Task 0

The 3 univariate time series datasets chosen for the tasks are ECG200, Coffee and Wafer dataset.

Task 1

1st model -It has an Input Layer followed by a Flatten layer and then 5 Fully connected dense layers and then output layer. Avg score of model - 0.7452

2nd model - The model has a SimpleRNN layer and a second SimpleRNN layer stacked on top and then an output layer Avg score of model - - 0.6381

3rd model - The model has an input layer ,then a Conv1D layer with 16 filters and a kernel size of 3. Following the convolutional layer, a MaxPooling1D layer is used with a pool size of 2. This is followed by another Dense layer and then an output layer. Avg score of model - 0.6957

4th model – The model has a Conv1D layer with 64 filters and a kernel size of 3. Then a second Conv1D layer followed by a GRU layer and a Dense output layer. Avg score of model - 0.6488

Task 2

CNN Classifier
ECG200 dataset - CNNClassifier Test Accuracy: 0.82
coffee dataset-CNNClassifier Test Accuracy: 1.0
Wafer dataset -CNNClassifier Test Accuracy: 0.9928617780661908

Fully connected network

ECG200 dataset – 0.6400

Coffee dataset - 0.4643

Wafer dataset – 0.8921

MLP network

ECG200 dataset – 0.6600

Coffee dataset – 0.8929

Wafer dataset – 0.9481

Rank of classifiers

1. CNN Classifier average accuracy 0.938,
2. MLP Network average accuracy 0.834,
3. Fully Connected Network average accuracy 0.665

Model structures constructed

The MLP model has a Flatten Layer followed by 3 Dense layers .After Each dense layer there is a Dropout layer with increasing Dropout rates. Then there is an Output layer.

The FCN model has an Input layer followed by Conv1D layer and a Batch Normalization layer.This is repeated 3 times.Then there is GlobalAveragePooling layer and an output layer.

Task 3

For task 3 chose an MLP model and tried to improve it by using a BoxCoxTransformer and Rocket transformer on the time series data before inputting it to the model.

Test scores of the model

ECG200 dataset - 0.6500

Coffee dataset -0.4643

Birdchicken – 0.5000

Task 4

Dataset chosen -Coffee

(classifier, transformer) used – 2 Transformers Rocket and Exponent

Classifier used – RandomForest

Parameters tried to optimize - 'rocketclassifier__num_kernels': [1, 10, 20, 100, 1000],

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'exponenttransformer__power': [1,2,3,4,5],
'randomforestclassifier__n_estimators': [100, 200, 300]
```

Test score of best model -1.0

Test score with default setting – 1.0

Task 5

Best model – FCN model accuracy – 0.8611

Tapnet – 0.4

Rocket – 0.38

The class labels are encoded in the dataset before input to the Model.