Author: Arjan Hada

ETS Models

==ETS models are designed to forecast time series data by observing the trend and seasonality patterns in a time series, and projecting those trends into the future.==

STEP 1: TIME SERIES DECOMPOSITION PLOT

A time series decomposition plot allows you to observe the seasonality, trend, and error/remainder terms of a time series.

Useful Alteryx Tool: TS Plot

STEP 2: DETERMINE ERROR, TREND, AND SEASONALITY

An ETS model has three main components: error, trend, and seasonality. Each can be applied either additively, multiplicatively, or not at all.

Trend - If the trend plot is linear then we apply it additively (A). If the trend line grows or shrinks exponentially, we apply it multiplicatively (M). If there is no clear trend, no trend component is included (N).

Seasonal - If the peaks and valleys for seasonality are constant over time, we apply it additively (A). If the size of the seasonal fluctuations tends to increase or decrease with the level of time series, we apply it multiplicatively (M). If there is no seasonality, it is not applied (N).

Error - If the error plot has constant variance over time (peaks and valleys are about the same size), we apply it additively (A). If the error plot is fluctuating between large and small errors over time, we apply it multiplicatively (M).

Useful Alteryx Tool: TS Plot

STEP 3: BUILD AND VALIDATE THE ETS MODEL

Build the ETS model using the components determined in step 2. You can use internal and external validation to validate the quality of the model.

Internal validation: Look at in-sample error measures, particularly RMSE (Root-Mean-Square Error) and MASE (Mean Absolute Scaled Error).

External validation: Determine the accuracy measures by comparing the forecasted values with the holdout sample. This is especially important for comparing ETS models to other types of models, such as ARIMA.

==Pick the ETS model with lowest AIC value.== If the AIC values are comparable, use calculated errors to pick one that minimizes error the most. Many software tools will automate the selection of the model by minimizing AIC.

Useful Alteryx Tools: ETS, TS Compare

STEP 4: FORECAST!

Use the best ETS model to forecast for the desired time period. Make sure to add the holdout sample back into the model. Plot the results along with 80% and 95% confidence intervals.

Useful Alteryx Tool: TS Forecast