



Energy Systems Planning and Operation (ESPO)

Sustainable Energy, Sustainable Development, Safe Future

MATLAB-Based Forecasting Source Code Using ARIMA Models

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Introduction

Making informed planning and operation decisions in energy systems needs an accurate uncertainty model of future realizations of parameters. The uncertainties can be forecasted from short-term (e.g., hours to days) to long-term (e.g., months to years) periods depending on the problem under study. Among different forecasting tools, autoregressive integrated moving average (ARIMA) is a univariate model and recognized as a practical method for forecasting uncertain parameters in energy sector. Especially, practitioners and researchers in energy sector needs a software package that can easily implement the ARIMA models and provide appropriate forecasts as well.

Aims

ESPO aims to develop a software package that allows the practitioners and researchers in energy sector to provide forecasts using the ARIMA models.

To this end, the main features of the software package are:

- To receive time series data and ARIMA model $(p,d,q)(P,D,Q)_s$ as input arguments.
- To implement the mathematical structure of ARIMA model.
- To provide forecasts under different uncertainty models: i) single-point forecasts, ii) scenarios, and iii) confidence bounds.

Applications

The software package is designed as a source code in the MATLAB environment, and can be used to forecast uncertain data such as energy consumption, energy price, renewable energy, and climatic indicators. Its applications can be different depending on the time horizon (i.e., from short-term to long-term) and the uncertainty model chosen by the user. The single-point forecasts can be incorporated into a deterministic model to make informed decisions. Additionally, the scenarios and confidence bounds can be used in stochastic programming and robust optimization models, respectively. The software package also allows the user to adjust the number of scenarios and the confidence level of forecasts bounds.