Last Class (Nov 10)

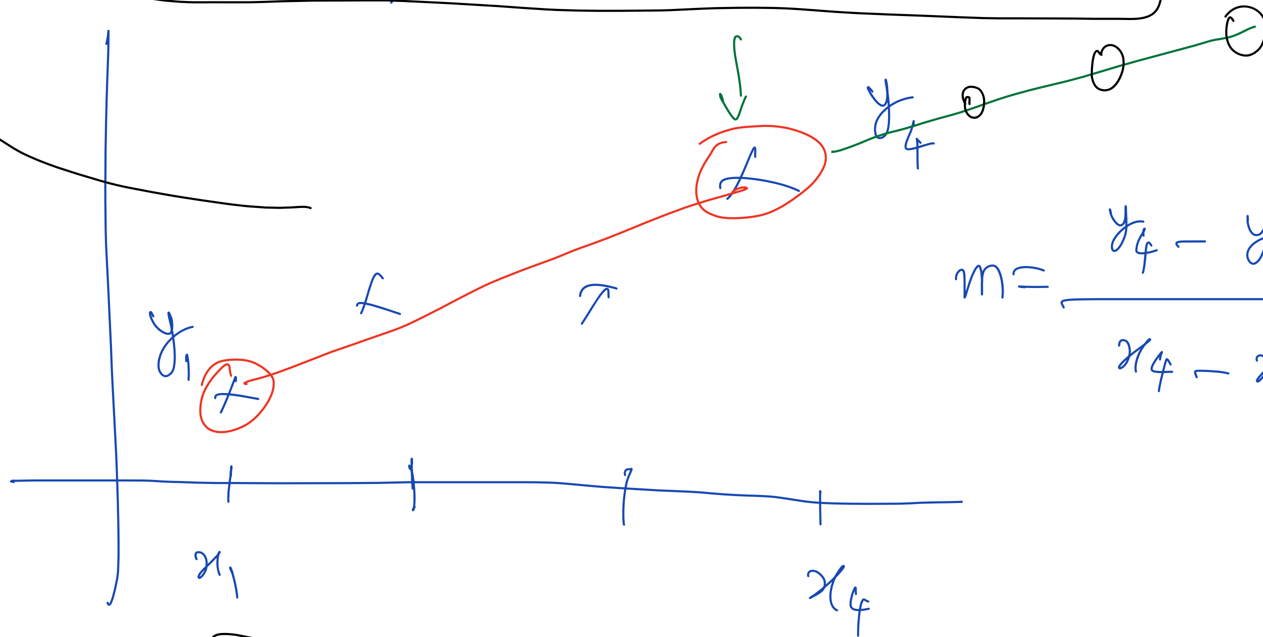
1) Breaking down a time series
2) Moving averages
3) Trend
4) Seasonality
5) Time Series decomposition
   ↳ Decomposition from scratch

Today's agenda

1) Generating forecasts
2) Train test splits
3) Simple Forecast methods
4) Naive Approach
5) Seasonal Naive Forecast
6) Drift Method
7) Smoothing Based Methods
8) Simple exponential smoothing

$\hat{y}_{t+1} = \boxed{m} \cdot t + \boxed{c}$ → linear method

$\hat{y}_{t+1} = \boxed{m_1} t^2 + \boxed{m_2} t + \boxed{c}$



$$m = \frac{y_4 - y_1}{x_4 - x_1}$$

[YYYY/MM/DD]

2019/01/01 2019/02/01 2019/03/01

1 2 3, . . . 13

X 0 [1 : 12]

$h = 1$

$t+1,\ t+2,\ t+3,\ \ldots$

$$\boxed{\hat{y}_{t+1}} = \alpha\, y_t + (1-\alpha)\, \hat{y}_t$$

actual value

pred value

$$= \alpha\, y_t + (1-\alpha)\left[\alpha\, y_{t-1} + (1-\alpha)\, \hat{y}_{t-1}\right]$$

$$\boxed{\hat{y}_t = \alpha\, y_{t-1} + (1-\alpha)\, \hat{y}_{t-1}}$$

$$= \alpha\, y_t + \alpha(1-\alpha)\, y_{t-1} + (1-\alpha)^2\, \hat{y}_{t-1}$$

α

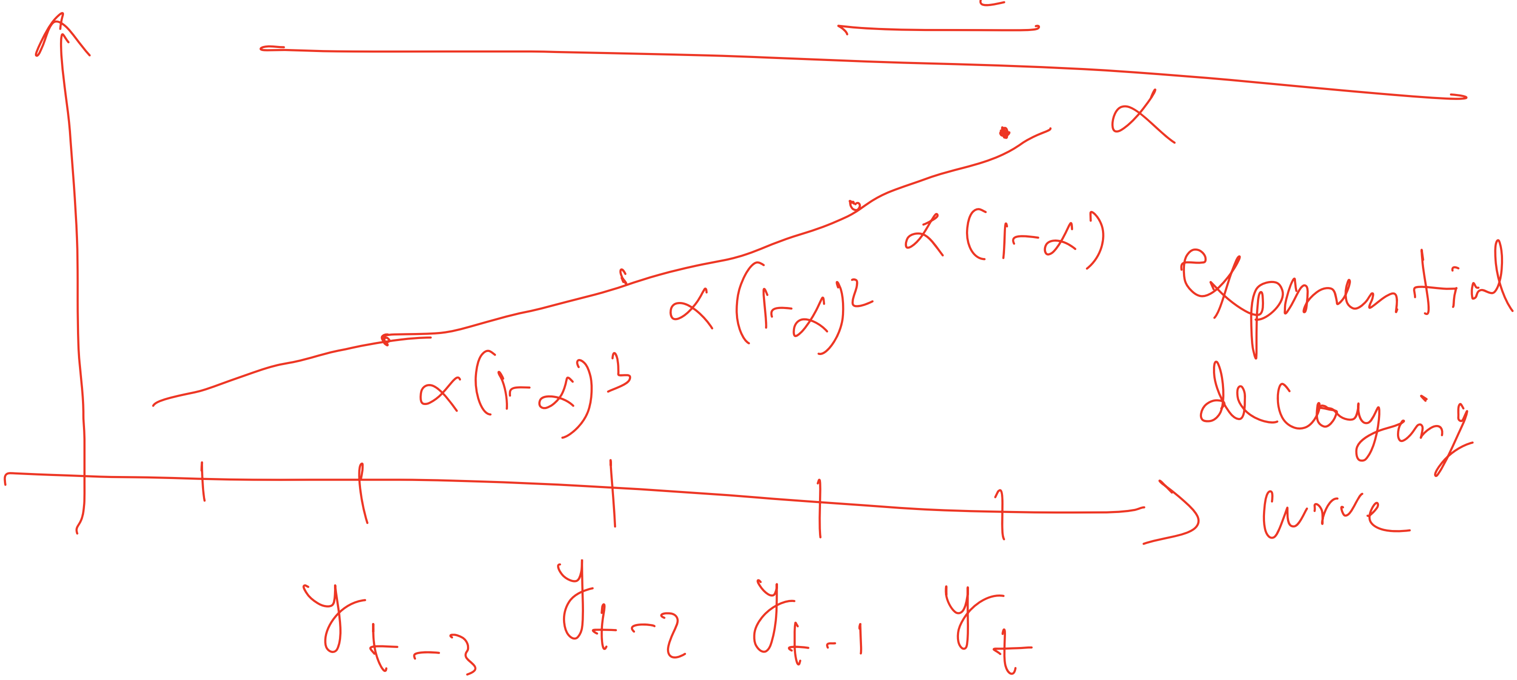
$\alpha(1-\alpha)$

$$\hat{y}_{t-1} = \alpha\, y_{t-2} + (1-\alpha)\, \hat{y}_{t-2}$$

$$\therefore\ (1-\alpha)^2\, \hat{y}_{t-1} = \alpha(1-\alpha)^2\, y_{t-2} + (1-\alpha)^3\, \hat{y}_{t-2}$$

$$\alpha y_t + \alpha(1-\alpha) y_{t-1}$$

$$+ \alpha(1-\alpha)^2 y_{t-2} + \ldots$$



$\alpha = 0$ to 1

$1-\alpha = 0$ to 1

$\alpha = 0.3$

$1-\alpha = 0.7$

$\alpha(1-\alpha) = 0.3 \times 0.7$

$= 0.21$

$0.21 < 0.3$

$\Rightarrow \alpha(1-\alpha) < \alpha$