Seasonal adjustment

ESTP-training
12-14/10/2021

Outline

- ESS guidelines
  - Objectives
  - Methods
- Series decomposition
- Overview of seasonal adjustment methods
- Final remarks

1. ESS Guidelines (2015)

- Objectives

The objectives of seasonal adjustment are to identify and remove seasonal fluctuations and calendar effects which can mask short and long-term movements in a time series and impede a clear understanding of underlying phenomena. Seasonal adjustment is therefore a fundamental process in the interpretation of time series to inform policy making.

To avoid misleading results, seasonal adjustment should be applied only when seasonal and/or calendar effects can be properly explained, identified and estimated.

Seasonally adjusted series should have neither residual seasonality nor residual calendar effects and should show both the full trend-cycle and irregular component

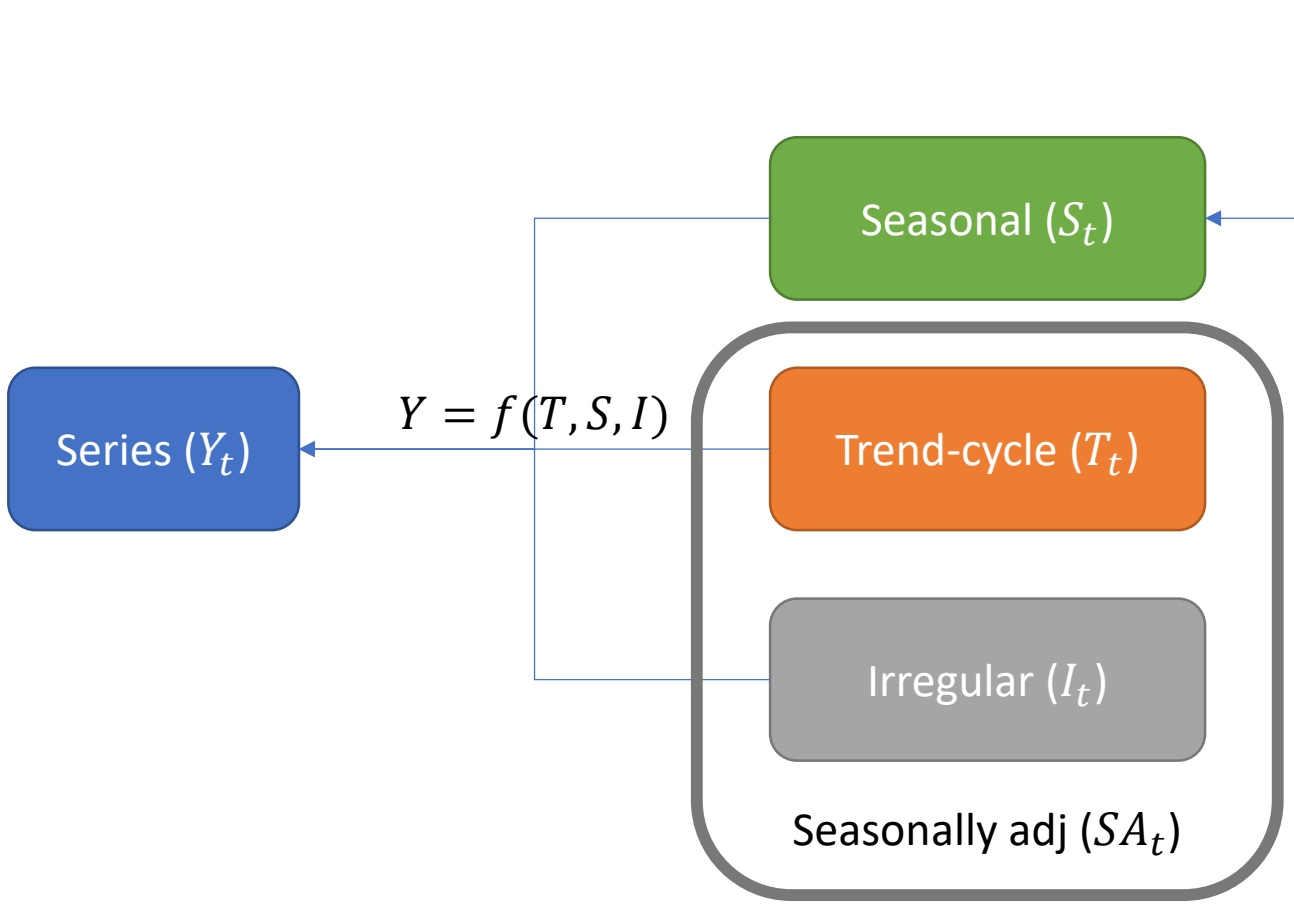
1. ESS Guidelines (2015)

- Methods

The use of regARIMA models is recommended to estimate and remove outliers before estimating the seasonal effect.
It is also recommended to use regARIMA modelling to calculate calendar adjustment factors. These calendar adjustment factors should take into account the different characteristics of national calendars.

The recommended seasonal adjustment methods are parametric methods based on signal extraction like Seats (Gomez and Maravall, 1996) and semi-parametric methods based on a set of predefined moving averages like Census II X 11 family (Findley et al., 1998) and X-13ARIMA-SEATS.

2. Series decomposition



$$Y = T + S + I$$
$$Y = T * S * I$$
$$log(Y) = log(T) + log(S) + log(I)$$
$$Y = T * (S + I - 1)$$
…

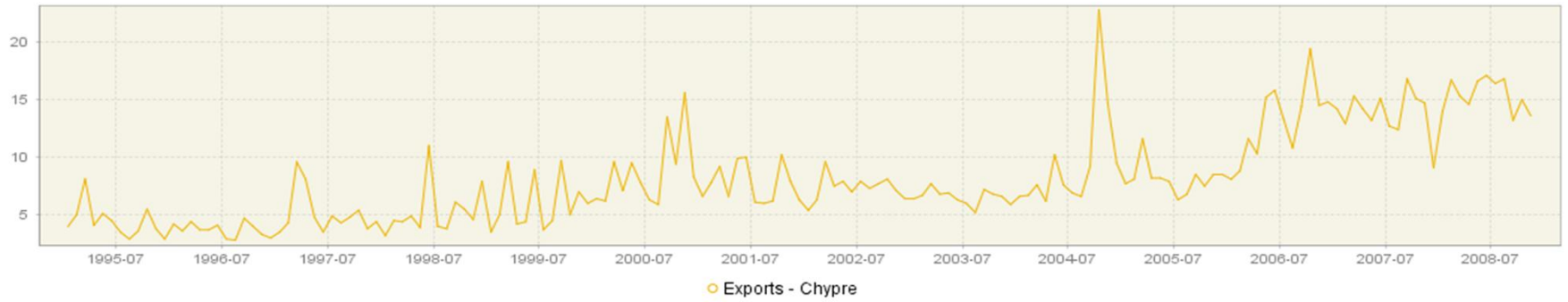
2. Decomposition

- Trend-cycle
  - Smooth (?)
  - Around the series
- Seasonal
  - Periodic, with slow changes (?)
  - Nearly 0 or 1 in average during 1 cycle (year)
- Irregular
  - Residual
  - Around 0 or 1

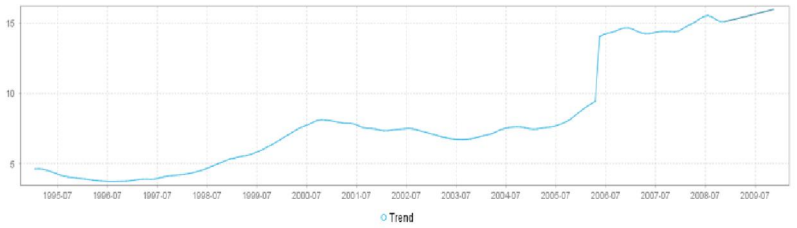
No actual definition of the components ⇒ Methods/software give different results

⇒ Seasonally adjusted not necessary smooth

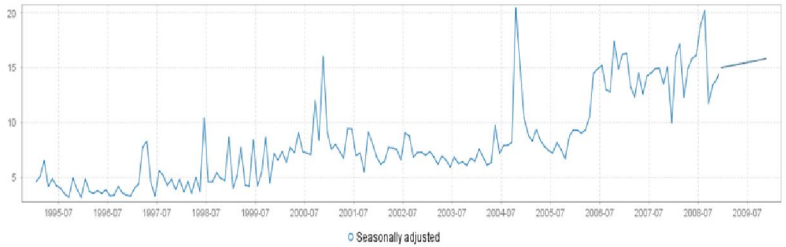
Volatile series

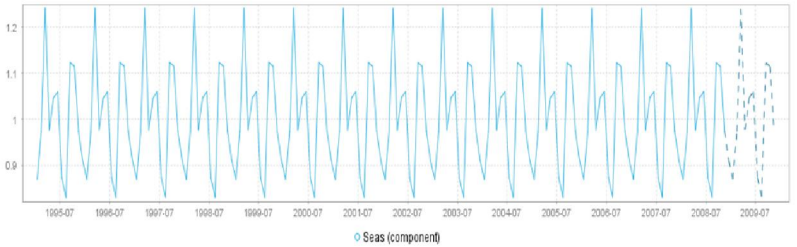


Stable trend and seasonal components

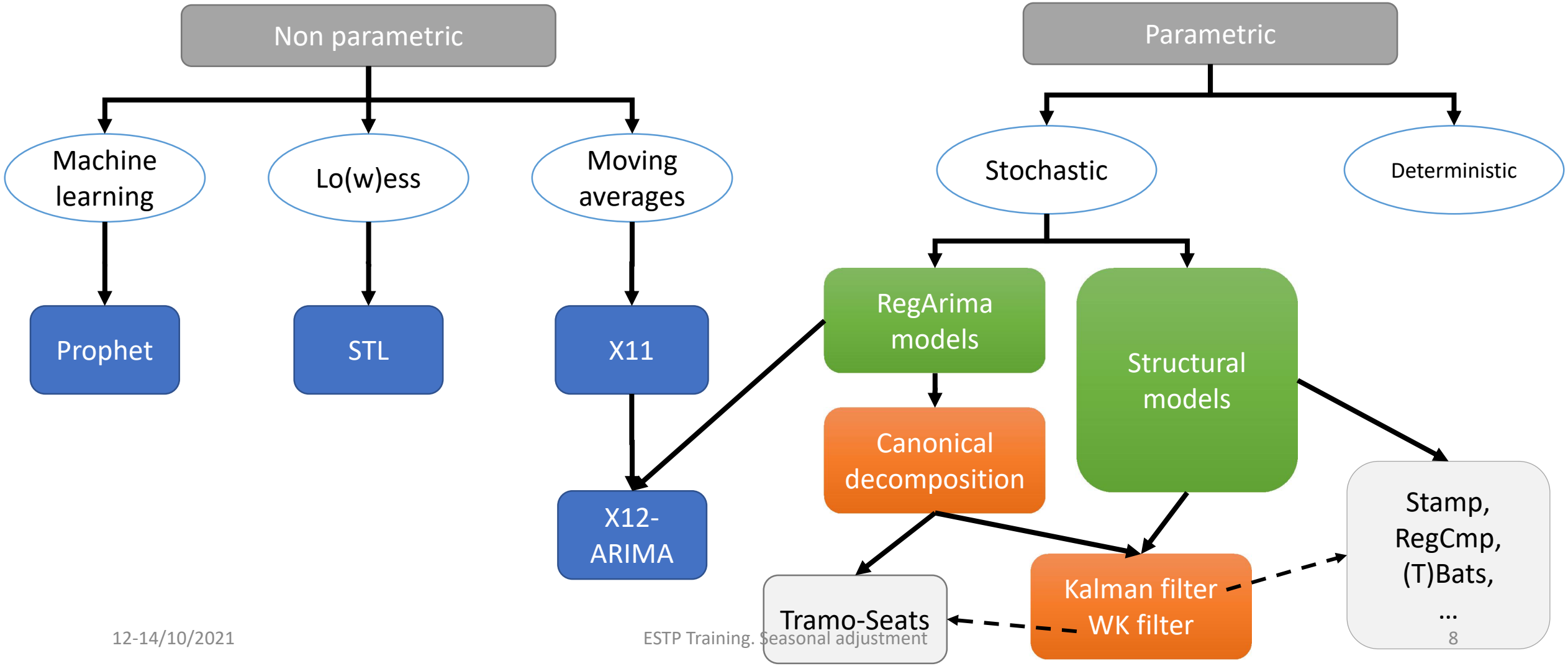


Volatile seasonally adjusted series





3. Rapid overview of the main SA methods



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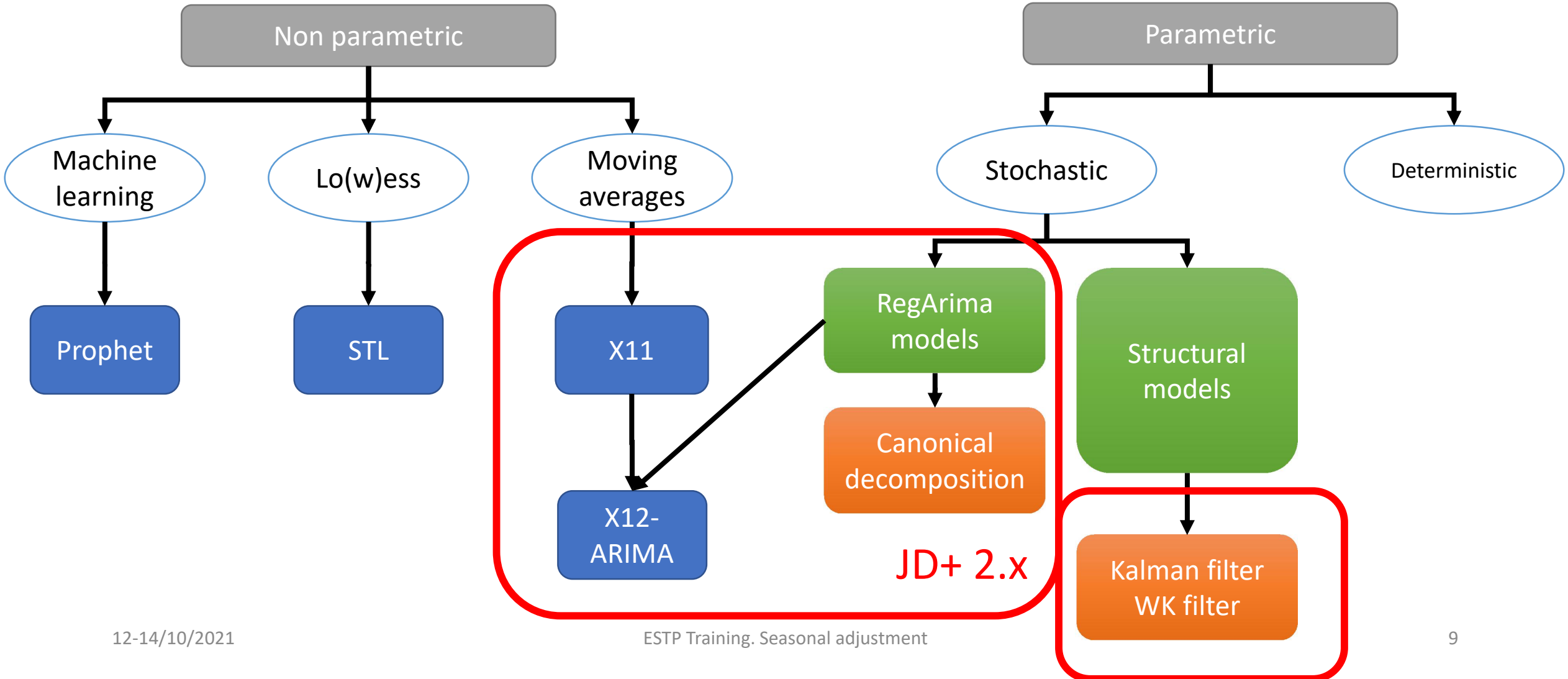

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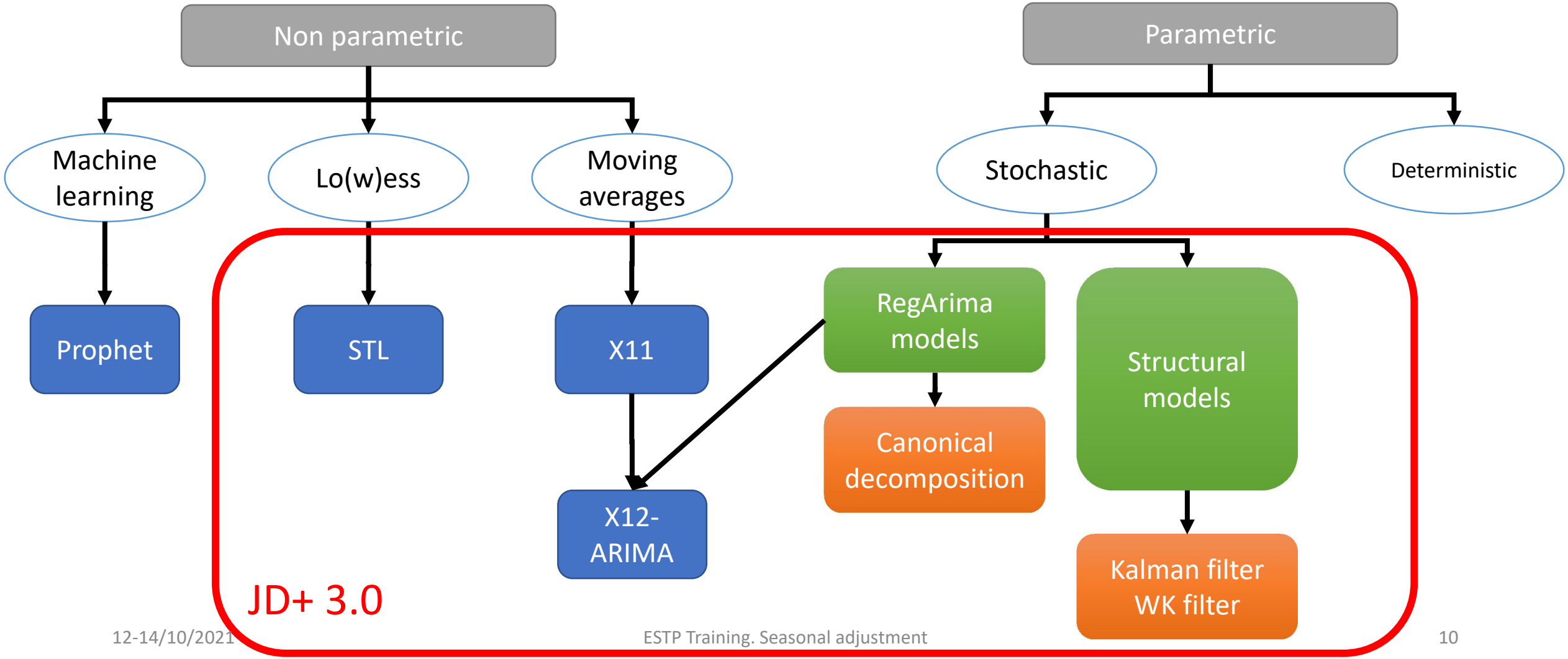

4. Final remarks

- Need to understand the principles of the main algorithms (not all the technical details)
  - Software automates many details
- Need for good quality reports
  - Recall: *“seasonally adjusted series should have neither residual seasonality nor residual calendar effects”*
- Need to “industrialize” the seasonal adjustment processing
  - Additional request: *“Seasonal adjustment procedures should generate consistent and robust results”*