EGYPTIAN UNIVERSITIES TRAINING SATELLITE

SUMMER TRAINING 2021

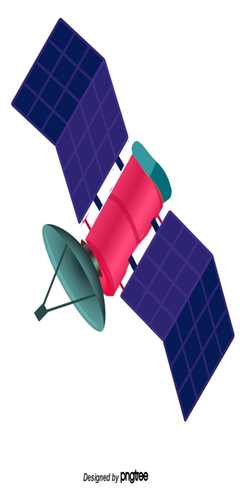
ANOMALY DETECTION FOR SATELLITE TELEMETRY DATA

T42 - COMPUTER AND ARTIFICIAL INTELLIGENCE HELWAN UNIVERSITY

Introduction

What is Telemetry Data?

Telemetry Definition:
Telemetry is the automated communication processes from multiple data sources. Telemetry data is used to improve customer experiences, monitor security, application health, quality, and performance.



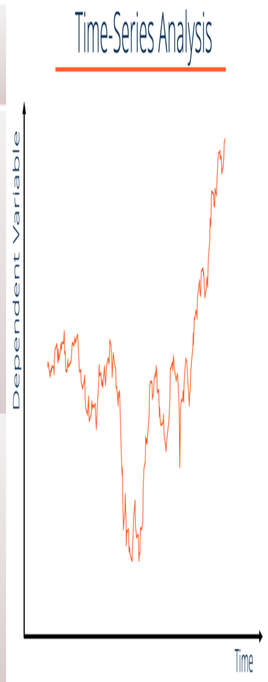
Dataset Description

Our Datasets consist of Two CSV file
- first file with Colum date and Temperature
- Second file with Two columns Date and Sunspots

What is Time Series?

A time series is a sequence of data points that occur in successive order over some period of time

It Include Analysis AS:
- Time Series Analysis
- Time Series Forecasting



Project Aim

The Project aim to analysis and predict Temperature data that come from satellite Over interval of time through various time series analysis Algorithms

Requirements and tools

- For our work, our implementation language is Python 3
- Using Library as:
  - Pandas Library For Data Manipulation Processing
  - NumPy Library For Array manipulation
  - Matplotlib Library For Data Visualization
  - Scikit-learn Library for calculate Mean square error between Actual and Predicted data
  - Statsmodels Library For ARIMA & ARMA
- Our Work Done Under Jupiter environment

Working Plan and Algorithms Used

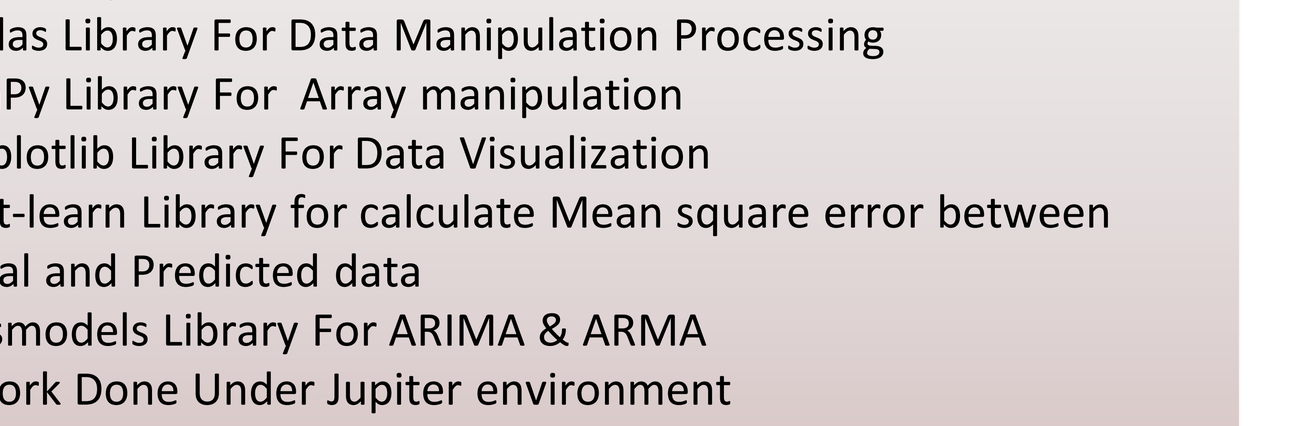
1-Data Preprocessing

Our first step was Clean and Analysis datasets, In Cleaning data set we depends on Remove missing value from dataset and change data type for some columns in the data

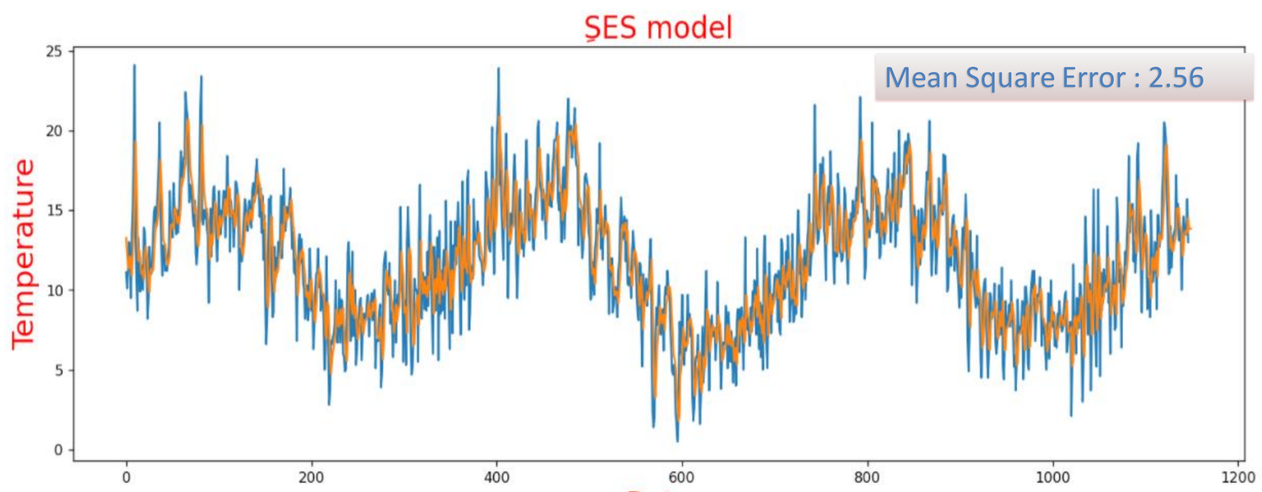
Algorithms used

- ARIMA
- ARMA
- Simple Exponential Smoothing “SES”
- Long Short Term Memory ‘LSTM’
- XGBosst Regression
- Gated recurrent Unit “GRU”
- We used best Algorithms Model For Datasets to be shown:

GRU Algorithm



Simple Exponential Smoothing



Conclusion

- We learnt about time series data, data analysis and unsupervised machine learning models used on time series data for anomaly detection.
- Best Algorithm that predict data based on mean square error
- For Dataset 1 is :
- For Dataset 2 is :

The Team Behind this Work

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