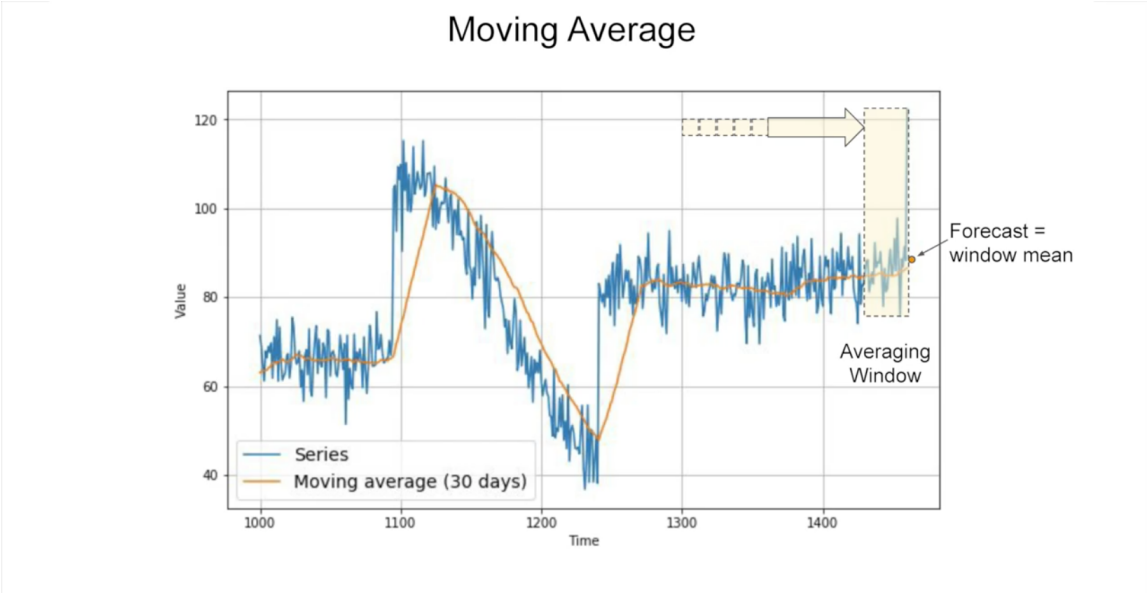
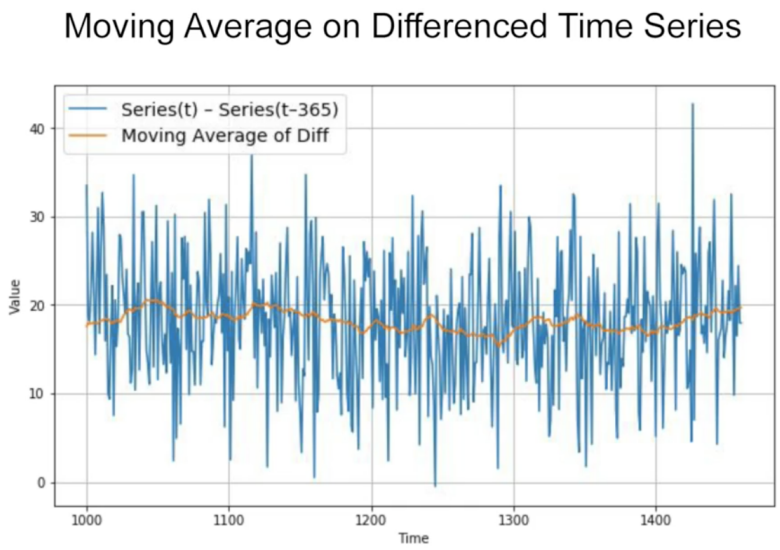
Moving average and differencing

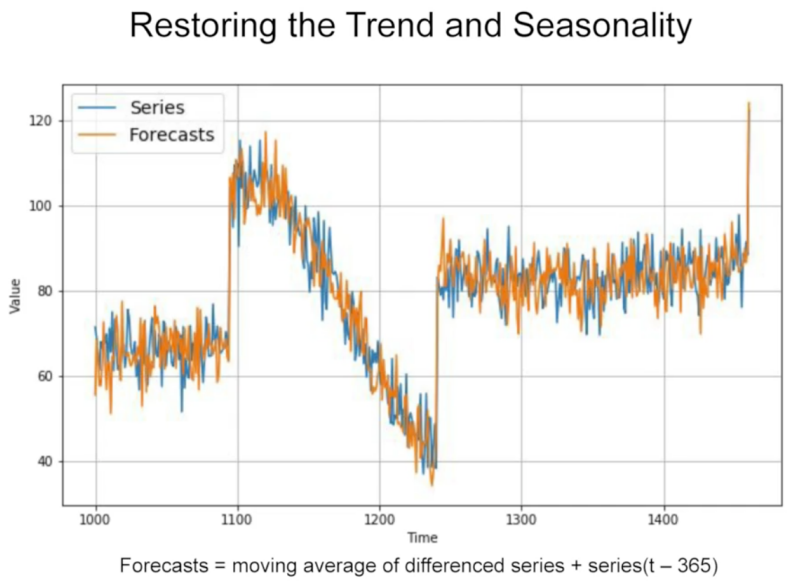
- Naive Forecasting: Estimating technique in which the last period's actuals are used as this period's forecast, without adjusting them or attempting to establish causal factors. It is used only for comparison with the forecasts generated by the better (sophisticated) techniques.
- The moving average curve is delayed because any change in the trajectory will be slower since it has to average over an entire window.



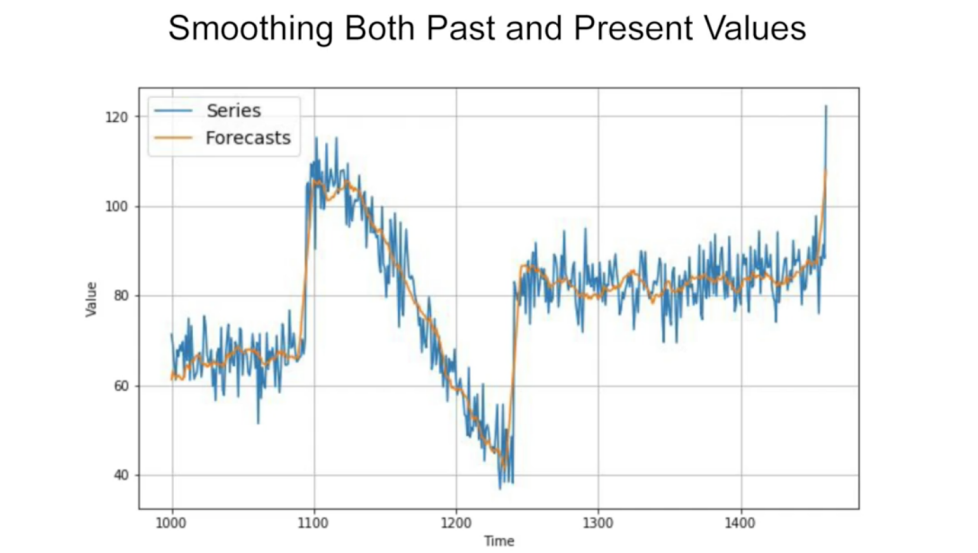
- Moving averages do not anticipate trend or seasonality. You can remove trend and seasonality in your data by studying the difference in data at 2 different times:



- The moving average above is for the differenced time series. In order to get the moving average forecast of the original time series, we just add the value at t - 365.



- However there's still noise in this forecast. That's coming from the noise in the past values (i.e t - 365). We can remove this noise by using a moving average on the past values alone, and then adding the averaged difference data:



Forecasts = trailing moving average of differenced series + centered moving average of past series (t – 365)

- For an analysis windows of size 2N+1 data points applied at time t, the window for a centred MA contains N data points before time t, and N data points after time t. In the case of a trailing moving average, the analysis window uses the 2N points *before* time t (only data that happened in the past relative to time t).
- We used the trailing window to compute the MA of present values from t-30 to t-1, but the centred window to compute the MA of past values from t-365-5 to t-365+5. Remember "present" values are with reference to t, while "past" values are with reference to t-365.
- Using centred windows can be more accurate than trailing windows, but we can't use centred windows to smooth present values since we don't know future values (imagine the centre at the end of the series - we don't know what the right half has). However to smooth past values, we can use centred averaging.