

Lab 4: Forecasting with exponential smoothing models - 2

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1 Grid search for double exponential smoothing (Holt's method)

Use grid search to determine the values of α ($0 \leq \alpha \leq 1$) and β^* ($0 \leq \beta^* \leq 1$) for Holt's model. Use the difference of the first two time series values to set up the initial trend value. Test implementation on the IBM data from the previous lab. Compare the obtained smoothing parameters with those returned by the statsmodels.

2 Triple exponential smoothing (Holt-Winters' method)

Both the trend and seasonal component can be either additive or multiplicative. This adds to the complexity of Holt-Winters' model since there are the following possibilities:

- Trend and seasonal components are additive
- Additive trend and multiplicative seasonal component
- Multiplicative trend and additive seasonal component
- Trend and seasonal components are multiplicative.

Use [ExponentialSmoothing function](#) from statsmodels library to forecast USgas time series 12 months into the future. You can set the trend and seasonal parameters to 'add' or 'mul'. Can you deduce the character of trend and seasonal components? The values in the USGas.csv file run from January 2000 up to Oct 2019. Compare the forecasting accuracy for different combinations of trend and seasonal parameters.