**HuYuDataInsight LLC Work Log**

**March 26th, 2024 – March 29th, 2024**

**Zhaowei Cai**

**Time Series Analysis:**

**Part 1:**

We generated an ARIMA(1,1,0) model with 636 observations in R using the random seed of 123. We set the AR coefficient to 0.65.

**Part 2:**

We performed all relevant procedures to identify the underlying model including model diagnostics – using only the first 600 observations.

**Part 3:**

(a) We used the first 600 observation to forecast the last 36 days of the time series. We made forecast plot including the mean forecast and also the 95% prediction interval. It included the true generated values of the last 36 observations in the plot as well.

(b) We performed one-day ahead forecast for the last 36 days of the observations. We made forecast plot including the mean forecast and also the 95% prediction interval. It included the true generated values of the last 36 observations in the plot as well.

**Part 4:**

We generated an AR(1) plus linear trend model with 636 observations in R. We set the AR coefficient to 0.65, and the linear trend to 0.33 + 0.15\*t.

**Part 5:**

We performed all relevant procedures to identify the underlying model including model diagnostics – using only the first 600 observations.

**Part 6:**

(a) We used the first 600 observation to forecast the last 36 days of the time series. We made forecast plot including the mean forecast and also the 95% prediction interval. It included the true generated values of the last 36 observations in the plot as well.

(b) We performed one-day ahead forecast for the last 36 days of the observations. We made forecast plot including the mean forecast and also the 95% prediction interval. It included the true generated values of the last 36 observations in the plot as well.

**Stock Price Analysis of Tesla:**

**Part 7:**

We tried to model the stock price of Tesla (TSLA). The data file is TSLA1.csv.

We tried to identify if there is a drift or a trend in the log return.

We removed the drift/trend identified above, from the log return, and obtained the residual; next, for this residual, we fitted the best ARIMA-model using the BIC criterion.

We used the one-day ahead forecast to predict the closing price on the first business day of 2020, namely, January 2, 2020. The fun fact is that the true closing price for that day was $430.26.