

VIRGINIA COMMONWEALTH UNIVERSITY

Statistical analysis and modeling (SCMA 632)

# **A6:**

Akanksha Yaramalla

V01108249

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* **BAJAJ AUTO**
* Clean the data, check for outliers and missing values, interpolate the data if there are any   
  missing values, and plot a line graph of the data neatly named. Create a test and train data set   
  out of this data.
* Convert the data to monthly and decompose time series into the components using additive and   
  multiplicative models.
* **1. Univariate Forecasting - Conventional Models/Statistical Models**  
  − Fit a **Holt Winters model** to the data and forecast **for the next year**.   
  − Fit an **ARIMA model** to the **daily data**and do a diagnostic check validity of the model. See whether a Seasonal-ARIMA (SARIMA) fits the data better and comment on your results. Forecast the series for the **next three months**.   
  − Fit the ARIMA to the monthly series.
* **2. Multivariate Forecasting - Machine Learning Models**  
  −**NN (Neural Networks)** -Long Short-term Memory (LSTM)  
  − **Tree based models** - Random Forest, Decision Tree

Univariate forecasting involves predicting future values of a time series based on its past values. Several conventional or statistical models can be used for univariate forecasting. Here are some popular ones:

**1. Autoregressive Integrated Moving Average (ARIMA)**

* **ARIMA** models are widely used for forecasting time series data.
* **Components**:
  + **AR (Autoregressive)**: The relationship between an observation and a number of lagged observations.
  + **I (Integrated)**: Differencing of raw observations to make the time series stationary.
  + **MA (Moving Average)**: The relationship between an observation and a residual error from a moving average model.

### **Decomposition of Time series**

**. Univariate Forecasting - Conventional Models/Statistical Models**

**3.1 HW Model**

**3.2 ARIMA Montly Data**[**¶**](http://localhost:8888/notebooks/Downloads%2FAkanksha%20yaramalla%20A6%20V01108249.ipynb#3.2-ARIMA-Montly-Data)

**3.3 ARIMA Daily Data**[**¶**](http://localhost:8888/notebooks/Downloads%2FAkanksha%20yaramalla%20A6%20V01108249.ipynb#3.3-ARIMA-Daily-Data)

**2. Multivariate Forecasting - Machine Learning Models**[**¶**](http://localhost:8888/notebooks/Downloads%2FAkanksha%20yaramalla%20A6%20V01108249.ipynb#2.-Multivariate-Forecasting---Machine-Learning-Models)

**Tree Based Models**

**Results:**

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