**Student Name:** **Weight:** 15%

**Student ID:** **Marks:** /40

# Lab 2 : Time Series Analysis and Forecasting

Time series datasets consist of a sequence of observations that vary with time (e.g., hourly, daily, weekly, monthly). Time series analysis gathers useful information from these datasets about how data values change over time and to make predictions for the future, using either statistical or machine learning models. In this lab, you’ll use a daily average temperature dataset to make predictions.

## Equipment and Materials

To build machine learning models using ensemble you will need:

* A computer with a minimum of 16 GB RAM and 250 GB of free disk space
* Access to the Anaconda environment with [Jupyter Notebook](https://jupyter.org/install) (https://jupyter.org/install).
* Download the dataset: **dailyaveragetemperature.csv** from Brightspace.

## Instructions

Using what you learned in the lectures on model development using time series algorithms, complete the following tasks. See the *Marking Criteria* section below for details on how you will be assessed.

### Part A: Predict Daily Average Temperature

**Note:** Use the heartdisease.csv dataset for this part.

1. Import the required Python libraries.
2. If you haven’t already done so, download the dataset: **dailyaveragetemperature.csv** from Brightspace.

**Note:** The average temperature is the target variable.

1. Plot your data to check whether the data is stationary or non-stationary.
2. Implement ARIMA (auto regression integrated moving average) to predict the average temperature.

## Deliverables

Submit the following items to Brightspace by the due date shown in the course calendar:

* Zip folder containing the dataset and your completed Jupyter Notebook file

Labs submitted after the due date will receive a mark of zero (0).

# Marking Criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **Needs Improvement** | **Good** | **Excellent** | **Marks** |
| **Libraries** | No libraries are imported.  (0 marks) | Some required libraries are imported. (2 marks) | All required libraries are imported. (5 marks) | /5 |
| **Target Variable Plotting** | Target variable is not plotted.  (0 marks) | Target variable is somewhat plotted.  (3 marks) | Target variable is plotted correctly to determine whether data is stationary.  (15 marks) | /15 |
| **AMIRA implementation** | AMIRA is poorly implemented. (2 marks) | AMIRA is somewhat implemented.  (10 marks) | AMIRA is perfectly implemented. (15 marks) | /15 |
| **Code Documentation** | Code is not documented.  (0 marks) | Code is somewhat documented. (2 marks) | Code is well documented. (5 marks) | /5 |
| **Total** | | | | **/40** |