**Project Brief for Data Analysis and Modelling Task**

**Objective**: Develop a statistical model to establish the relationship between a target variable and five key influencing parameters using data **from the year 2021**. The target variable exhibits non-linear, sinusoidal variation over time, represented by a combination of sine and cosine functions.

**Key Requirements:**

**Data Characteristics**: The dataset shows time-varying behaviour with a sinusoidal pattern. The variation is complex, involving a mix of sine and cosine curves.

**Target Value Limit**: The target value has an upper limit of approximately 16. The model should be capable of recognizing and validating this upper limit by closely predicting values around this threshold.

**Model Development**: Construct a model that accurately represents the relationship between the target value and the influencing parameters. The model should account for the non-linear, time-dependent nature of the data.

**Statistical Analysis**: After developing the model, evaluate its performance using key statistical metrics. Ensure the model fits well with the observed data and reliably predicts the target value within the specified constraints.

**Output: The final deliverable should include:**

* A detailed statistical model (MATLAB Code or R code).
* Analysis of the relationship between the target and influencing parameters (Equation).
* Validation of the model's accuracy and fit using statistical parameters (R-square, MSE, RMSE, PAME).

**Validation:** The model should be validated using the **dataset from 2022 and 2023**. Note that the model should be capable of reproducing the same R-square (above 0.8) for the validation dataset.

Expected Sample Equation:

**Y\_model(t) = b1 + b2⋅|sin(b3t + b4)|b18 + b5⋅|cos(b6t + b7)|b19 + b8⋅X1b11 + b9⋅|X2|b12 + b10⋅|X3|b13 + b14⋅|X4|b15 + b16⋅|X5|b17**

Where X1, X2, X3, X4, and X5 are influencing parameters and 'b' represents the model fitting coefficients. This equation is just a starting point and can be modified for improving the model.

Thank you.