Production Management (ME-419)

Module 2 – Demand Management

Holt & Winter

Amin Kaboli

Week 5 – Session 1&2&3 – Oct 10th, 2024

Course Framework

Business plan
Strategic plan
Financial plan

Production Management (ME-419)

Module 1	Module 2	Module 3	Module 4	
Introduction to PM	**Demand Management**	**Supply Management**	**Digital Transformation**	**Final Presentation**
Sep	**Sep-Oct**	**Oct-Nov**	**Dec**	**Dec 20th**
Value Adding Network Production Process Flows, Production procedures, Items, BOM	Demand disruptions Forecasting Methods Qualitative methods Quantitative methods Demand plan	Supply disruptions Production Planning AP, MPS, MRP Capacity Planning Inventory Management Supply Plan	Digital technologies for PM, Demand and Supply Analytics, From Products to Ecosystems	Final presentation & solid understanding of the course

Production Management Happy Hour

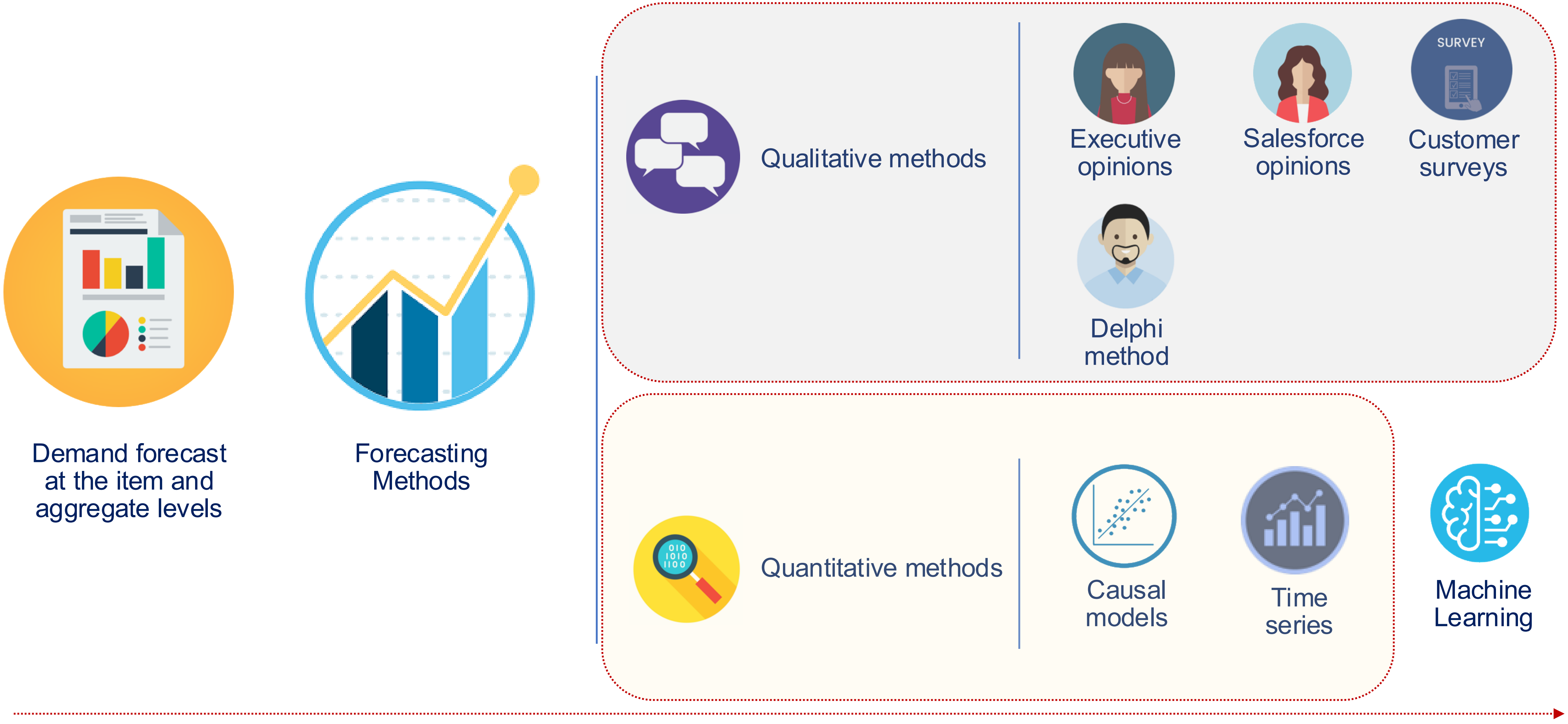
This week, drink at 4:45 PM in Sat.

Demand Management – Forecasting Steps

Demand forecast at the item and aggregate levels

- **Goal:** What is the purpose of the forecast (Type of products, Granularity, Horizon)
- **Data:** Obtain, clean, and analyze appropriate data
- **Method:** Select a forecasting method (Qualitative *vs* Quantitative)
- **Forecast:** Make the forecast
- **Performance:** Monitor the forecast errors

Demand Management – Forecasting Methods

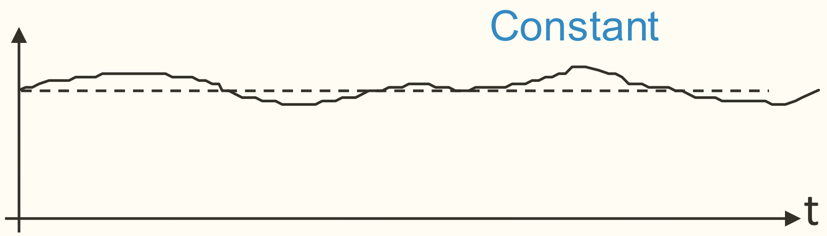


Time Series Models

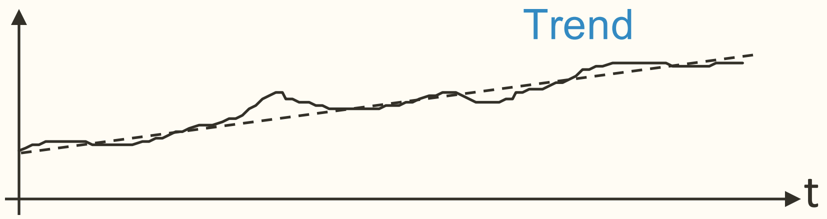
Time

Series

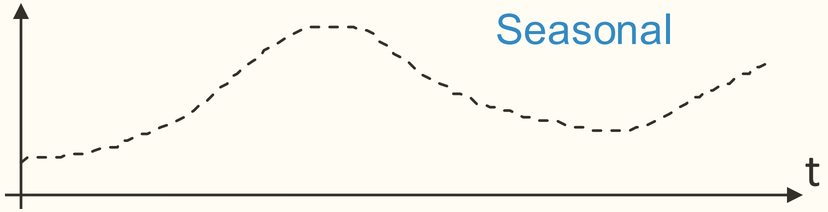
Stationary



Trend



Trend
+
Seasonality



Summary – Time Series – Stationary Models

1) Naïve: $F_{t+1} = Y_t$

2) Simple mean: $F_{t+1} = \Sigma Y_t / n$

3) Simple moving average: $F_{t+1} = \Sigma Y_t / n$ or $F_{t+1} = \frac{1}{p} \sum_{i=0}^{p-1} [Y_{t-i}]$

4) Weighted moving average: $F_{t+1} = \sum w_t * Y_t$

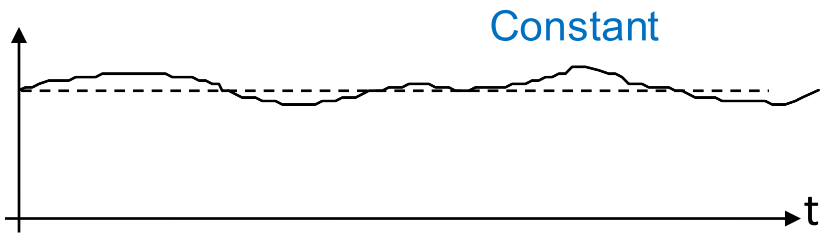
5) Exponential Smoothing $F_{t+1} = \alpha\, Y_t + (1- \alpha)\, F_t$

Time Series Models

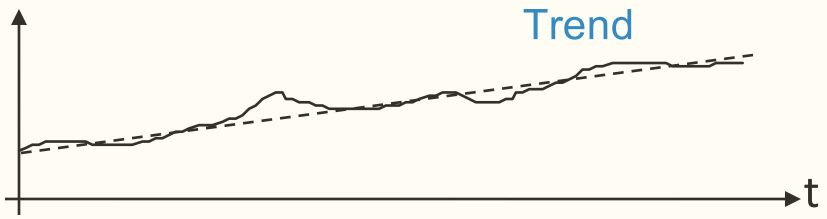
Time

Series

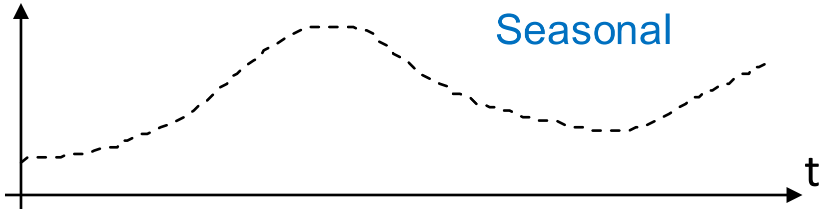
Stationary



Trend



Trend
+
Seasonality



Time Series – Trend (Holt Model)

An exponential smoothing model (with two smoothing equations) for data with trend:

Step 1) Forecast equation $F_{t+h} = B_t + hT_t$ $h = 1,2,3,\dots$

Step 2) Level equation $B_t = \alpha Y_t + (1-\alpha)(B_{t-1} + T_{t-1})$ $0 \le \alpha \le 1$

Smoothing constant for the based level

Step 3) Trend equation $T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$ $0 \le \beta \le 1$

Smoothing constant for trend

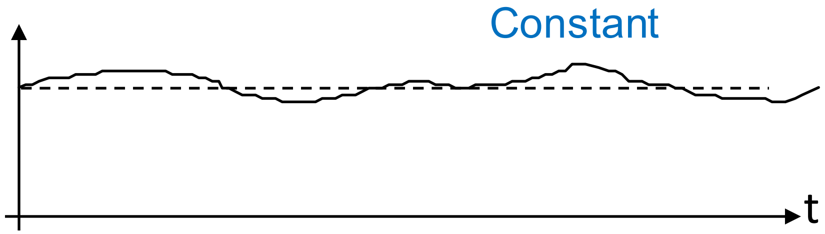
EPFL

Time Series Models

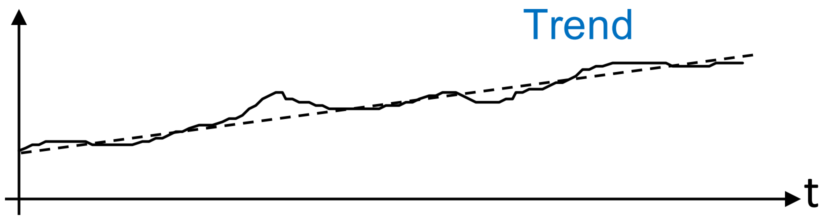
Time

Series

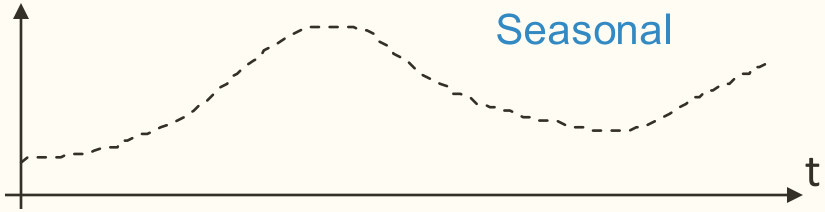
Stationary



Trend



Trend
+
Seasonality



Time Series – Trend & Seasonality (Holt-Winter Model)

An exponential smoothing model (with three smoothing equations) for data with trend + seasonality:

Step 1) Forecast equation

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

c: periodicity of the seasonal effect

Step 2) Level equation

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$0 \leq \alpha \leq 1$

Smoothing constant for the based level

Step 3) Trend equation

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$0 \leq \beta \leq 1$

Smoothing constant for trend

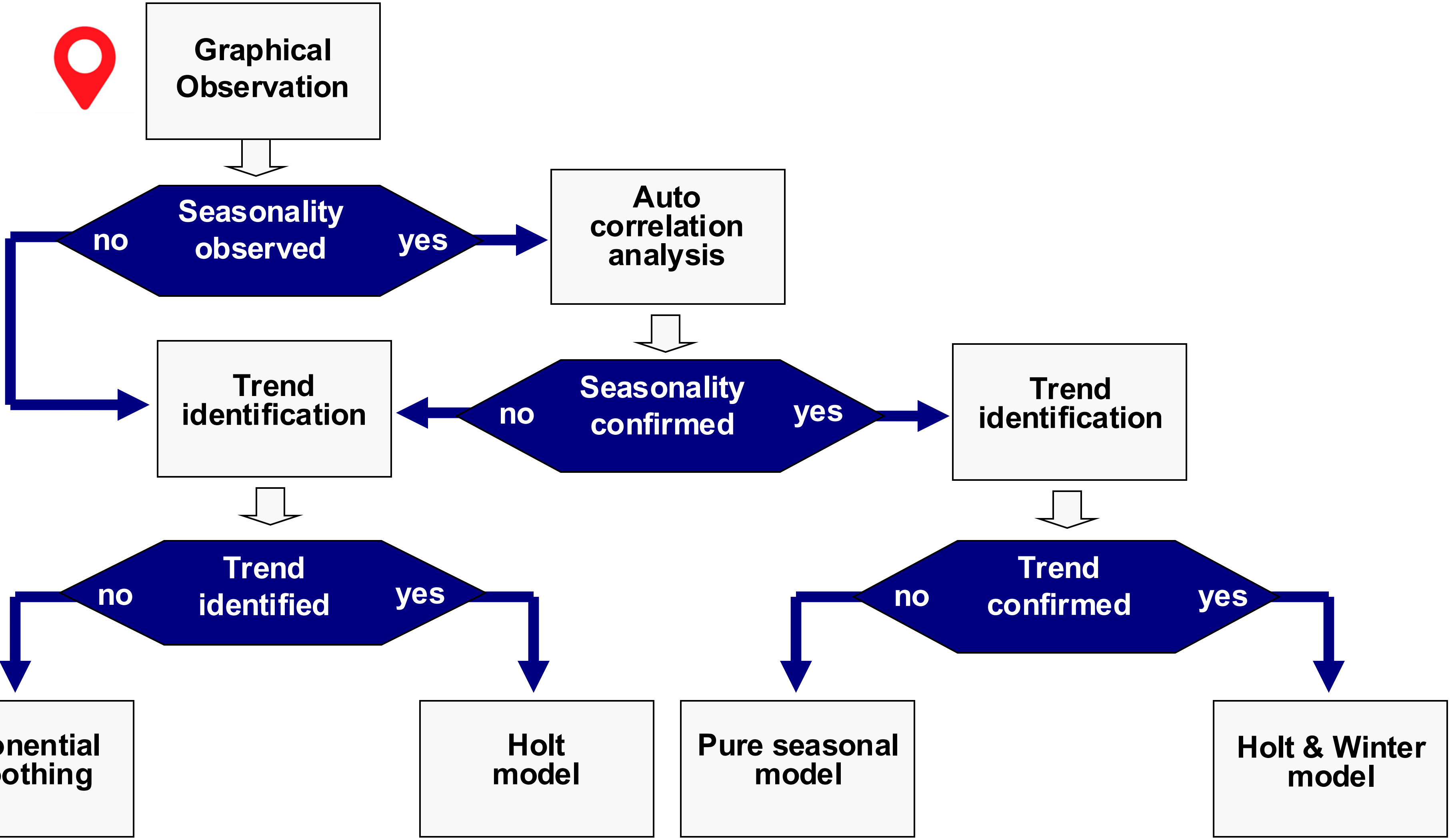
Step 4) Seasonality equation

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

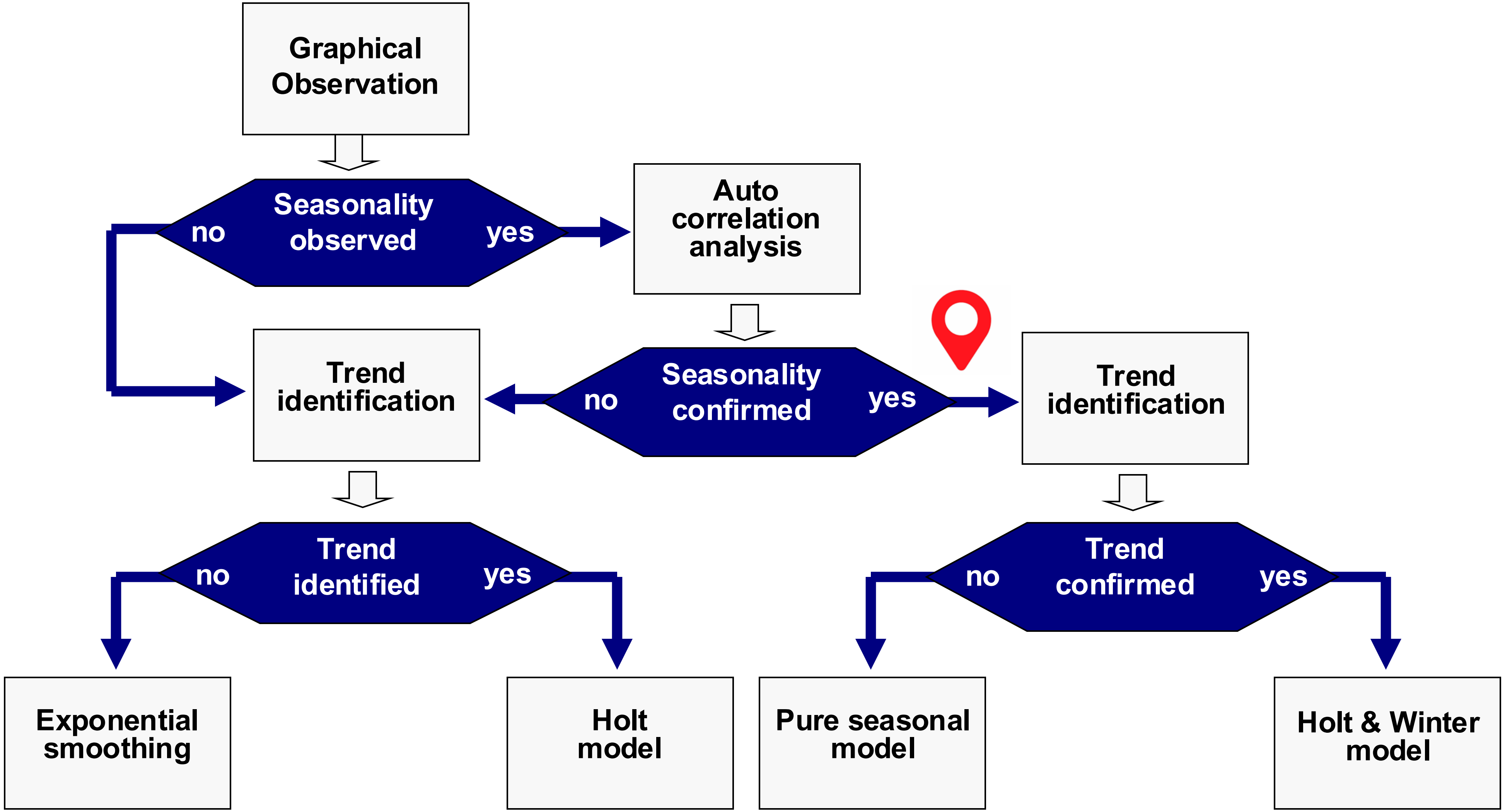
$0 \leq \gamma \leq 1$

Smoothing constant for seasonal

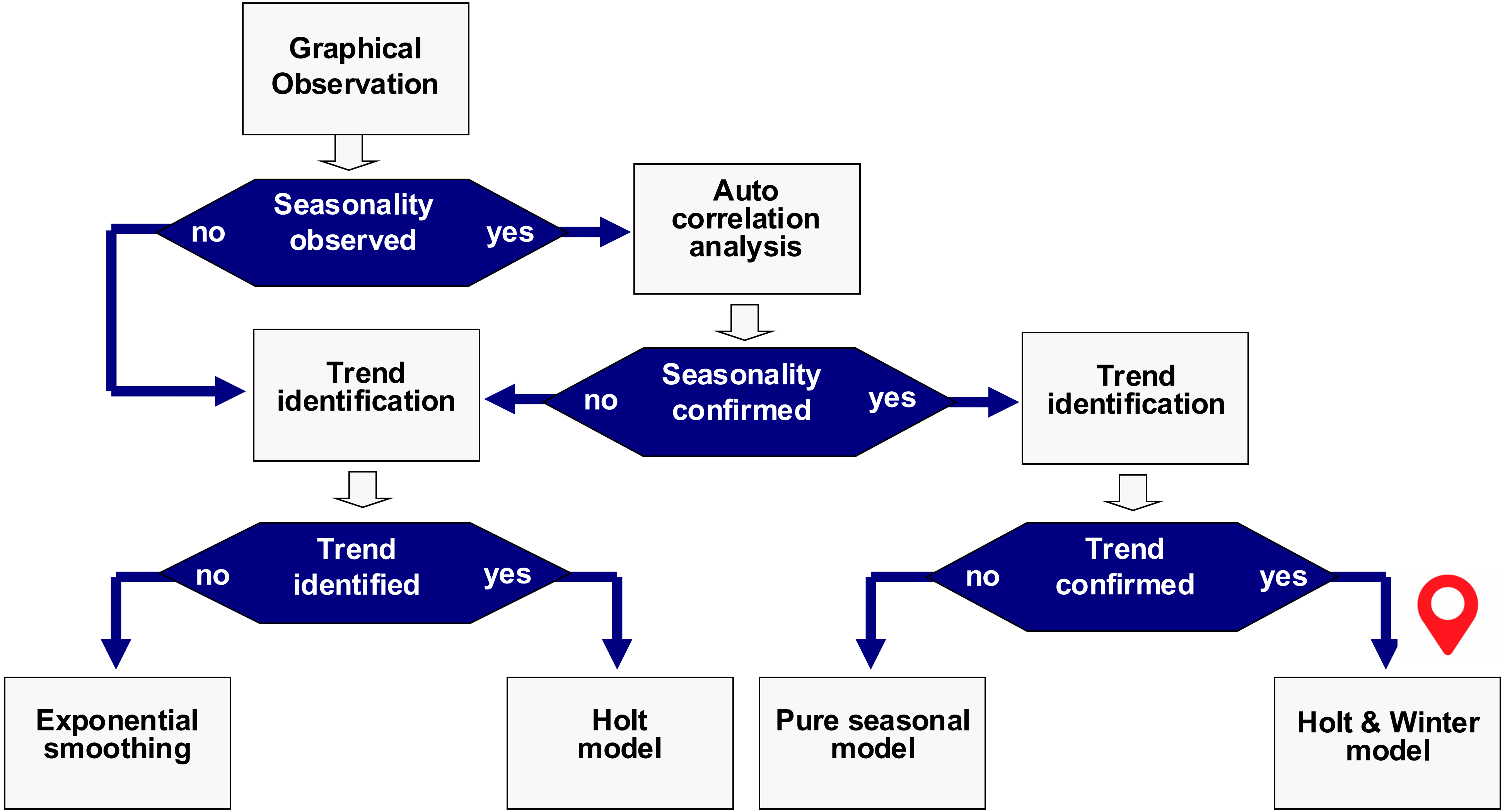
Forecast Method Selection Roadmap – Step 3: Method



Forecast Method Selection Roadmap – Step 3: Method

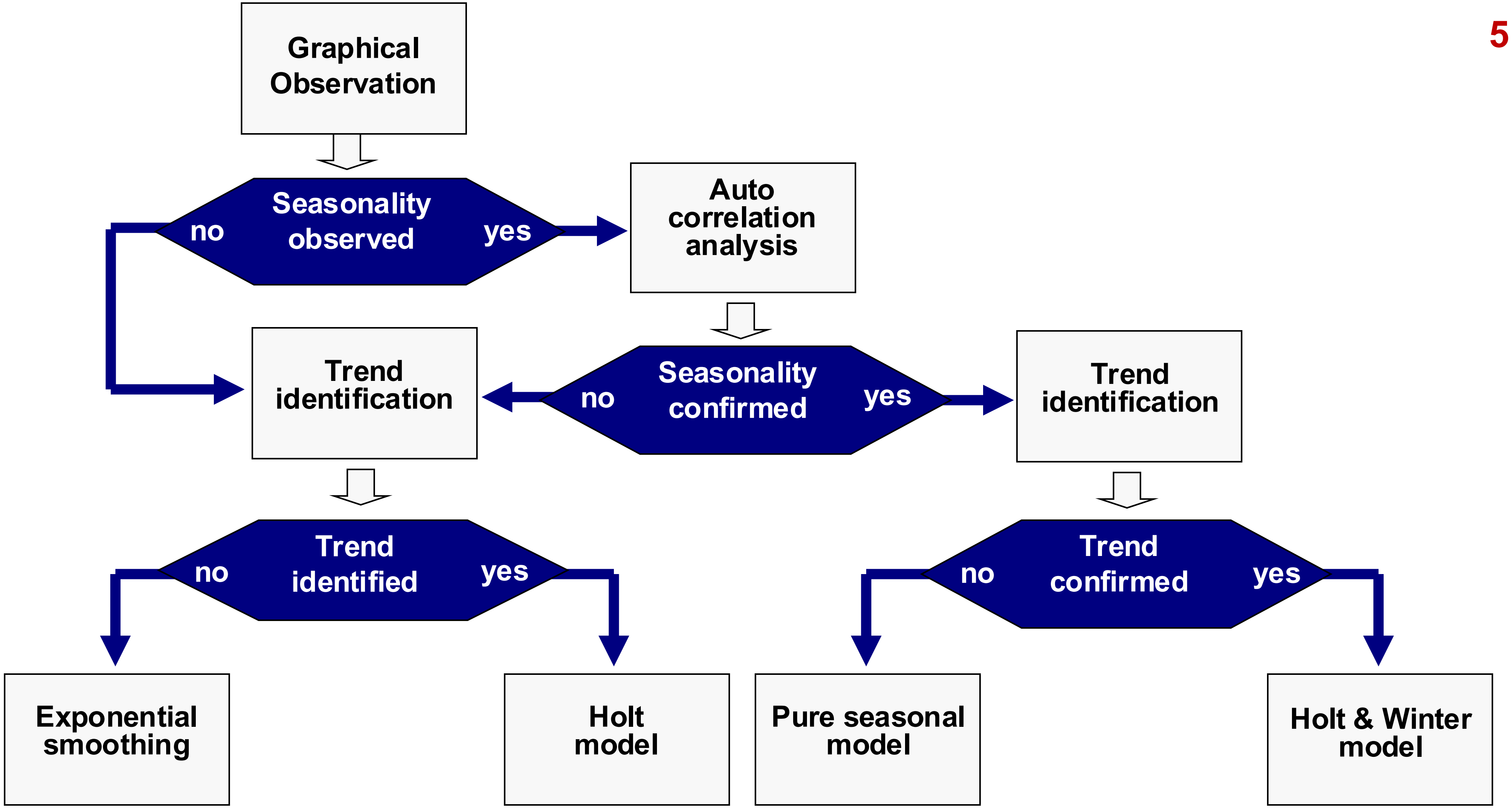


Forecast Method Selection Roadmap – Step 3: Method



Define Your Forecasting Method on the Roadmap

5 min



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Time Series – Trend & Seasonality (Holt-Winter Model)

An exponential smoothing model (with three smoothing equations) for data with trend + seasonality:

Step 1) Forecast equation

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

c: periodicity of the seasonal effect

Step 2) Level equation

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

Smoothing constant for the based level

$0 \leq \alpha \leq 1$

Step 3) Trend equation

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

Smoothing constant for trend

$0 \leq \beta \leq 1$

Step 4) Seasonality equation

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Smoothing constant for seasonal

$0 \leq \gamma \leq 1$

Seasonal Factors – Additive & Multiplicative

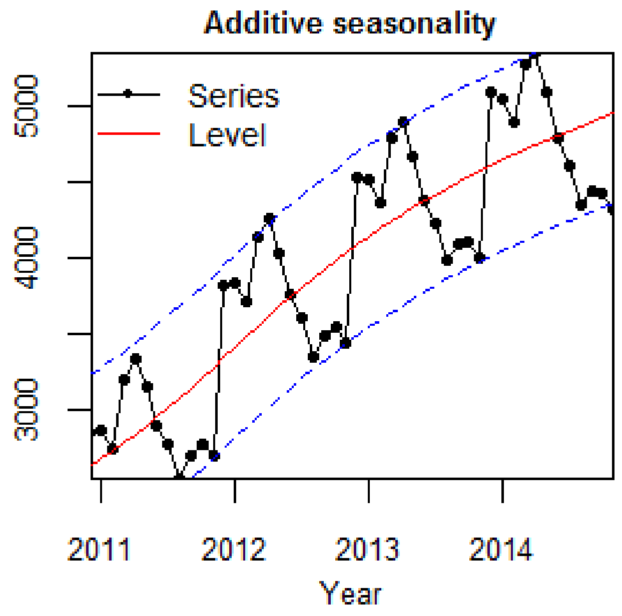
- Accordingly, the time series model used to described data ($\mathcal{Y}$) can be:

Additive

Modification by addition of a fixed quantity

$Y_{t+1} = Y_t + 100$

$$\mathcal{Y} = \mathcal{B} + \mathcal{T} + \mathcal{S} + \mathcal{R}$$

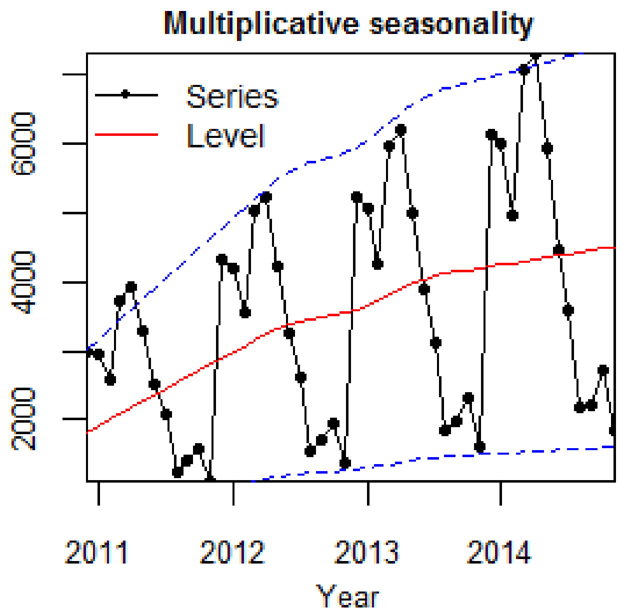


Multiplicative

Modification by multiplication by a coefficient

$Y_{t+1} = 1.05\, Y_t$

$$\mathcal{Y} = \mathcal{B} \times \mathcal{T} \times \mathcal{S} \times \mathcal{R}$$



EPFL

Time Series – Additive & Multiplicative Components

- Trend and Seasonal components can be additive or multiplicative;

$$\mathcal{Y} = \mathcal{F}(\mathcal{B}, \mathcal{T}, \mathcal{S}) + \mathcal{R}$$

$[\mathcal{T};\mathcal{S}]$ ➡

0 = no component
a = Additive components
m = Multiplicative components

Examples:

[*a*;*0*] =
- Additive trend
- No seasonal components

$$\mathcal{Y} = \mathcal{B} + \mathcal{T} + \mathcal{R}$$

[*0*;*m*] =
- No trend
- Multiplicative seasonal components

$$\mathcal{Y} = \mathcal{B} \times \mathcal{S} + \mathcal{R}$$

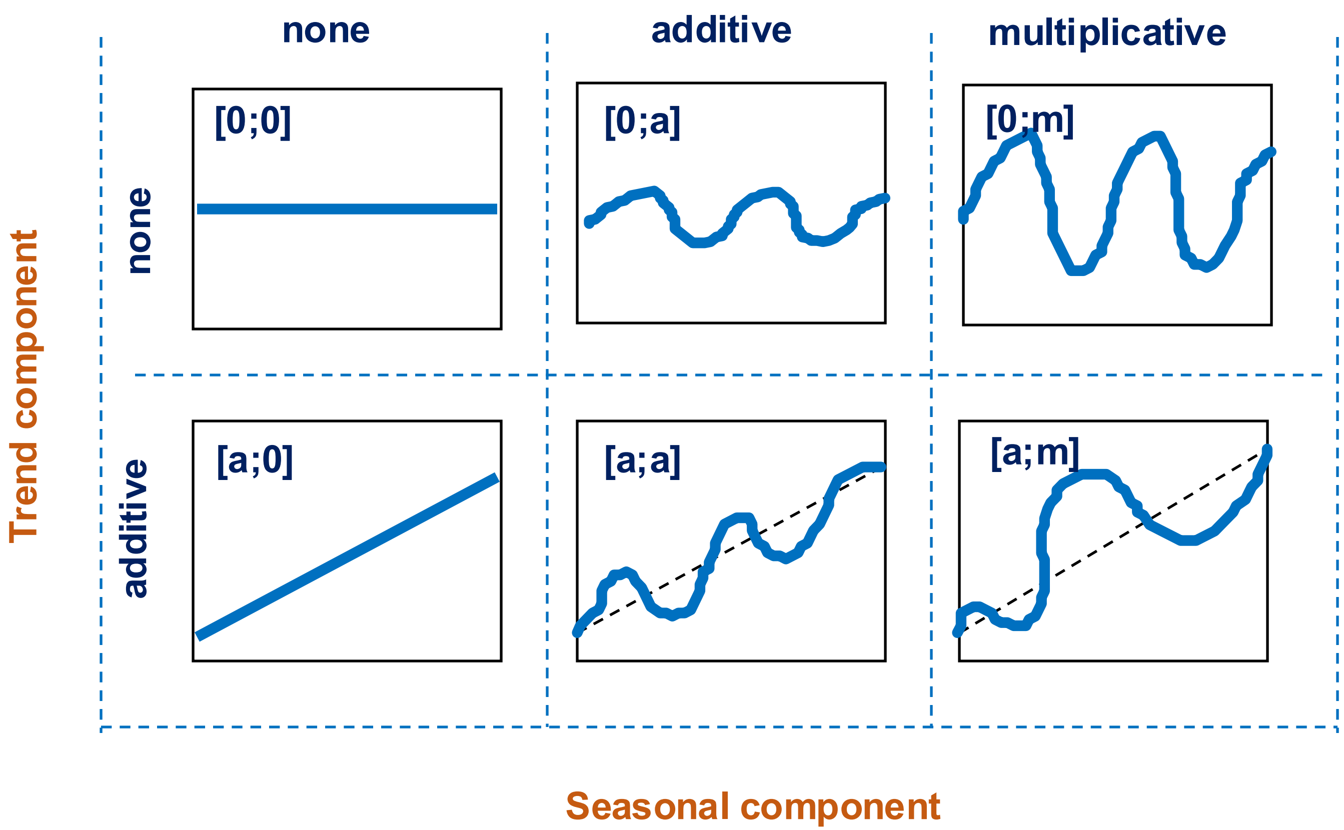
[*a*;*m*] =
- Additive trend
- Multiplicative seasonal component

$$\mathcal{Y} = (\mathcal{B} + \mathcal{T})\mathcal{S} + \mathcal{R}$$

Time series – Additive & Multiplicative Components

0 = no component
a = Additive components
m = Multiplicative components

[$\mathcal{T}$;$\mathcal{S}$]



Time series – [*0*;*0*]

[*0*;*0*] • No trend, No seasonal component

$$\mathcal{Y} = \mathcal{F}(\mathcal{B}) + \mathcal{R}$$

$$F_{t+1} = F_t + \alpha(Y_t - F_t) = \alpha Y_t + (1-\alpha)F_t$$

$$F_{t+h} = F_t + \alpha(Y_t - F_t) = \alpha Y_t + (1-\alpha)F_t$$

$$\mathcal{Y} = \mathcal{B} + \mathcal{R}$$

[*0*;*0*]

Time series – [*0*;*m*]

[*0*;*m*] • No trend, Multiplicative seasonal component

$$\mathcal{Y} = \mathcal{F}(\mathcal{B}, \mathcal{S}) + \mathcal{R}$$

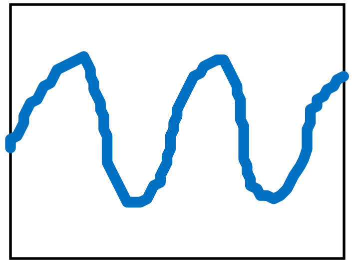
$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha) B_{t-1}$$

c: periodicity of the seasonal effect

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma) S_{t-c}$$

$$F_{t+h} = B_t \times S_{t+h-c}$$

$$\mathcal{Y} = \mathcal{B} \times \mathcal{S} + \mathcal{R}$$



[*0*;*m*]

Time series – [*a*;*0*]

[*a*;*0*] • Additive trend, No seasonal component

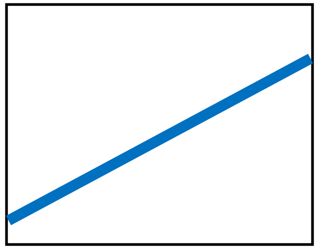
$$\mathcal{Y} = \mathcal{F}(\mathcal{B}, \mathcal{T}) + \mathcal{R}$$

$$B_t = \alpha Y_t + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$F_{t+h} = B_t + hT_t$$

$$\mathcal{Y} = \mathcal{B} + h\mathcal{T} + \mathcal{R}$$



[*a*;*0*]

Time series – [a;a]

[a;a] • Additive trend and seasonal component

$$\mathcal{Y} = \mathcal{F}(\mathcal{B}, \mathcal{T}, \mathcal{S}) + \mathcal{R}$$

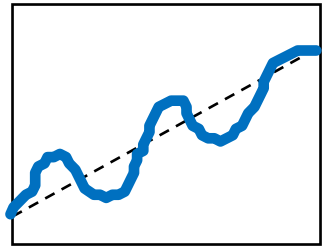
$$B_t = \alpha(Y_t - S_{t-c}) + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma(Y_t - B_t) + (1-\gamma)S_{t-c}$$

$$F_{t+h} = (B_t + hT_t) + S_{t+h-c}$$

$$\mathcal{Y} = \mathcal{B} + h\mathcal{T} + \mathcal{S} + \mathcal{R}$$



[a;a]

Time series – [*a*;*m*]

[*a*;*m*] • Additive trend, Multiplicative seasonal component

$$\mathcal{Y} = \mathcal{F}(\mathcal{B}, \mathcal{T}, \mathcal{S}) + \mathcal{R}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

c: periodicity of the seasonal effect

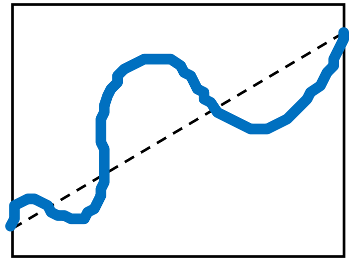
$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

h: forecasting horizon (1, 2, …, 12)

$$\mathcal{Y} = (\mathcal{B} + \mathcal{T})\mathcal{S} + \mathcal{R}$$



[*a*;*m*]

Assignment 5 – Tasks

5 min

1) Identify the demand model you need to use based on Roadmap (see the slide)
2) If you observe seasonality in your dataset, specify if the seasonal factor is Additive & Multiplicative
3) Select a preliminary forecast model (align with task 1 and 2)
4) Compute possible initial trend components
5) Compute possible initial seasonal components
6) Validate the proposed initial model
7) Comment the results of the validation process
8) Set a logic for smoothing coefficients (alpha, beta, Gamma) for running your forecasting model.
9) Forecast the demand of your product (product family level) for the next 18 months.
10) Measure performance of your forecasting model (Use MAPE).

Time Series – Trend (Holt Model)

An exponential smoothing model (with two smoothing equations) for data with trend:

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Step 2) Level equation $B_t = \alpha Y_t + (1-\alpha)(B_{t-1} + T_{t-1})$ $0 \le \alpha \le 1$

Step 3) Trend equation $T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$ $0 \le \beta \le 1$

Time Series – Trend & Seasonality (Holt-Winter Model)

An exponential smoothing model (with three smoothing equations) for data with trend + seasonality:

Step 1) Forecast equation

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

c: periodicity of the seasonal effect

Step 2) Level equation

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

Smoothing constant for the based level

$0 \leq \alpha \leq 1$

Step 3) Trend equation

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

Smoothing constant for trend

$0 \leq \beta \leq 1$

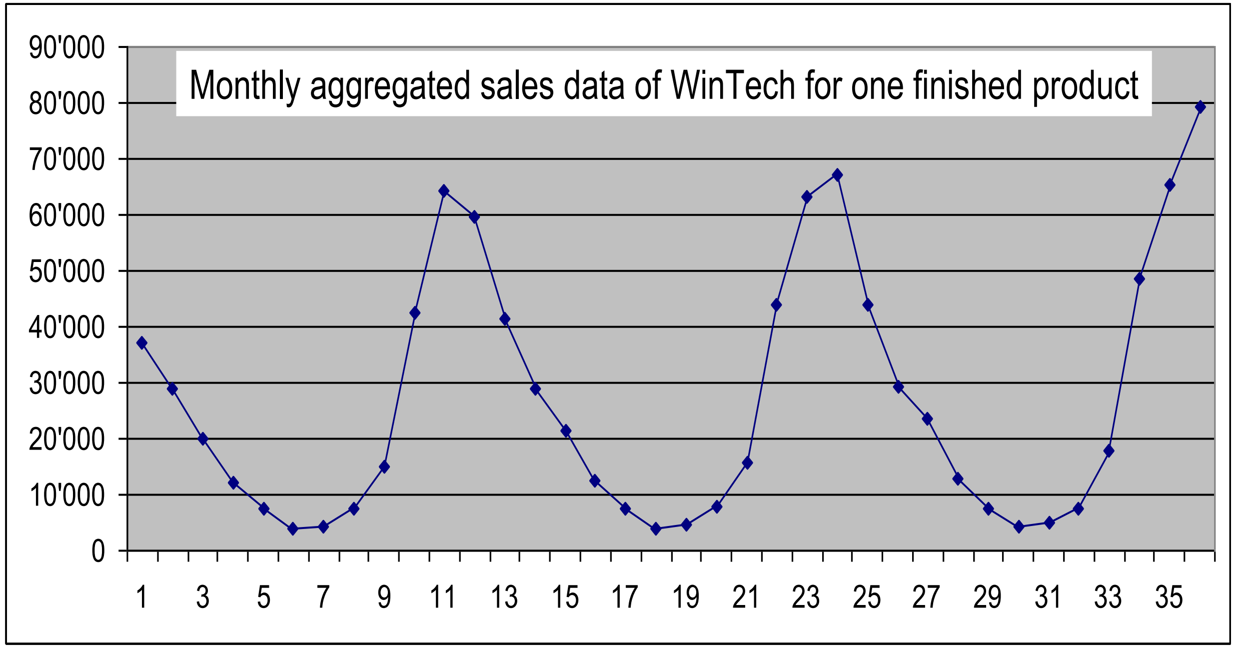
Step 4) Seasonality equation

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Smoothing constant for seasonal

$0 \leq \gamma \leq 1$

Model Initiation – Holt & Winter



Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

There is no unique process, however, its recommended to identify the most obvious components

Model Initiation – Use of Our Dataset

cycle 1	cycle 2	cycle 3
used to initiate trend and seasonal components		
	used to initiate the base	
		used to validate the model

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Initial trend component (T’): Cycle 1, 2, 3

Initial Seasonal component (S’): Cycle 1, 2, 3

Initial base (B’): Cycle 2

Model validation: Cycle 3

Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

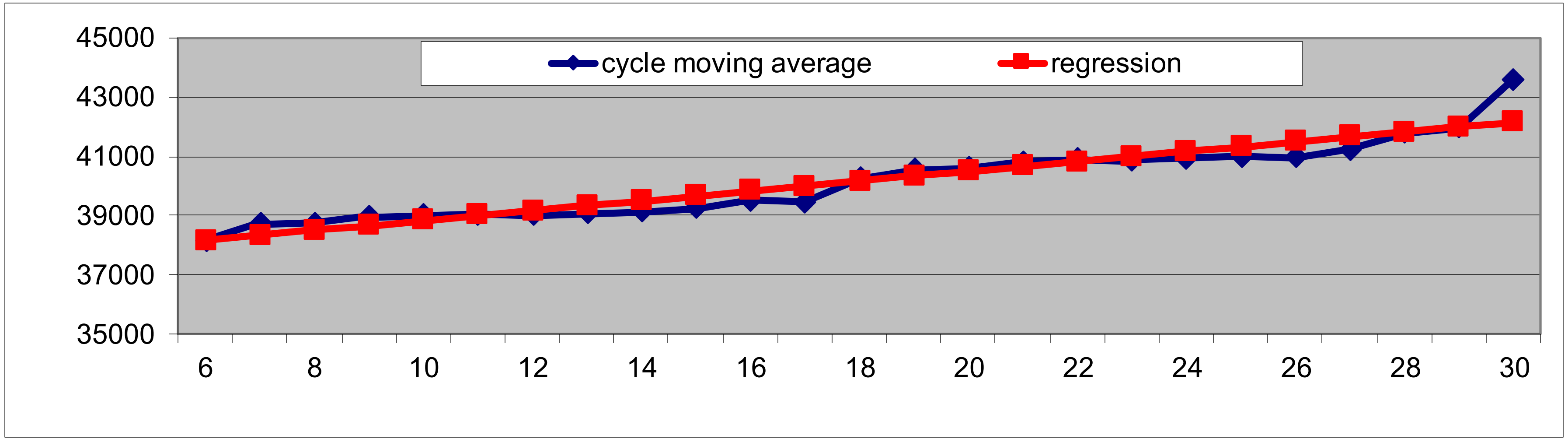
Model Initiation – Step 1

Step 1. Identify the initial trend (*T'*)

1. Calculate the cycle moving average $\overline{Y}_t = \frac{1}{c}\left[\sum_{i=t-(c-2)/2}^{i=t+(c-2)/2} Y_i + \frac{1}{2}\left(Y_{t-c/2} + Y_{t+c/2}\right)\right]$ *c=12 (even)*

2. Determine the additive trend component by linear regression of $\overline{Y}_t$

3. Define initial trend



Model Initiation – Step 1.1

1. Calculate the cycle moving average $\bar{Y}_t$

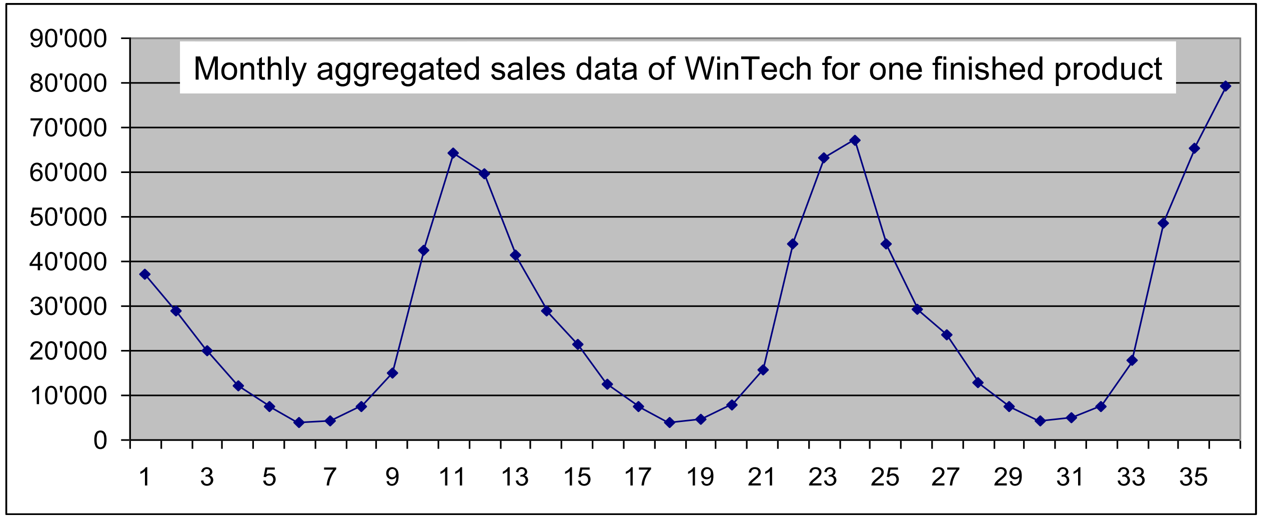
If c (periodicity of the seasonal effect) is odd

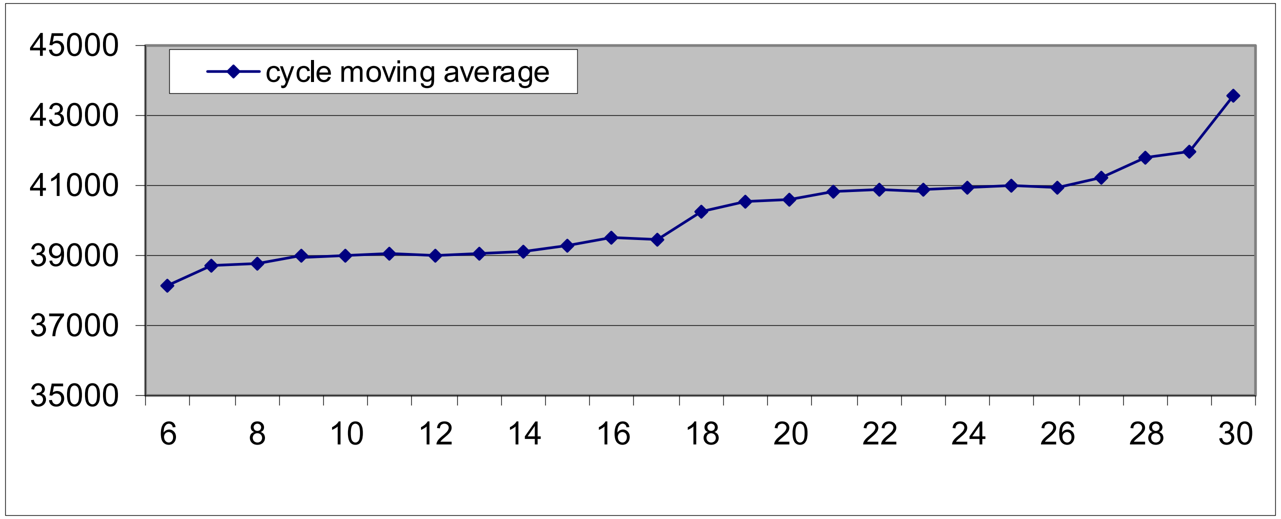
$$\bar{Y}_t = \frac{1}{c}\sum_{i=t-(c-1)/2}^{i=t+(c-1)/2} Y_i$$

If c (periodicity of the seasonal effect) is even

$$\bar{Y}_t = \frac{1}{c}\left[\sum_{i=t-(c-2)/2}^{i=t+(c-2)/2} Y_i + \frac{1}{2}\left(Y_{t-c/2} + Y_{t+c/2}\right)\right]$$

Model Initiation – Step 1.1



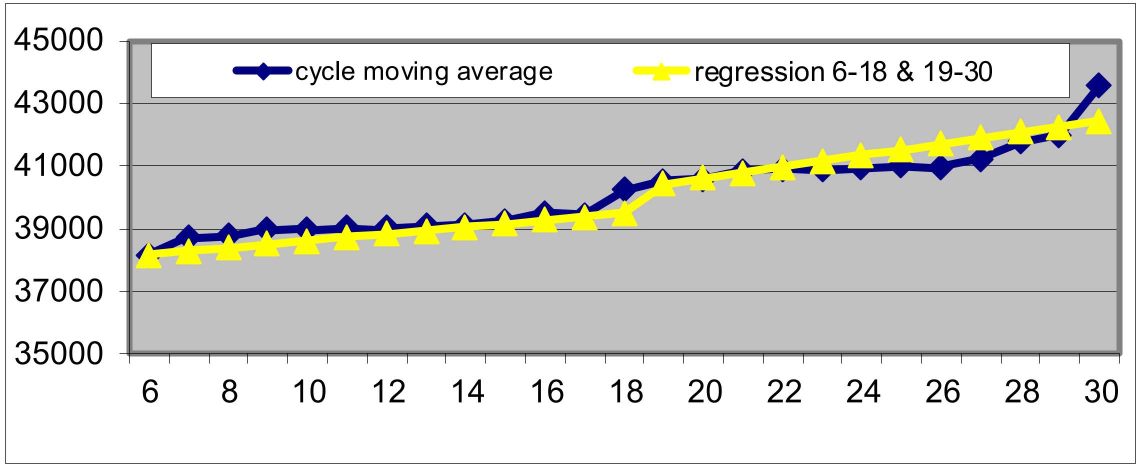


Model Initiation – Step 1.2 & Step 1.3

1.2. Determine the additive trend component by linear regression of $\bar{Y}_t$

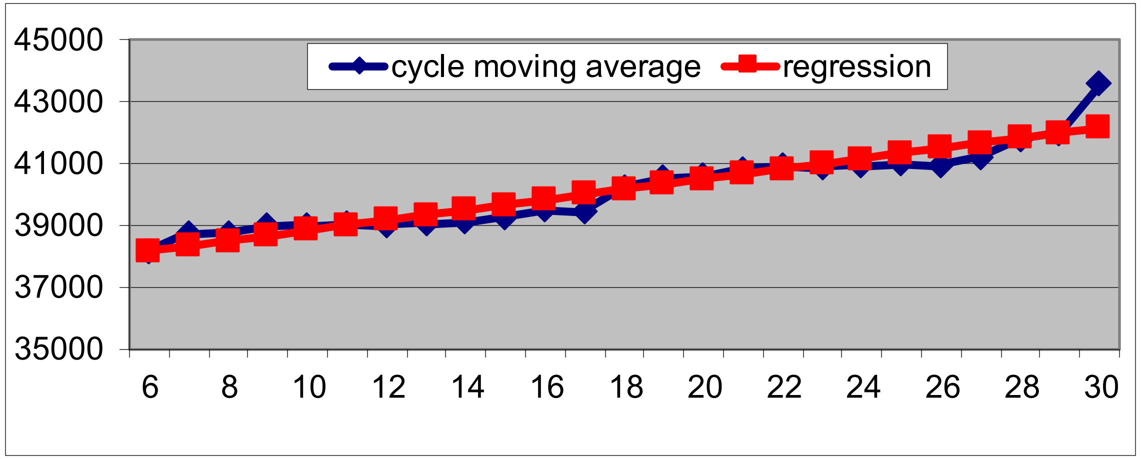
For smaller range of data (per year)

T'(6-18) = 110 part / period
T'(19-31) = 183 part / period



For the entire data

T'(6-30) = 166 part / period



Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

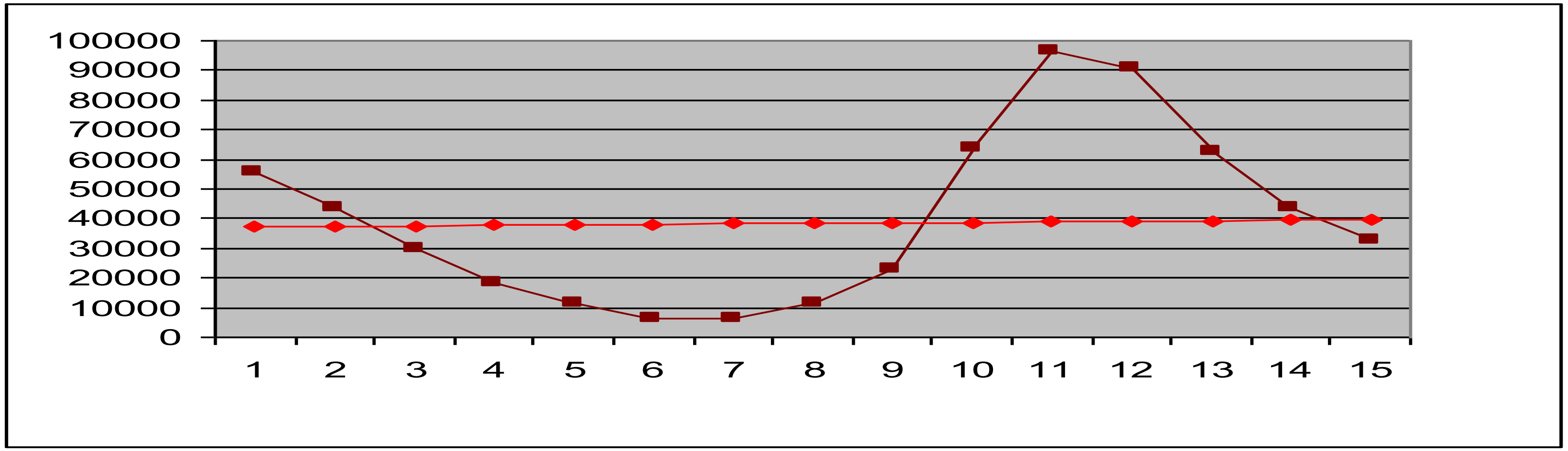
$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Model Initiation – Step 2

Step 2. Identify the initial seasonal components (*S’*)

1. Define the given cycle $\left[t^\circ; t^\circ + (c-1)\right]$
2. Define the cycle average $\bar{Y}_c = \frac{1}{c} \sum_{t=t^\circ}^{t^\circ+(c-1)} Y_t$
3. Define deseasonalized time series $\tilde{Y}_t = \bar{Y}_c + T' \left[t - t^\circ - \frac{c-1}{2} \right]$
4. Define initial seasonal coefficient $S'_t = \frac{Y_t}{\tilde{Y}_t}$



Model Initiation – Step 2.3

2.3. Determine the values of the seasonal components

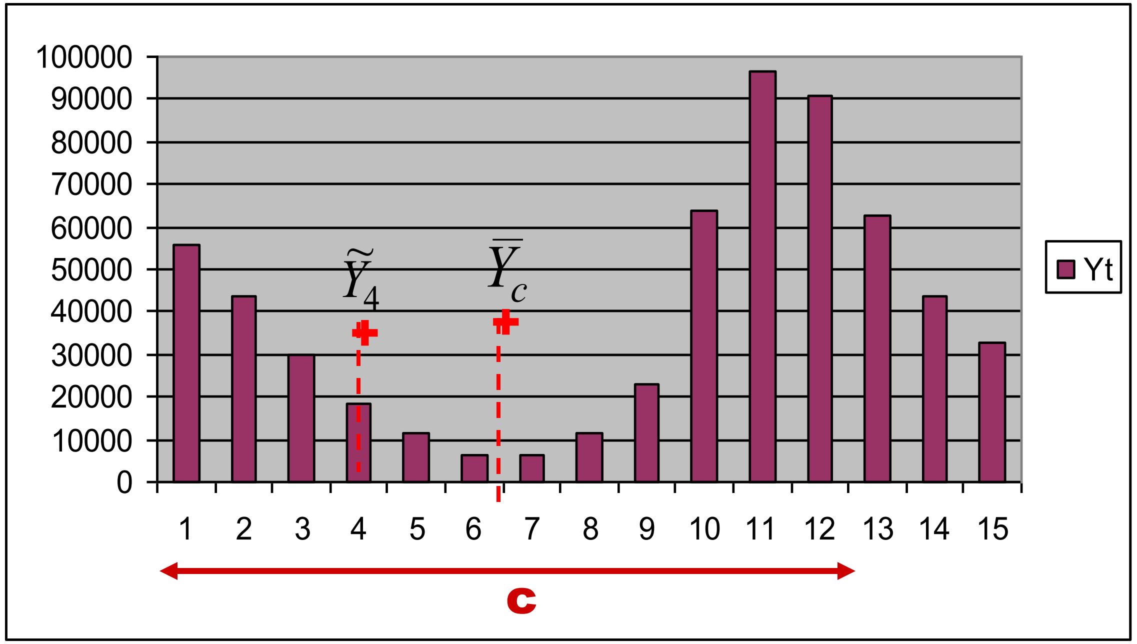
Eliminate the seasonal effect and create deseasonalized time series

$$\tilde{Y}_t = \overline{Y}_c + T'\left[t - t^\circ - \frac{c-1}{2}\right]$$

With cycle of: $\left[t^\circ; t^\circ + (c-1)\right]$ *and cycle average of:* $\overline{Y}_c = \frac{1}{c}\sum_{t=t^\circ}^{t^\circ+(c-1)} Y_t$

$$\tilde{Y}_t = \overline{Y}_c + T'\left[t - t^\circ - \frac{c-1}{2}\right]$$

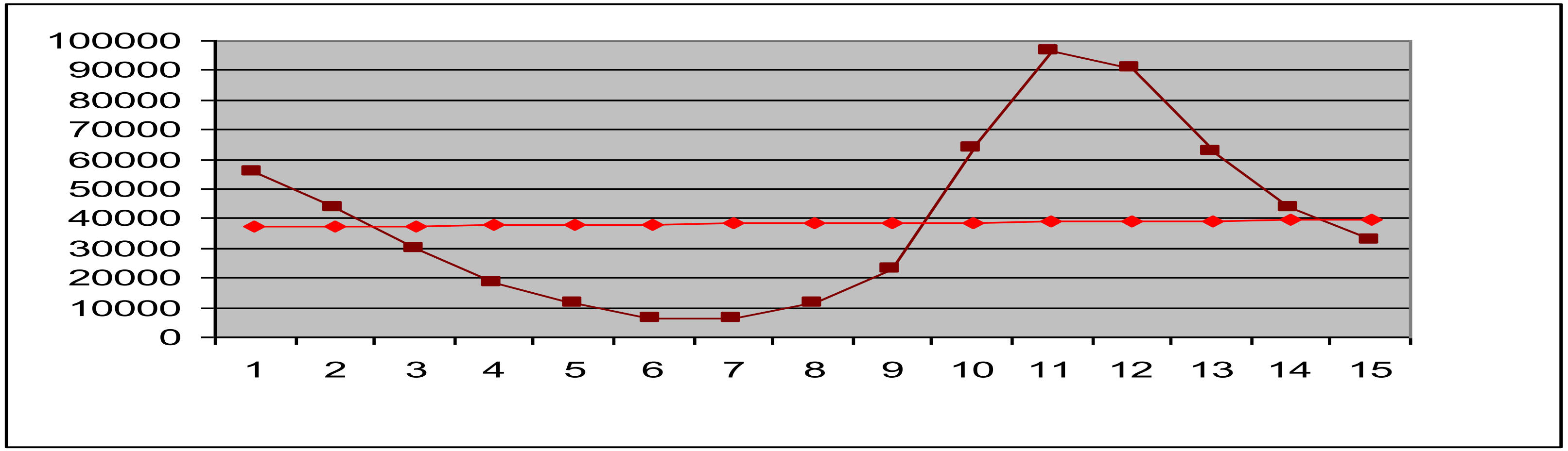
$$\tilde{Y}_4 = \overline{Y}_c + T'\left[4 - 1 - \frac{12-1}{2}\right] = \overline{Y}_c - 2.5T'$$



Model Initiation – Step 2

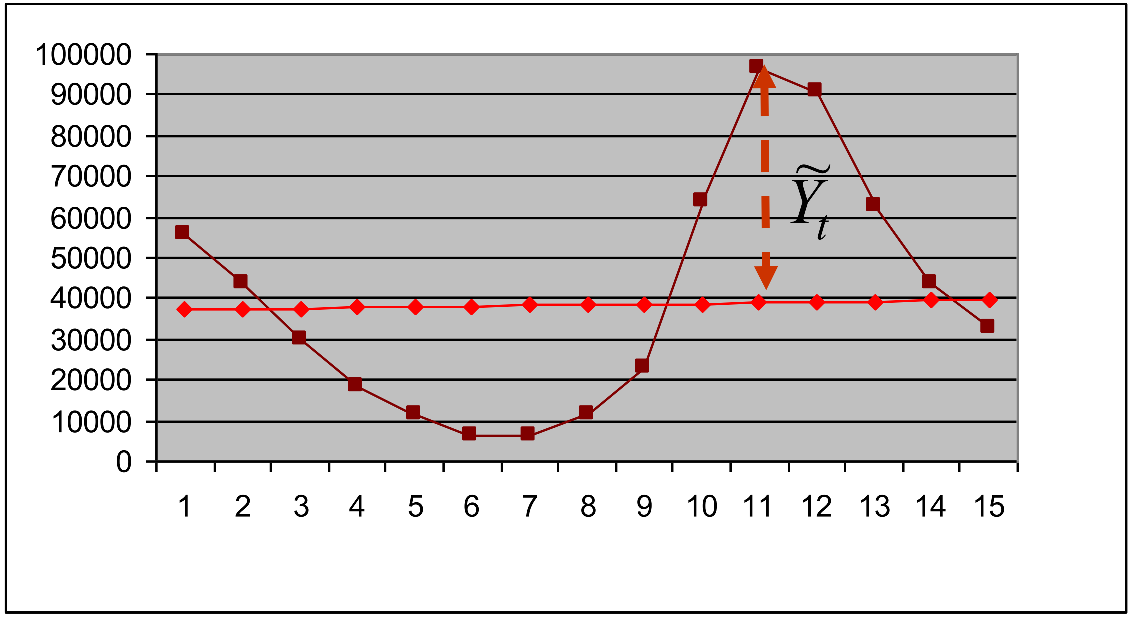
Step 2. Identify the initial seasonal components (*S'*)

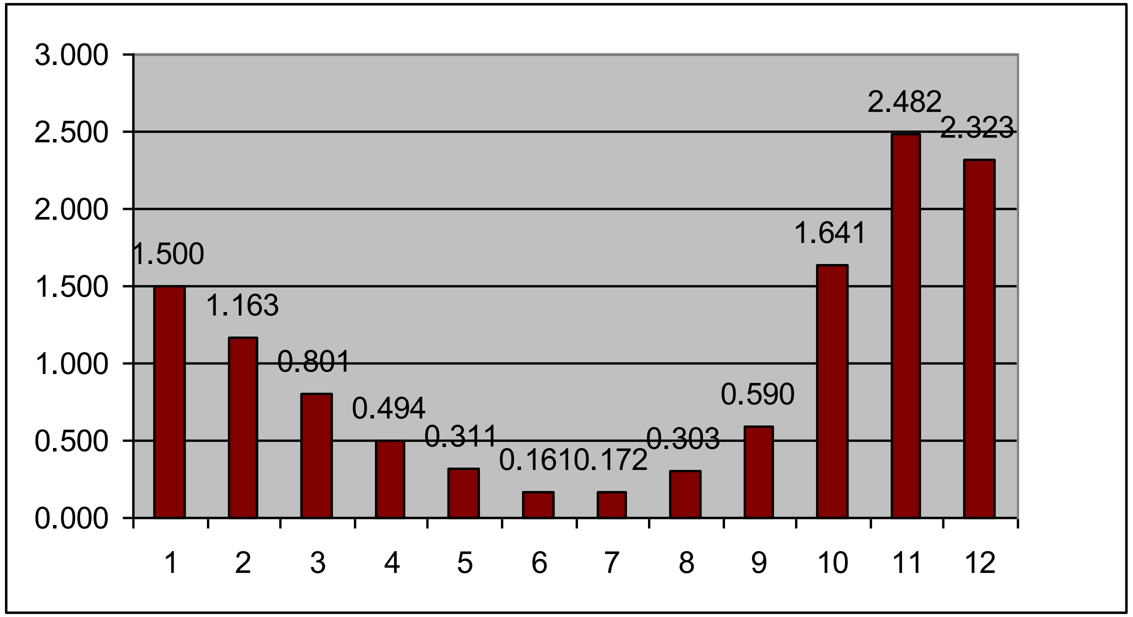
1. Define the given cycle $\left[t^\circ; t^\circ + (c-1)\right]$
2. Define the cycle average $\bar{Y}_c = \frac{1}{c}\sum_{t=t^\circ}^{t^\circ+(c-1)} Y_t$
3. Define deseasonalized time series $\tilde{Y}_t = \bar{Y}_c + T'\left[t - t^\circ - \frac{c-1}{2}\right]$
4. Define initial seasonal coefficient $S'_t = \frac{Y_t}{\tilde{Y}_t}$



Model Initiation – Step 2.4

2.4. Define initial seasonal coefficient $S'_t = \frac{Y_t}{\widetilde{Y}_t}$





Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Model Initiation – Step 3

Step 3. Identify the initial base (*B'*)

1. Calculate the average value of cycle 2 $$\bar{Y}_c = \frac{1}{c}\sum_{t=t^\circ}^{t^\circ+(c-1)} Y_t$$
2. Define initial base $$B' = \bar{Y}_2 + \frac{c-1}{2}T' \quad ; c=12$$

Example: Initial base (B') = 40243 + 5.5 * 166

Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Model Initiation – Step 4

4.1. Define the validation cycle (Year 3)

4.2. Define the initial model $F'_{t+h} = (B' + hT') \times S'_{t+h}$

Initial model (F'_{t+h}) = (40243 + h * 166)* S'_{t+h}

h =1,2, …, 12

Examples:

h=1 ; F'_{24+1} = (40243 + (1) * 166)* S'_{24+1}

h=5 ; F'_{24+5} = (40243 + (5) * 166)* S'_{25+5}

h=11 ; F'_{24+11} = (40243 + (11) * 166)* S'_{25+11}

Note: I used the third cycle of my data for initial forecast and validation of my model

Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

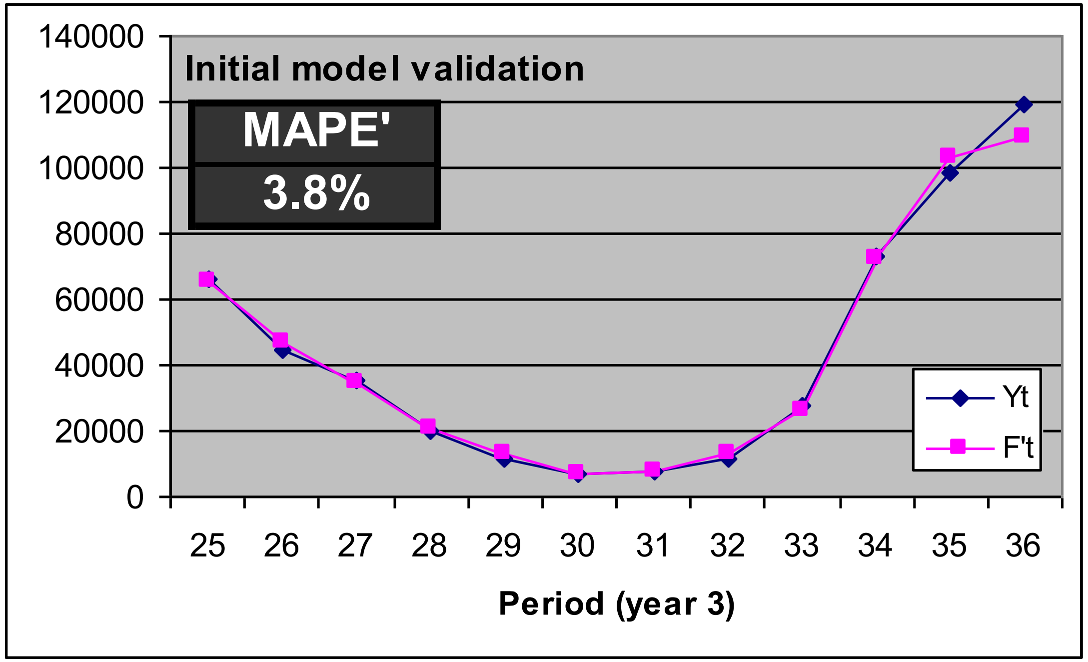
$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Model Initiation – Model Validation

5. Determine the reliability measure $MAPE' = \frac{1}{c}\sum_{h=1}^{c}\left|\frac{Y_{t^\circ+h} - F'_{t^\circ+h}}{Y_{t^\circ+h}}\right|$

where $c = 12$, and $h = 1, 2, \ldots, 12$



Initial model validation

Model Initiation – Steps

Step 1. Identify the initial trend (*T'*)

Step 2. Identify the initial seasonal components (*S'*)

Step 3. Identify the initial base (*B'*)

Step 4. Identify the initial forecasting model (*F'*)

Step 5. Validate the forecasting model (*MAPE'*)

Holt & Winter Model

$$F_{t+h} = (B_t + hT_t) \times S_{t+h-c}$$

$$B_t = \alpha \frac{Y_t}{S_{t-c}} + (1-\alpha)(B_{t-1} + T_{t-1})$$

$$T_t = \beta(B_t - B_{t-1}) + (1-\beta)T_{t-1}$$

$$S_t = \gamma \frac{Y_t}{B_t} + (1-\gamma)S_{t-c}$$

Assignment 5 – Tasks

15 min

1) Identify the demand model you need to use based on Roadmap (see the slide)
2) If you observe seasonality in your dataset, specify if the seasonal factor is Additive & Multiplicative
3) Select a preliminary forecast model (align with task 1 and 2)
4) Compute possible initial trend components
5) Compute possible initial seasonal components
6) Validate the proposed initial model
7) Comment the results of the validation process
8) Set a logic for smoothing coefficients (alpha, beta, Gamma) for running your forecasting model.
9) Forecast the demand of your product (product family level) for the next 18 months.
10) Measure performance of your forecasting model (Use MAPE).

Production Management (ME-419)

Coaching Rooms

Amin Kaboli

Week 5 – Session 4 – Oct 10th, 2025

The Art of Giving and Receiving Effective Feedback

Feedback is a gift

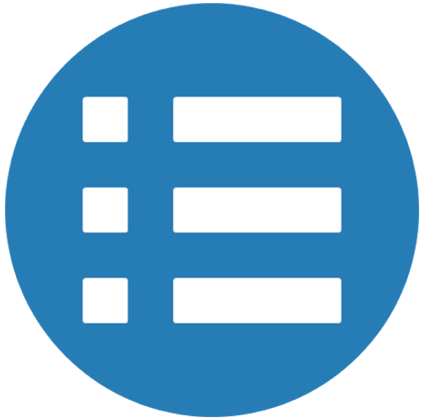
Feedback/comments are always welcome

Giving Effective Feedback

Respectful

Ask for permission

May I share my observation



Fact-based

Share facts/ your feelings

What I observed/felt is that …

Constructive

Stay focused on growth

What I suggest is that …

Concise

Be to-the-point and short

Max three key points

Open

Be open to any reaction

I respect your feeling …

Receiving Effective Feedback

Receive the gift

Be open and receptive

I appreciate your feedback

Listen

Listen to listen!

The goal is to listen not to answer, no interruption (zip it)

Understand

Focus on THE message

The goal is to understand, ask questions, clarify, repeat key points, …

Decide

You always have a choice

Thank you, I have never seen it this way

OR

Thank you, let me reflect and get back to you?

Follow up

Reach a common understanding

There are many ways to follow up: revise the work, set up a meeting, …

EPFL