**ML Internship Task 1**

**Objective:**

The goal of this task is to develop a classification model that can accurately classify a labeled univariate time series dataset into one of four classes with a target accuracy of 95% or higher

**Dataset:**

* You are provided with a labeled univariate time series dataset. Each data point consists of a time series and its corresponding class label (one of four possible classes).

**Requirements:**

1. **Data Preprocessing**:
   * Inspect and clean the data (handle missing values, outliers, etc.).
   * Normalize or standardize the data as necessary to improve model performance.
   * Perform any necessary feature engineering to extract useful information from the time series.
2. **Model Selection and Development**:

Evaluate different classification algorithms suitable for time series data. Possible models include:

* + Classical machine learning models (e.g., SVM, Random Forest, KNN).
  + Deep learning models (e.g., LSTM, GRU, CNN).
  + Hybrid models (e.g., CNN-LSTM).

1. **Model Training**:

* Split the data into training and validation sets (if not already split).
* Train the selected model(s) on the training set.
* Use appropriate evaluation metrics (accuracy, precision, recall, F1-score) to assess model performance on the validation set.
* Fine-tune hyperparameters to optimize model performance.

1. **Model Evaluation**:

* Evaluate the final model on the test set to ensure it generalizes well to unseen data.
* Aim for an accuracy of 95% or higher on the test set.
* If the target accuracy is not achieved, iterate on the model by trying different preprocessing techniques, model architectures, or hyperparameter tuning.

1. **Documentation**:

* Evaluation results and final model performance.

**Deliverables:**

1. **Results Report**: Accuracy graphs, F1 score, precision, recall.
2. **Code**
3. **Final Model**:
   * The trained model saved in a format that can be loaded and used for future predictions.

**Deadline to report:**

**21-June 2024**