


Power Consumption Forecasting using Time Series Analysis

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Course: MSc in Data Analytics
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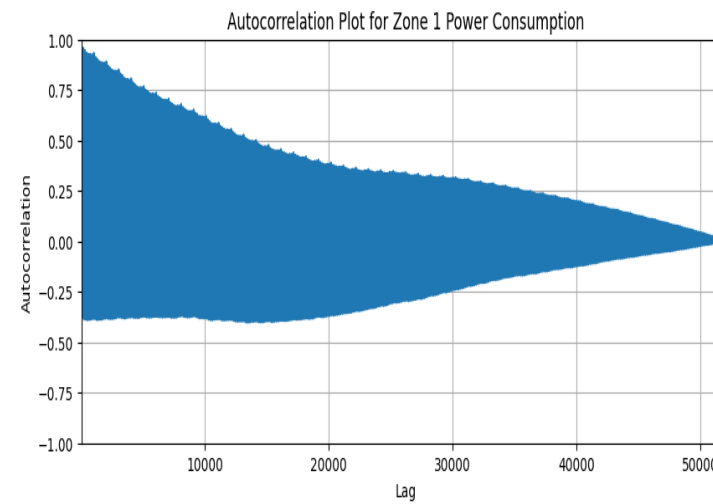
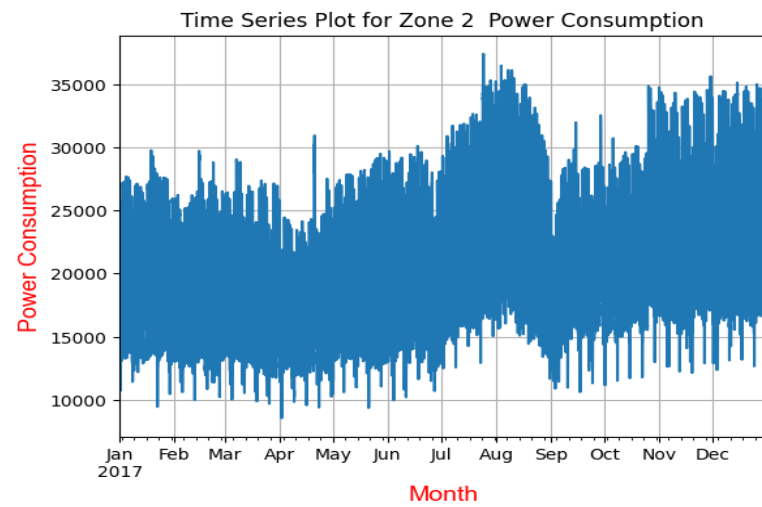
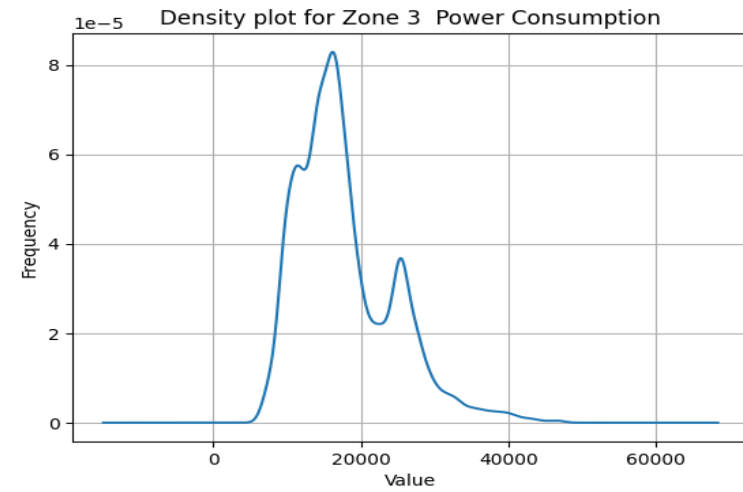
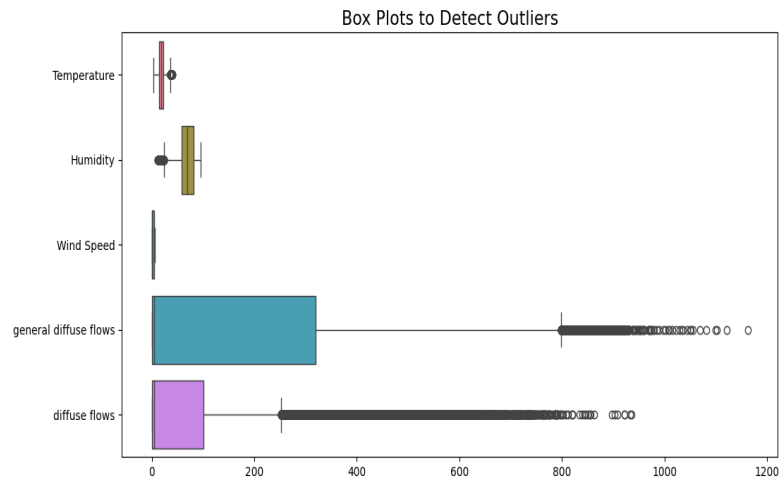
Research Question

Explore the effectiveness of time-series models like ARIMA, SARIMA, LSTM, with PCA, and Factor Analysis on time-series data for Power Consumption forecasting in Tetouan City.

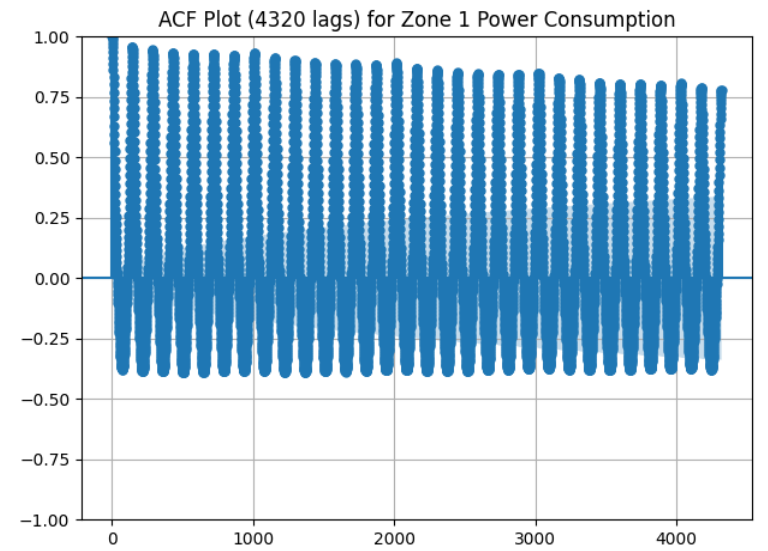
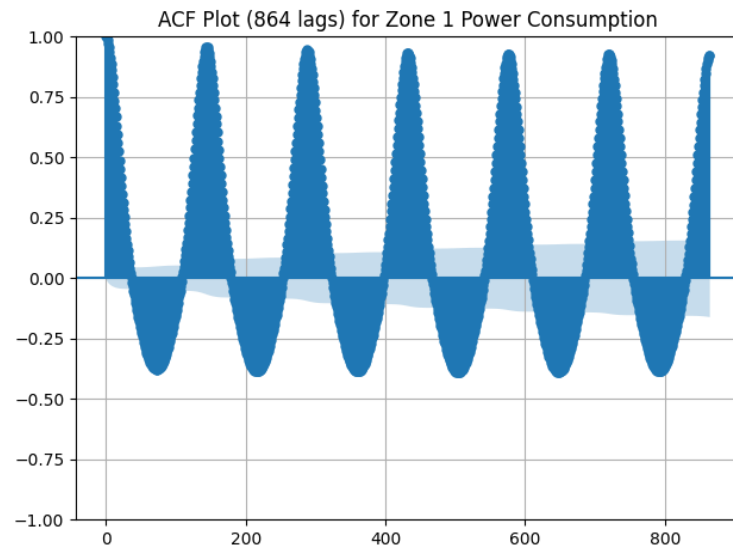
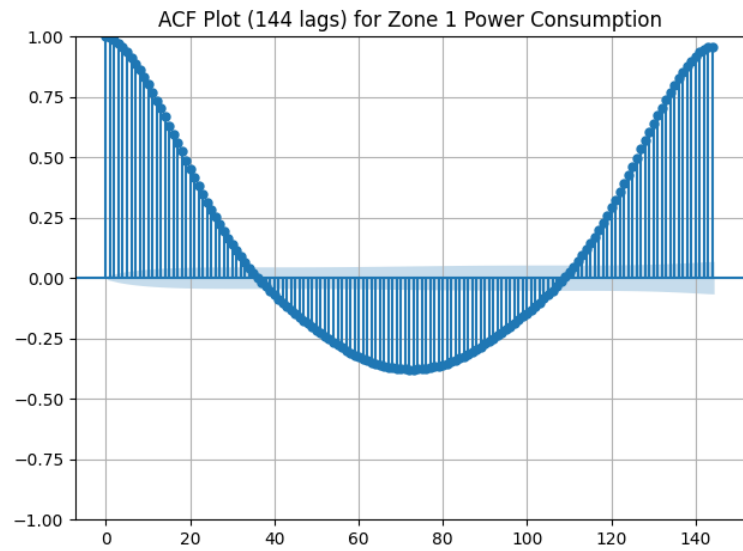
Dataset

Name	Description
Datetime	Data recorded every 10 mins
Temperature	Temperature of Tetouan City
Humidity	Humidity level in Tetouan City
Wind Speed	Wind speed in Tetouan City
General Diffuse Flows	General diffuse flows in the city
Diffuse Flows	Diffuse flows in the city
Zone 1 Power Consumption	Power consumption in Zone 1
Zone 2 Power Consumption	Power consumption in Zone 2
Zone 3 Power Consumption	Power consumption in Zone 3

EDA



EDA



Models and Methods

Following are the models and methods explored for this project:

ARIMA

Analyze and forecast univariate time-series data.
Assumptions: Linearity and stationarity.
Captures **trends and autocorrelation patterns**

SARIMA

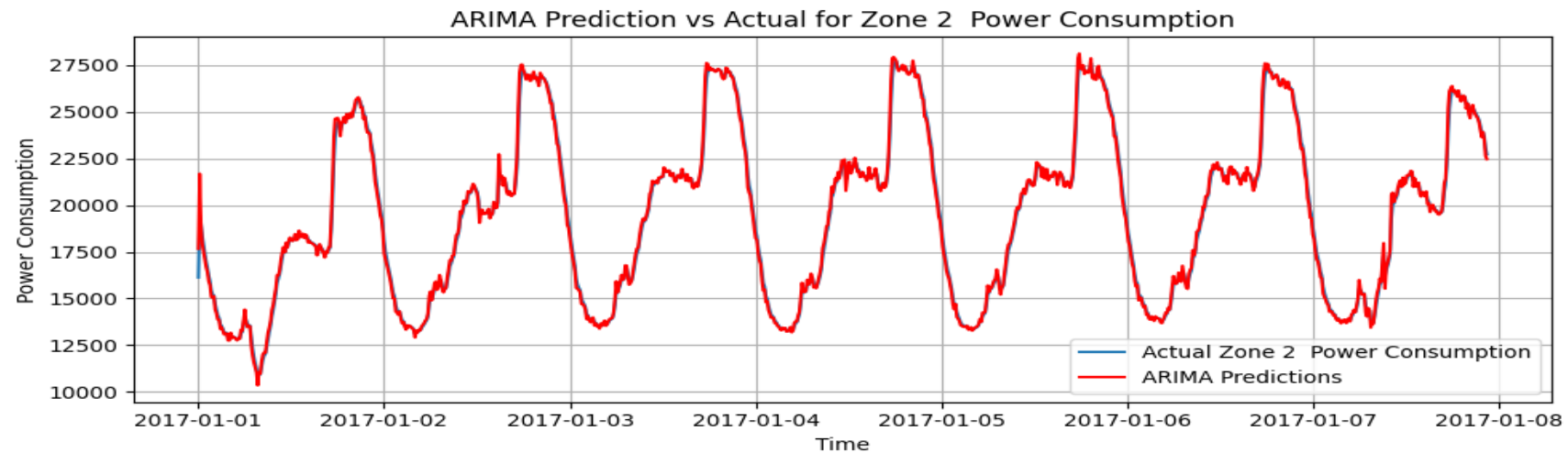
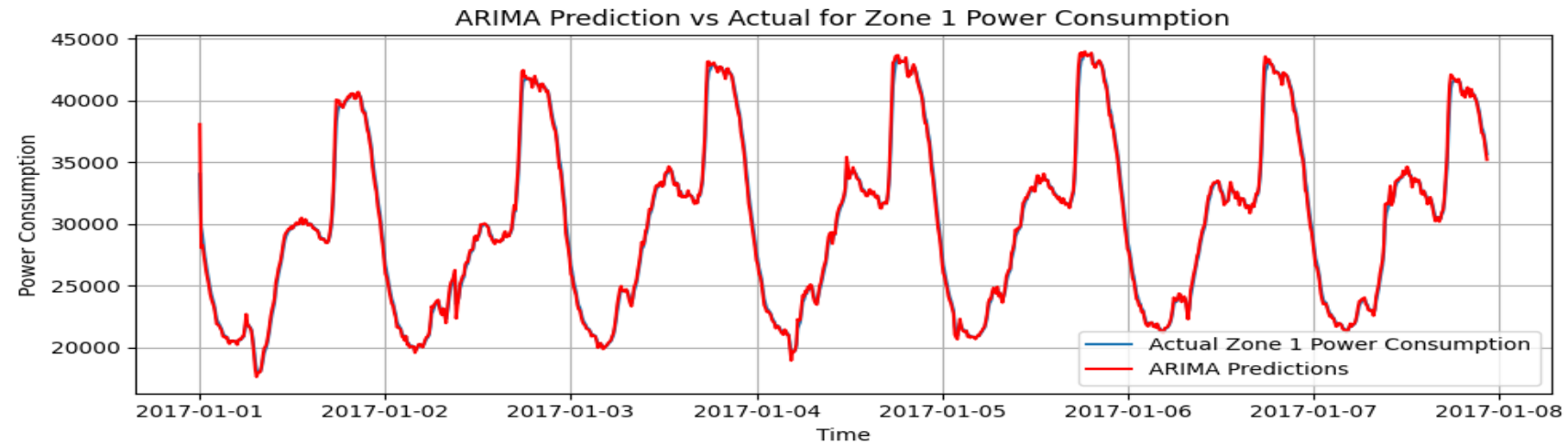
Dimensionality reduction and feature extraction technique.
Assumptions: Resulting variables are orthogonal and uncorrelated.

PCA

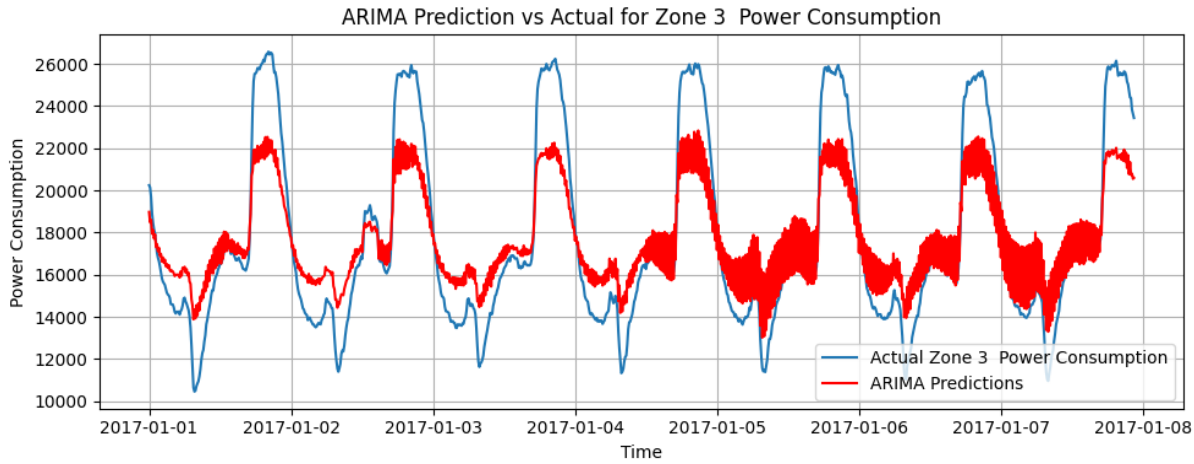
Recurrent Neural Network design that captures long-term dependencies in time-series data.
Assumptions: No stationarity present. Requires large data to generalize.

ZONE 1: ARIMA(2,1,2)(0,0,0)[0] intercept
RMSE: 461.234 kWh

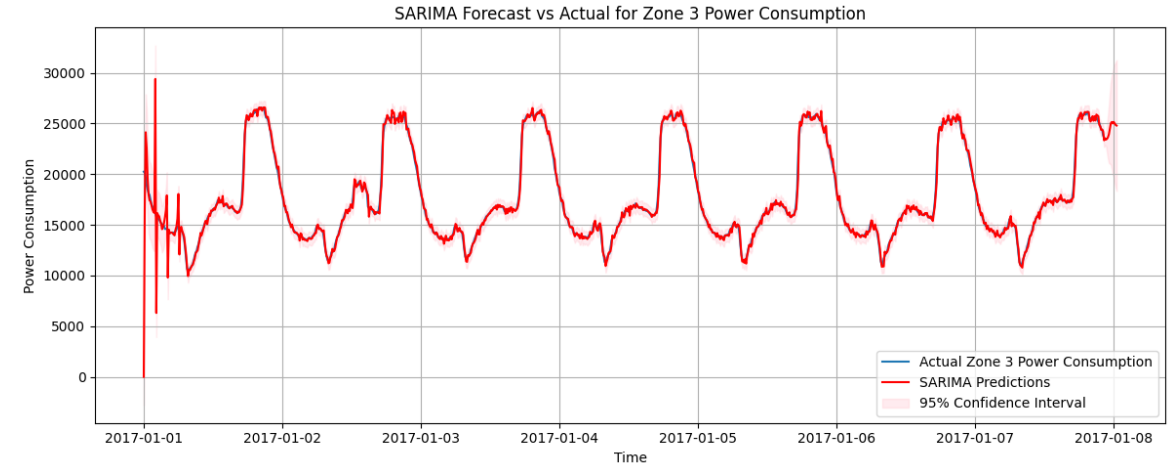
ZONE 2: ARIMA(1,1,2)(0,0,0)[0]
RMSE: 285.546 kWh



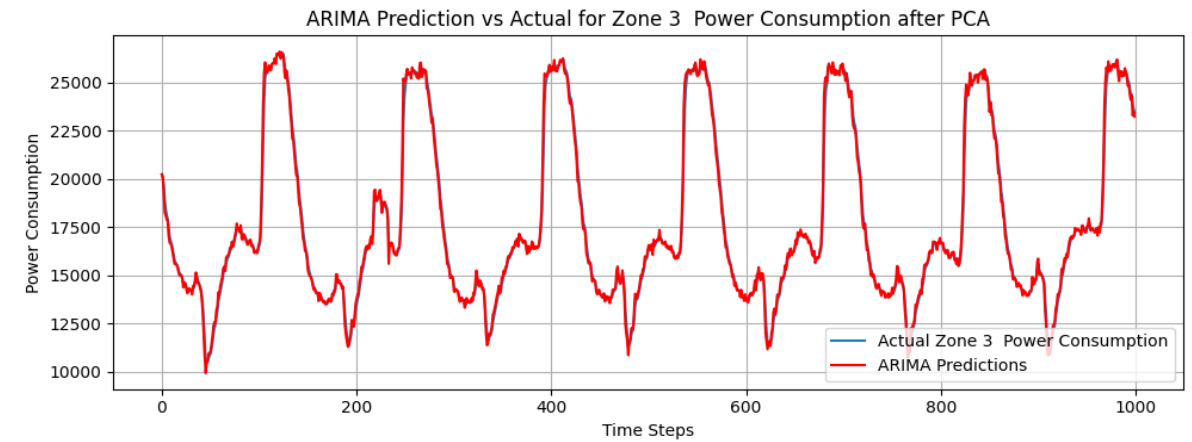
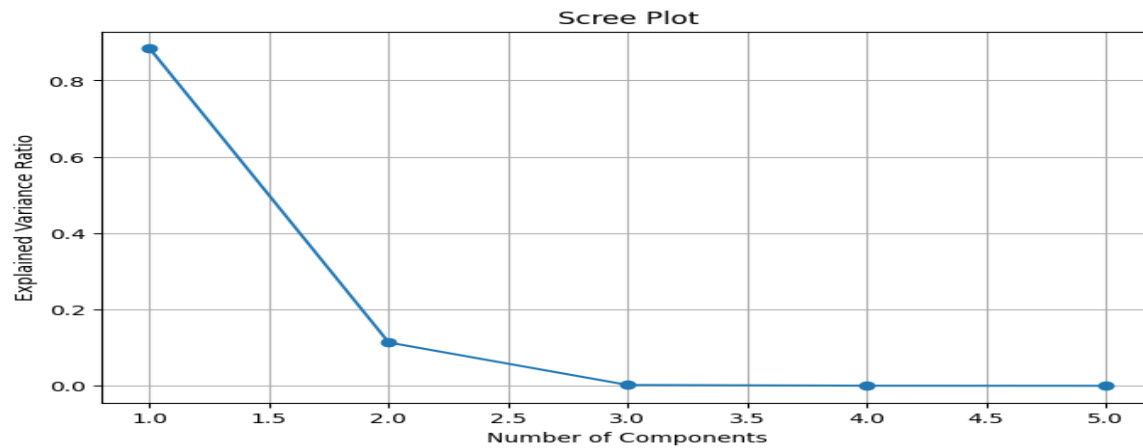
ZONE 3: ARIMA(0,0,1)(2,0,2)[12] intercept
RMSE: 2327.934 kWh



ZONE 3 SARIMA: SARIMAX(0, 0, 1)x(2, 0, [1, 2], 12)
RMSE: 928.4612 kWh



After PCA: ARIMA(2,0,1)(0,0,0)[0] intercept; RMSE: 248.554 kWh



Thank You
