

# Predictive Analytics Exercise

June 22, 2021

## Case: Bike Sharing Demand Dataset



Source: [UCI Bike Sharing Demand Dataset](#): complete data 2011-2012

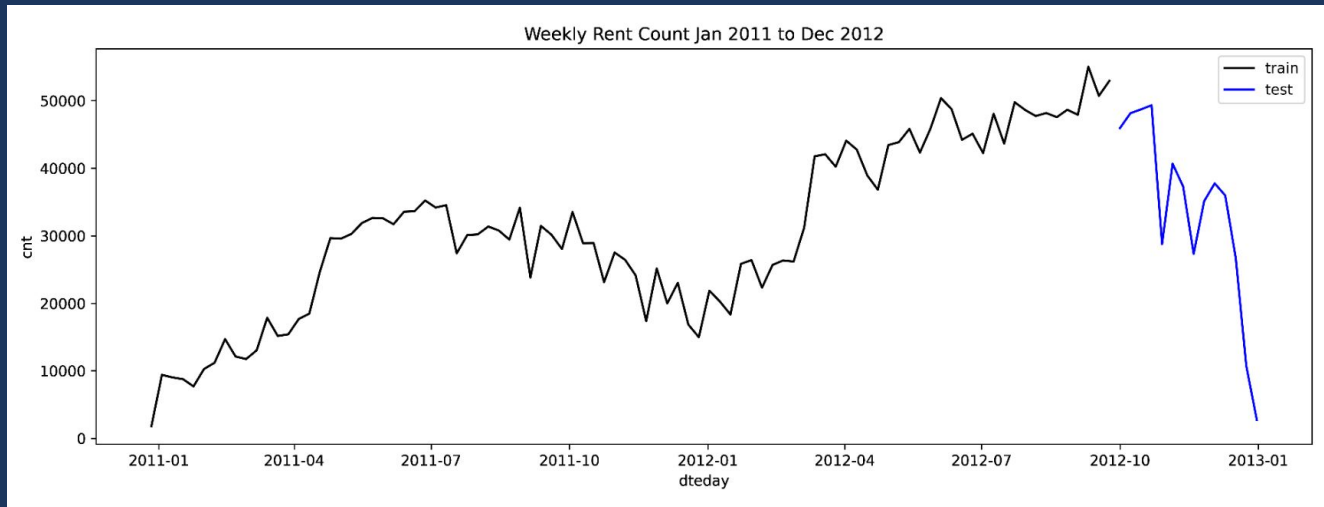
# Use Case: Bike Sharing Demand Dataset

**This Task:** Create Time Series Forecast from Oct 2012 to Dec 2012

1. Perform forecasting models using the following models:
  - Naive forecast
  - Simple Moving Average (4-week, 8-week, 12-week)
  - Exponentially Weighted Moving Average (4-week, 8-week, 12-week)
  - Autoregressive Integrated Moving Average (ARIMA)
2. Compare and Evaluate Model
3. Store Model into Pickle

# Use Case: Bike Sharing Demand Dataset

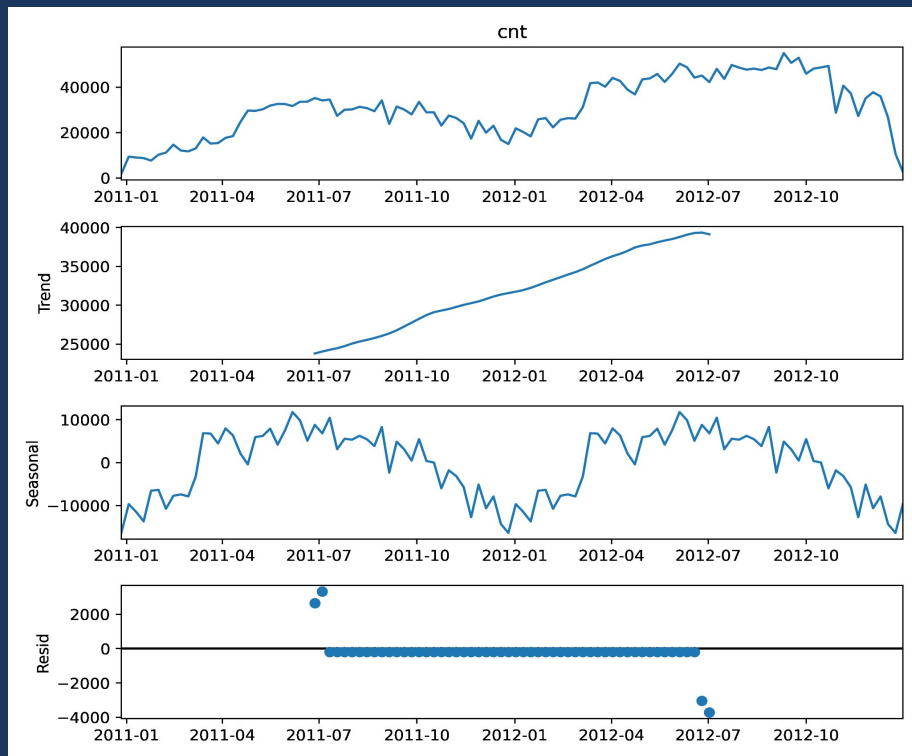
**Problem:** Develop Time Series Forecast and Predict Weekly Bike Sharing Demand from October 2012 to December 2012



- **Train** - January 2011 to September 2012
- **Test** - October 2012 to November 2012

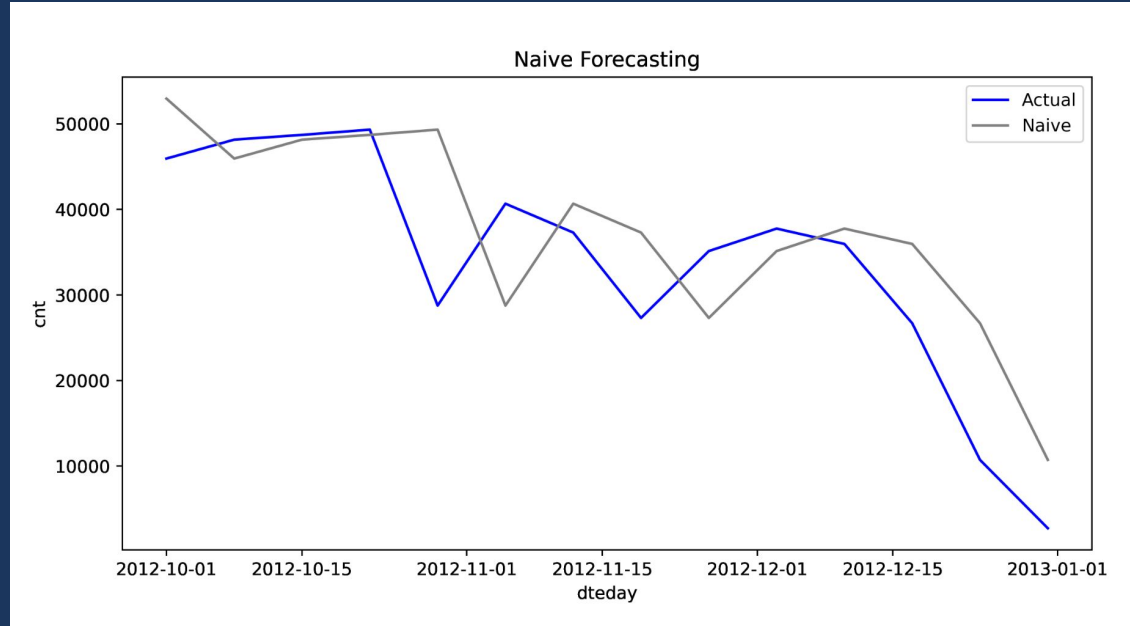
# Use Case: Bike Sharing Demand Dataset

## Decompose Time Series into Trend, Seasonality and Residual



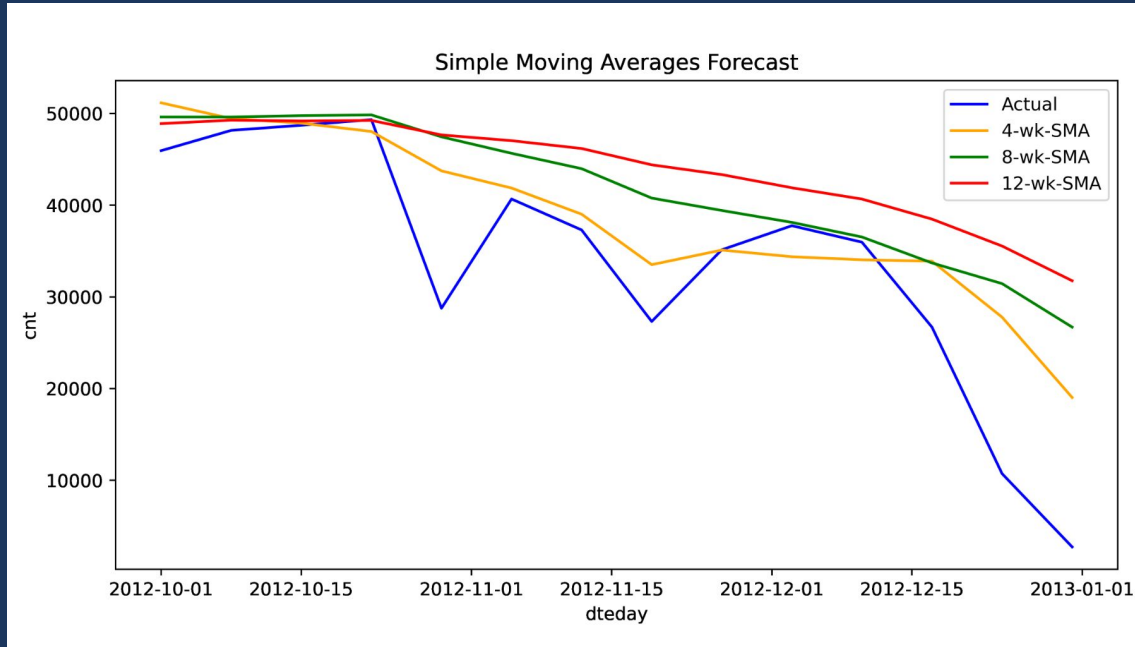
# Use Case: Bike Sharing Demand Dataset

## Naive Forecast



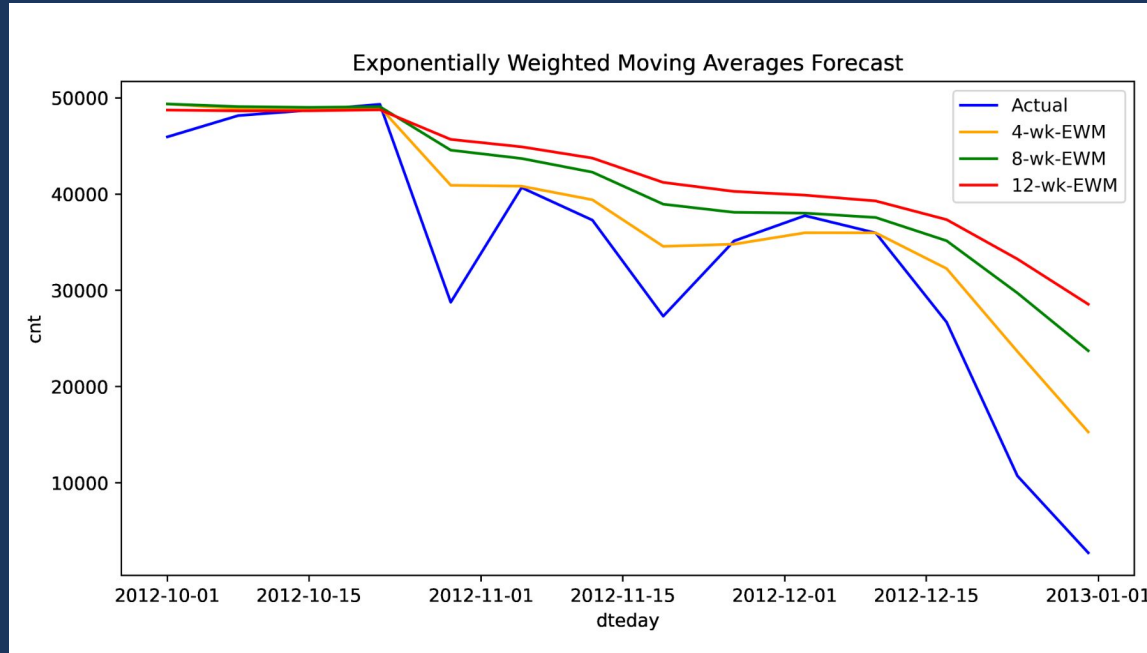
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## Simple Moving Average Forecast



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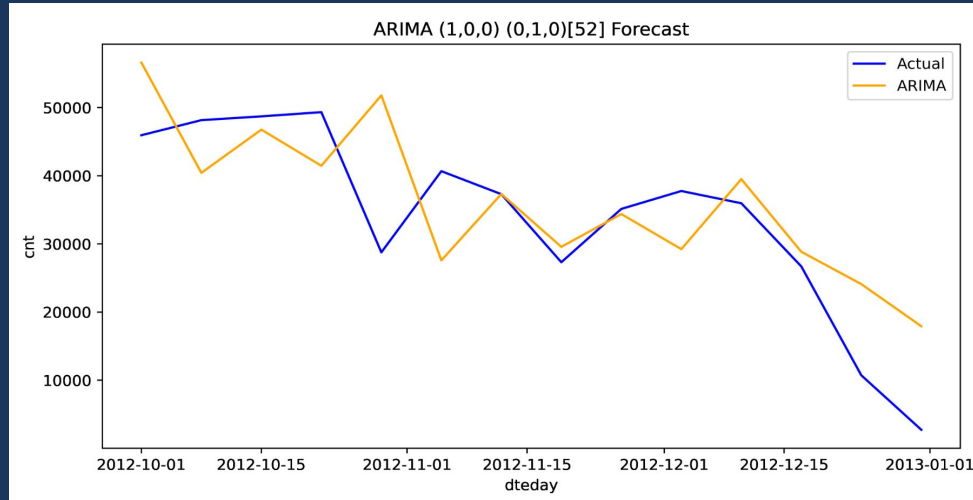
## Exponentially Weighted Moving Average (Span) Forecast





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## Autoregressive Integrated Moving Average (ARIMA) Forecast



### Best ARIMA parameter based on “BIC” Criterion

- Order: ( $p = 1$ ,  $d = 0$ ,  $q = 0$ )
- Seasonal Order: ( $p = 0$ ,  $d = 1$ ,  $q = 0$ ), 52 (weeks)
- Use R's forecast : : auto.arima

ARIMA(1,0,0) (0,1,0)[52]

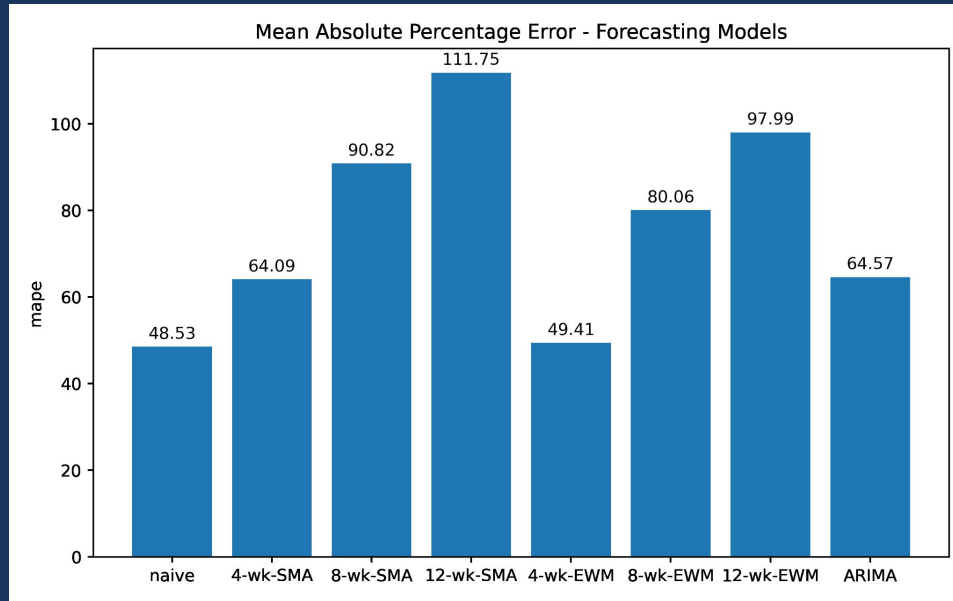
Coefficients:

ar1  
0.9235  
s.e. 0.0477

sigma^2 estimated as 41208904: log likelihood=-550.5  
AIC=1105 AICC=1105.23 BIC=1108.97

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## Evaluate Time Series Forecasting Models for Oct 2012 to Dec 2012



### Insights

- Best Forecasting Model : **Naive**

### Store Model in Pickle File

- Use Model : **ARIMA**