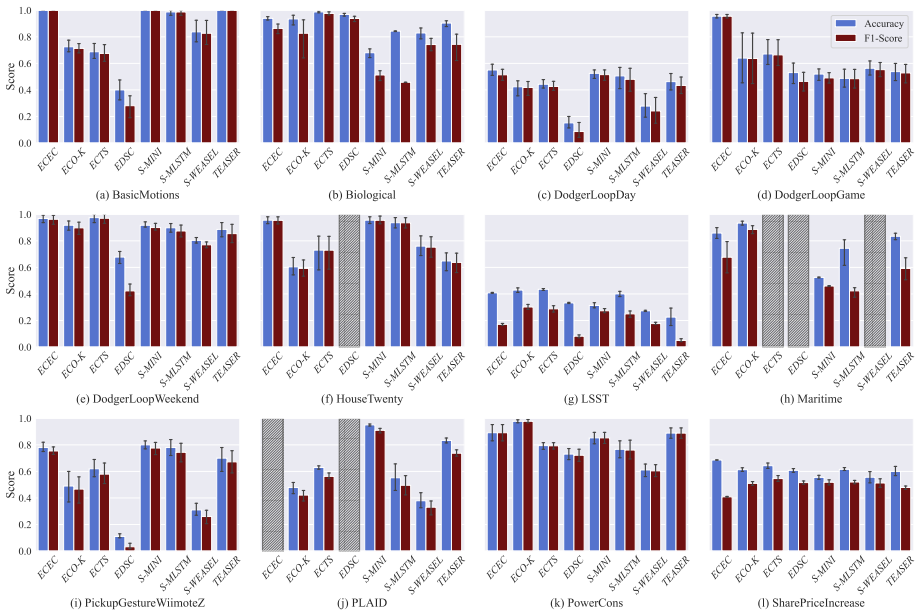

Figure 1: Accuracy and F_1-Score.

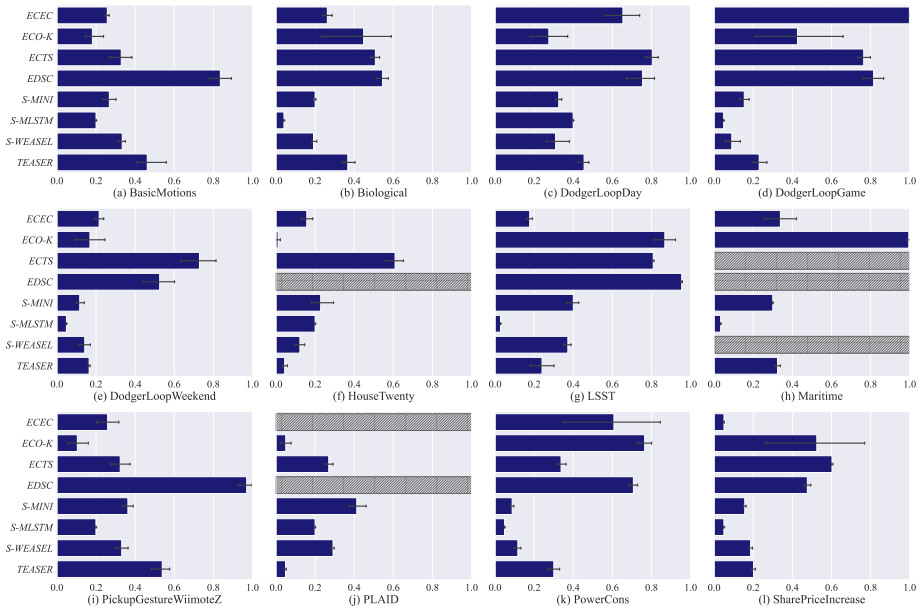

Figure 2: Earliness (lower values are better).

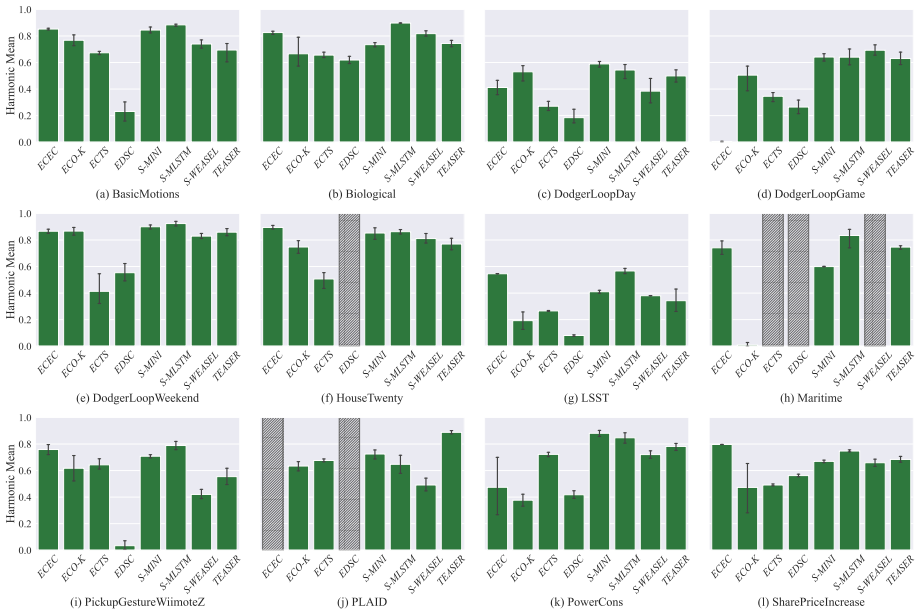

Figure 3: Harmonic Mean between earliness and accuracy.

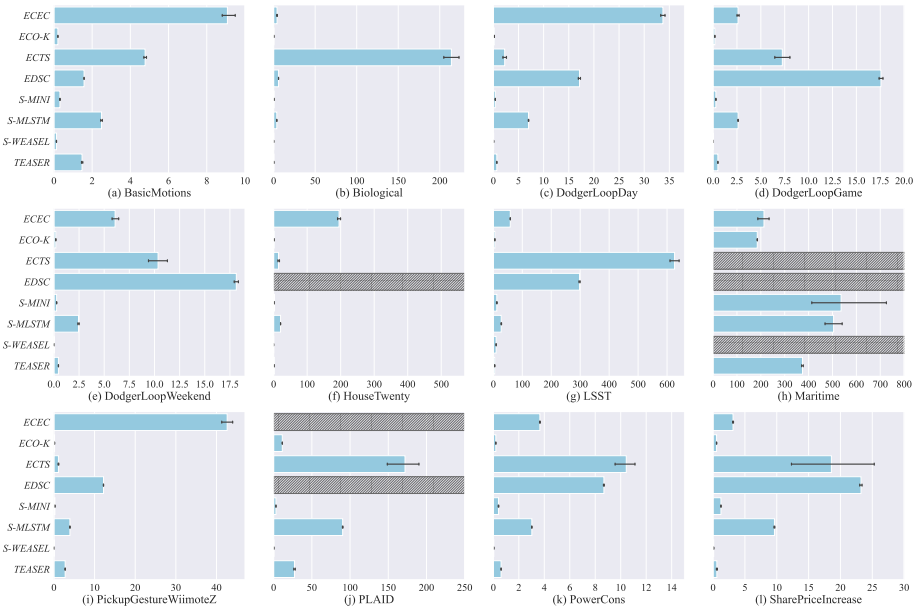

Figure 4: Training times (x-axis scale varies, lower values are better).

B Details of Incorporated Datasets

We hereby provide a brief overview of the contents of each dataset.

BasicMotions This dataset contains measurements from smart watches wore by four students performing different tasks. The measurements correspond to accelerometer and gyroscope 3-dimensional values. The labels correspond to a specific type of motion, in particular walking, resting, running, and playing badminton. The frequency of the measurements in this dataset is 10 Hz, and the duration of the time-series is 10 seconds. Figure 5 illustrates the mean and standard deviation of the measurements at each time-point, for the different variables categorized by the class labels assigned.

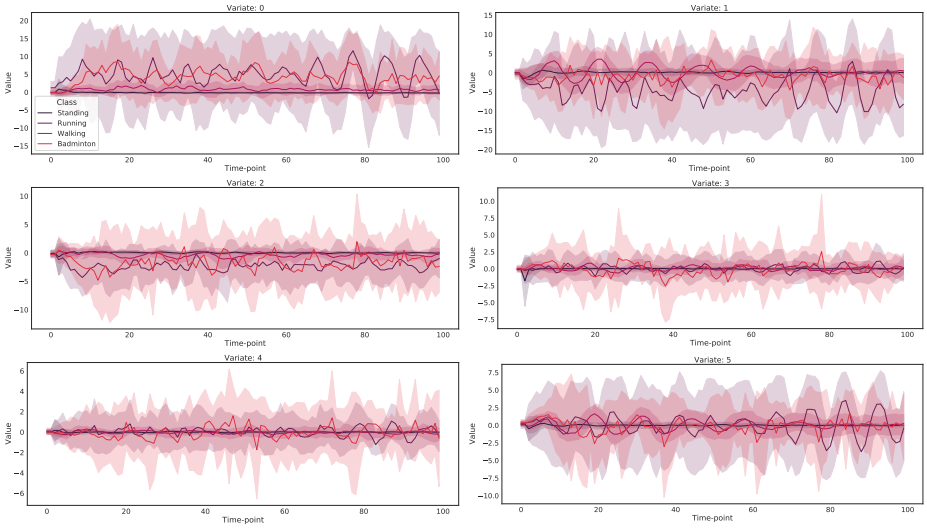

Figure 5: BasicMotions dataset: Mean and standard deviation of each variable's time-points per class.

Biological The summary is given in Figure 6.

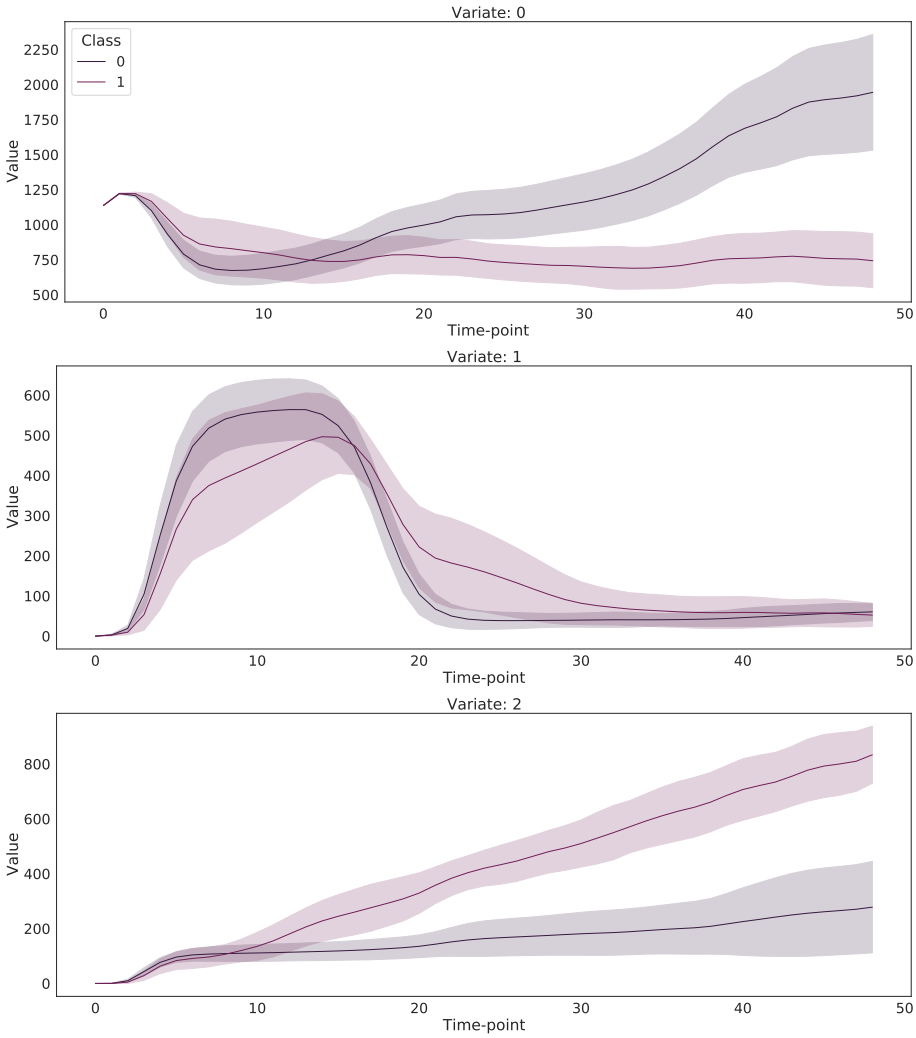

Figure 6: Biological dataset: Mean and standard deviation of each variable's time-points per class.

DodgerLoopDay This dataset contains measurements regarding the number of cars passing by a freeway ramp in Los Angeles, which is located close to a baseball stadium and where traffic is impacted when a game is scheduled. The frequency of measurements is 5 minutes and each class corresponds to a day of the week, Sunday to Saturday, respectively. Figure 7 illustrates the mean and standard deviation of the measurements at each time-point, for the different variables categorized by the class labels assigned.

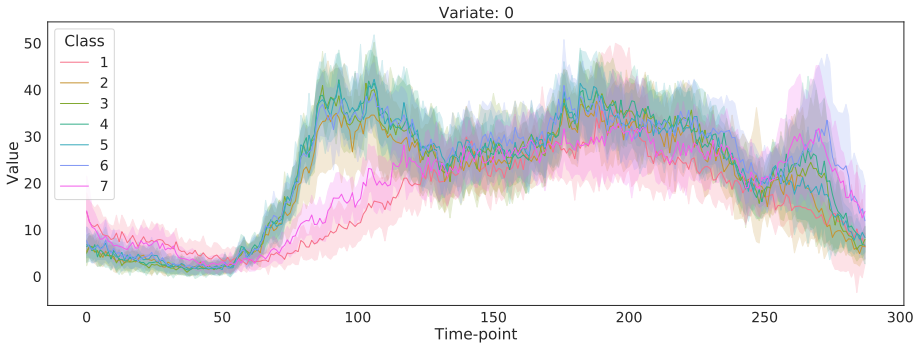

Figure 7: DodgerLoopDay dataset: Mean and standard deviation of each variable's time-points per class.

DodgerLoopGame This dataset's measurements are the same as the previous case, however here we have only two classes that correspond to normal and game days. Figure 8 summarizes the measurements contained in this dataset.

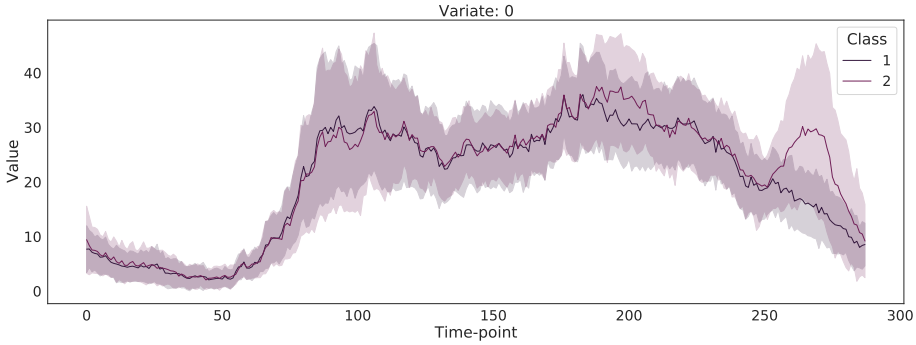

Figure 8: DodgerLoopGame dataset: Mean and standard deviation of each variable's time-points per class.

DodgerLoopWeekend In this case, the measurements are the same as the two previous datasets, but now the class labelling is performed according to if the day is a week day or a weekend (see, Figure 9).

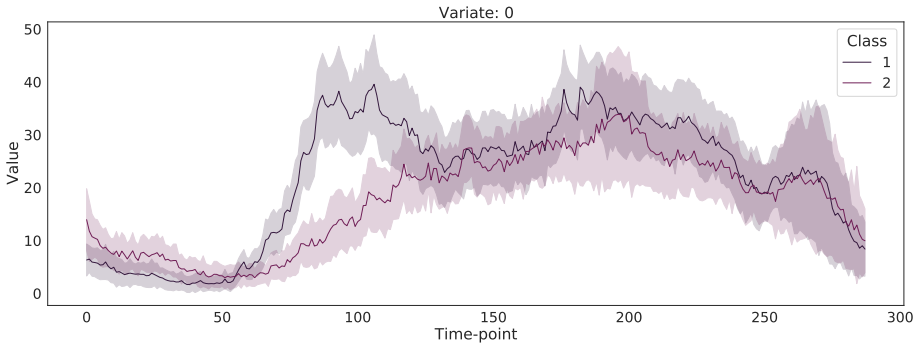

Figure 9: DodgerLoopWeekend dataset: Mean and standard deviation of each variable's time-points per class.

HouseTwenty This dataset includes electricity consumption measurements originating from a house in a UK area. The two classes correspond to aggregate electricity consumption (label "1") and to washing machine and tumble dryer aggregate (label "2") with an 8 second frequency of measurements. The summary of this dataset's values is given by Figure 10

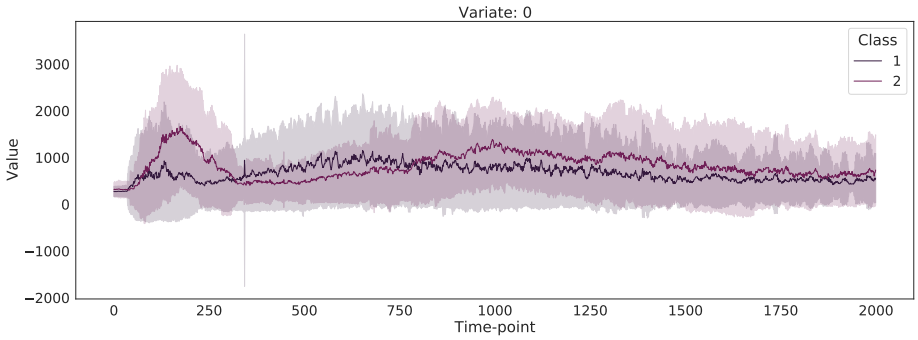

Figure 10: HouseTwenty dataset: Mean and standard deviation of each variable's time-points per class.

LSST In this case the measurements originate from simulations of astronomical time-series observations that are expected to be captured by the Large Synoptic Survey Telescope. These values describe the brightness of an object in terms of 6 photometric passbands. The class labels indicate the type of the astronomical object. The summary is given in Figure 11.

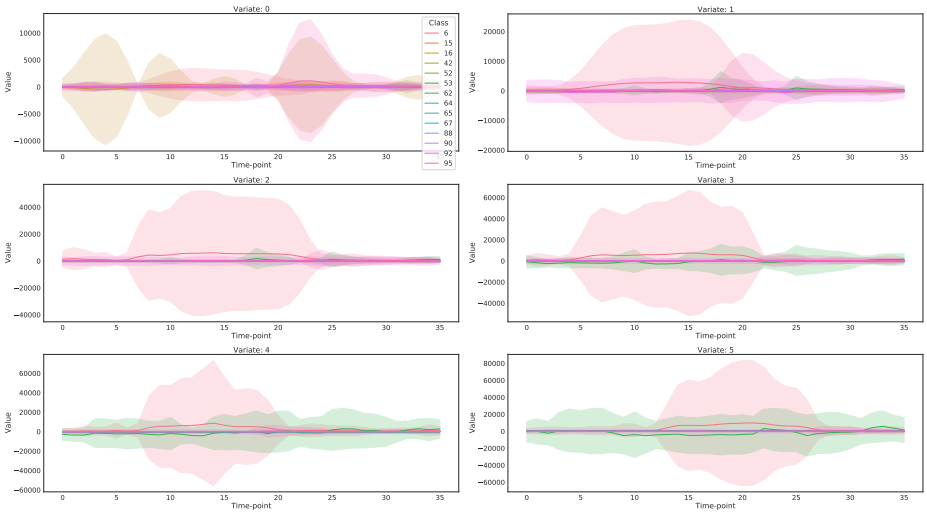

Figure 11: LSST dataset: Mean and standard deviation of each variable's time-points per class.

Maritime The summary of this dataset is given in Figure 12.

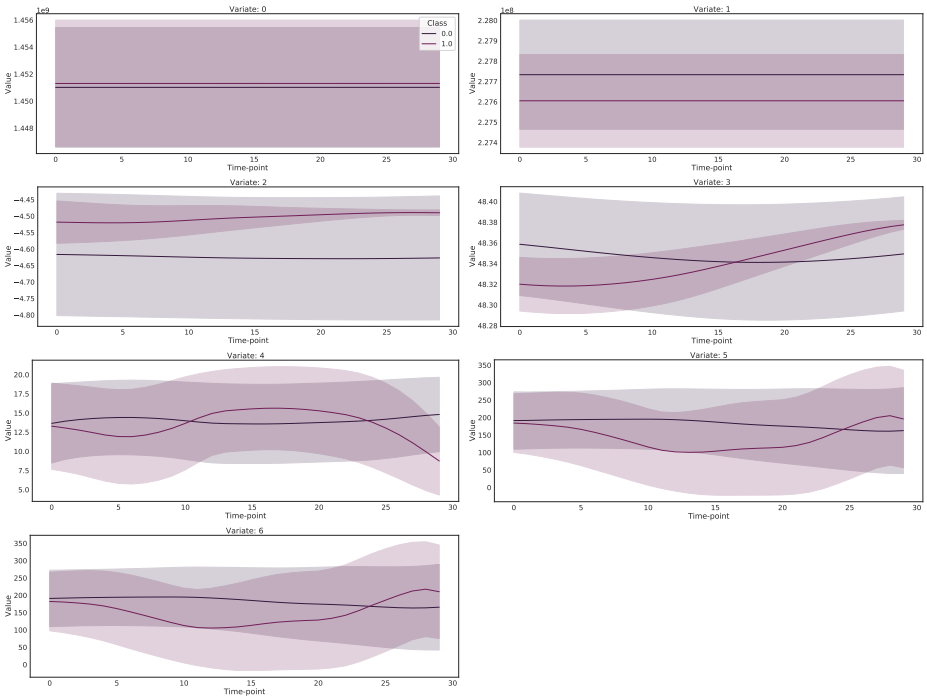

Figure 12: Maritime dataset: Mean and standard deviation of each variable's time-points per class.

PickupGestureWiimoteZ This dataset contains Z-axis acceleration measurements from a video game controller, as 10 persons pick it up a number of times. The labels correspond to each different person, and the frequency of measurements is 100 per second. In this case the length of the time-series varies (see Figure 13).

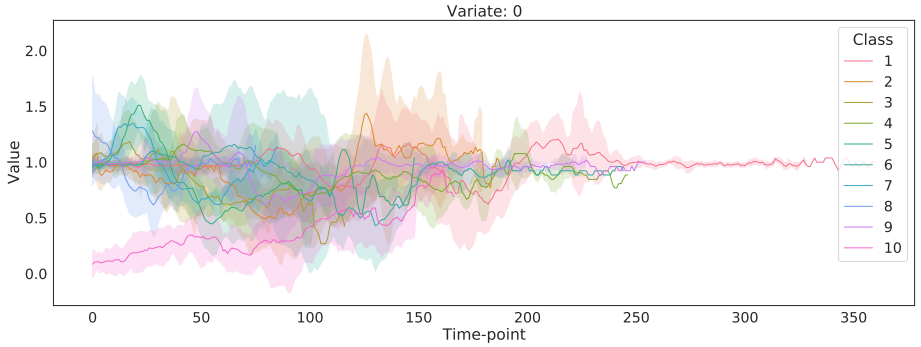

Figure 13: PickupGestureWiimoteZ dataset: Mean and standard deviation of each variable's time-points per class.

PLAID This case includes high frequency (30kHz) current and voltage measurements from different types of electrical appliances operating at different states. Each class label encodes the type of the appliance, and in this case two, the length of the instances varies. The dataset summary is given in Figure 14.

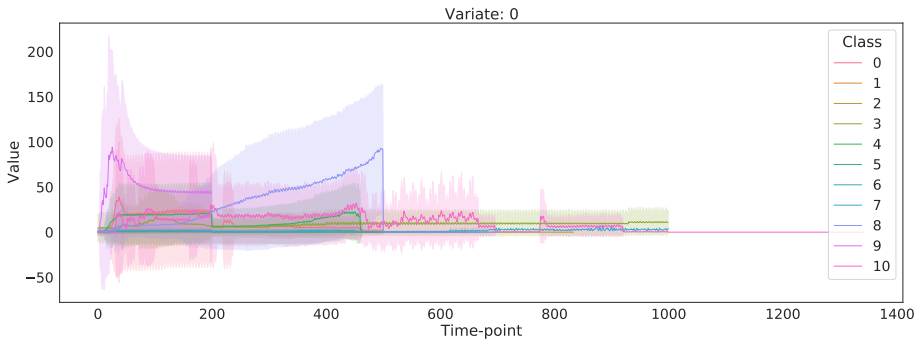

Figure 14: PLAID dataset: Mean and standard deviation of each variable's time-points per class.

PowerCons This is another dataset that contains household electricity consumption measurements, divided into two classes, during warm (label "1"), and cold (label "2") periods. The frequency of observations is 10 minutes. The summary is given in Figure 15.

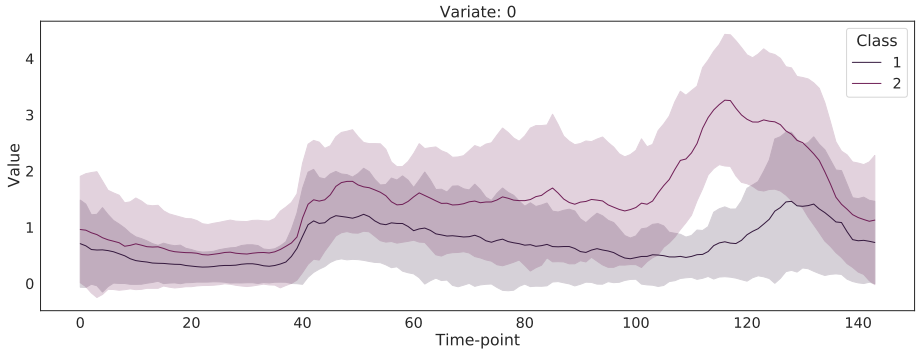

Figure 15: PowerCons dataset: Mean and standard deviation of each variable's time-points per class.

SharePriceIncrease The last dataset that we incorporate from the UEA & UCR repository includes signals of share price evolution over time in the form of close price percentage change during a day for the past 60 days. The class label indicates if the share price did not increase after Earning Per Share report releases more than 5% (label "0"), or if it increased more (label "1"). The summary is given in Figure 16.

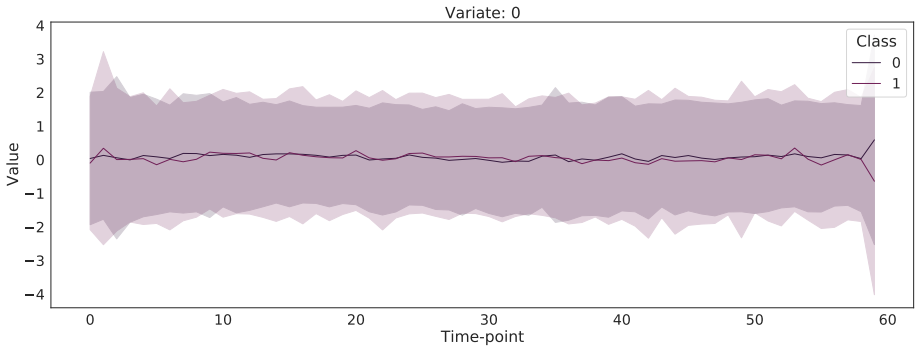

Figure 16: SharePriceIncrease dataset: Mean and standard deviation of each variable's time-points per class.

Table 1 presents the characteristics of all datasets used in our experimental evaluation.

Dataset Name	No. of Variables	No. of Instances (Height)	No. of Time-points (Length)	No. of Classes	Class Imbalance Ratio	Coefficient of Variation
BasicMotions	6	80	100	4	1	608.91
Biological	3	644	49	2	5.37	1.06
DodgerLoopDay	1	158	288	7	1.25	0.63
DodgerLoopGame	1	158	288	2	1.07	0.63
DodgerLoopWeekend	1	158	288	2	2.43	0.63
HouseTwenty	1	159	2,000	2	1.27	1.10
LSST	6	4,925	36	14	111	69.16
Maritime	7	80,591	30	2	4.21	2.08
PickupGestureWiimoteZ	1	100	361	10	1	0.41
PLAID	1	1,074	1,345	11	6.73	3.01
PowerCons	1	360	144	2	1	0.97
SharePriceIncrease	1	1,931	60	2	2.19	24.21

Table 1: Dataset characteristics.