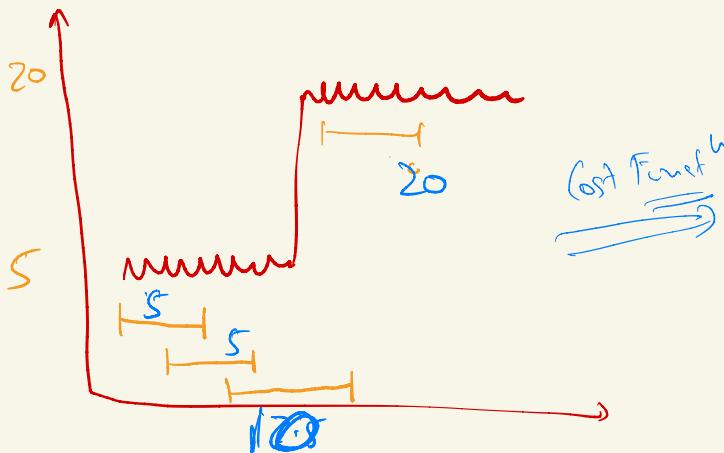
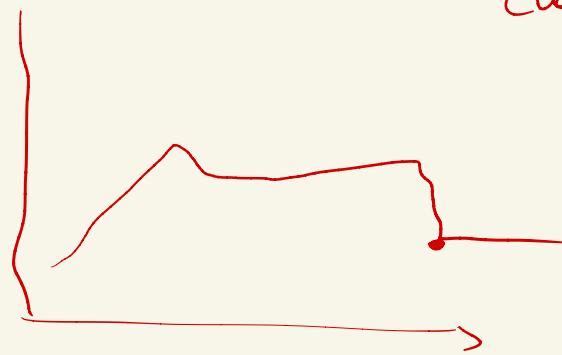



Agenda

- ① Change pt Code
- ② Regression as forecasting Tool
- ③ General Predictions about TS using ACF/PACF plots

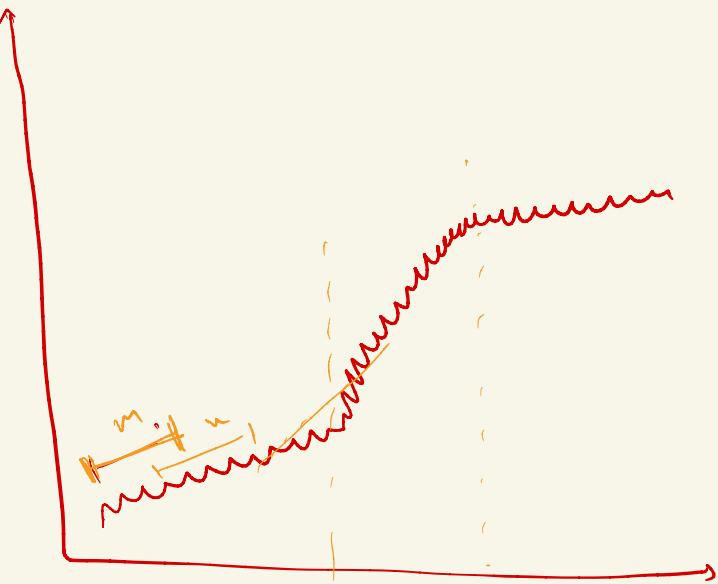
Start at 9:05

\Rightarrow Change Points \rightarrow Pts where (or more) properties of TS change

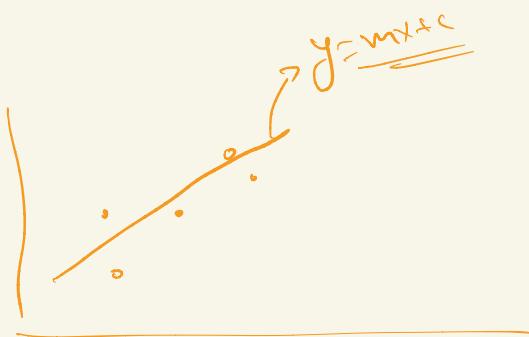


mean of window	Diff
5	$C_2 - C_1$
5	0
7.5	2.5
10	2.5
15	5
20	5
20	0
20	0
20	0
20	0

Threshold



change in slope
↳ Cost function



np.polyfit()
↓

fits a Polynomial
in given
datapts.

⇒ Regressor as a Forecasting Model?

AR model

$$\hat{y}_t = \alpha_1 y_{t-1} + \dots + \alpha_p y_{t-p}$$

Is winter	y_{t-p}	y_{t-pt}	-	\dots	y_{t-1}	y_t
0						$\frac{200}{250}$
1						270
0						
1						
0						
1						
0						

x y $\Rightarrow \underline{\underline{LP}}$

Past values as input columns.

Why should be restrict to only y values

\Rightarrow ARIMA, TES \rightarrow not giving good results.

Features \rightarrow comes from business understanding.

- Shoe sales \rightarrow Clothing Sales

- y_{t-50} \times 200 years

$\hookrightarrow \underline{\underline{15-20 TS}}$

Created features

GBDT Reg
RF Reg

\Rightarrow y_{t+1} Cannot be used to predict y_t

y_{t+1}	y_{t+2}	y_{t+1}	y_t
150	120	130	140
160	130	140	150
170	140	150	160
180	150	160	170

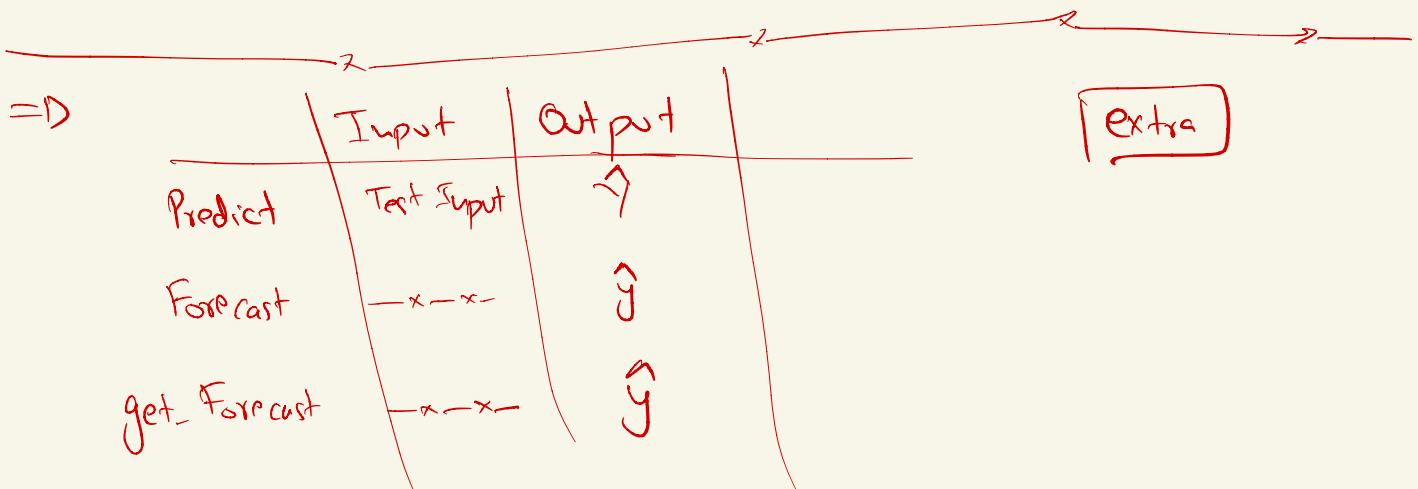
$\Rightarrow 160, 120, 130, 140, 150, 160, 170$

② Any created feature should be available in future as well.

\Rightarrow We use it as a feature

SARIMAX \rightarrow add $\rightarrow y_{t-p} \dots y_{t-1}$ data
 \rightarrow Seasonality

\rightarrow



$\Rightarrow MAE$

$$\leq \frac{|y_t - \hat{y}_t|}{N}$$

Interview
question

MSE

$$\leq \frac{(y_t - \hat{y}_t)^2}{N}$$

MAPE

$$\frac{1}{N} \sum \frac{|y_t - \hat{y}_t|}{y_t}$$

$$\frac{y_t}{\sum} = 0$$

for values where y_t can
be 0 avoid using MAPE

$\Rightarrow ACF - PACF$ plots \rightarrow

\hookrightarrow Seasonality

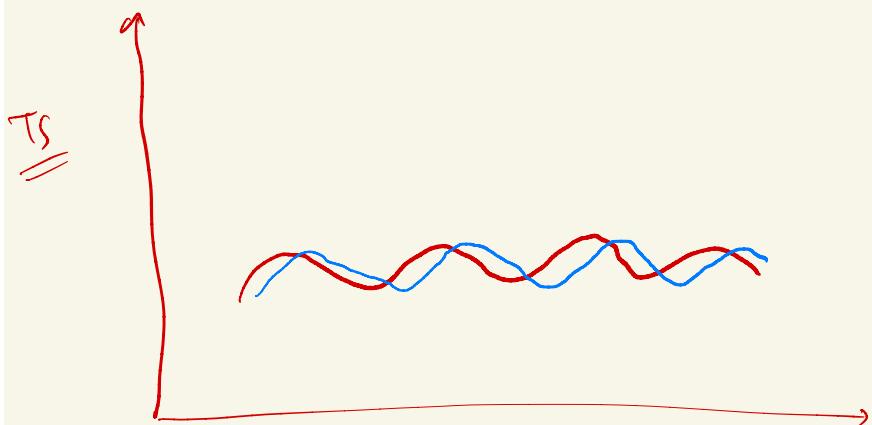
P, Q, D, p, q, d

\hookrightarrow Trend or not

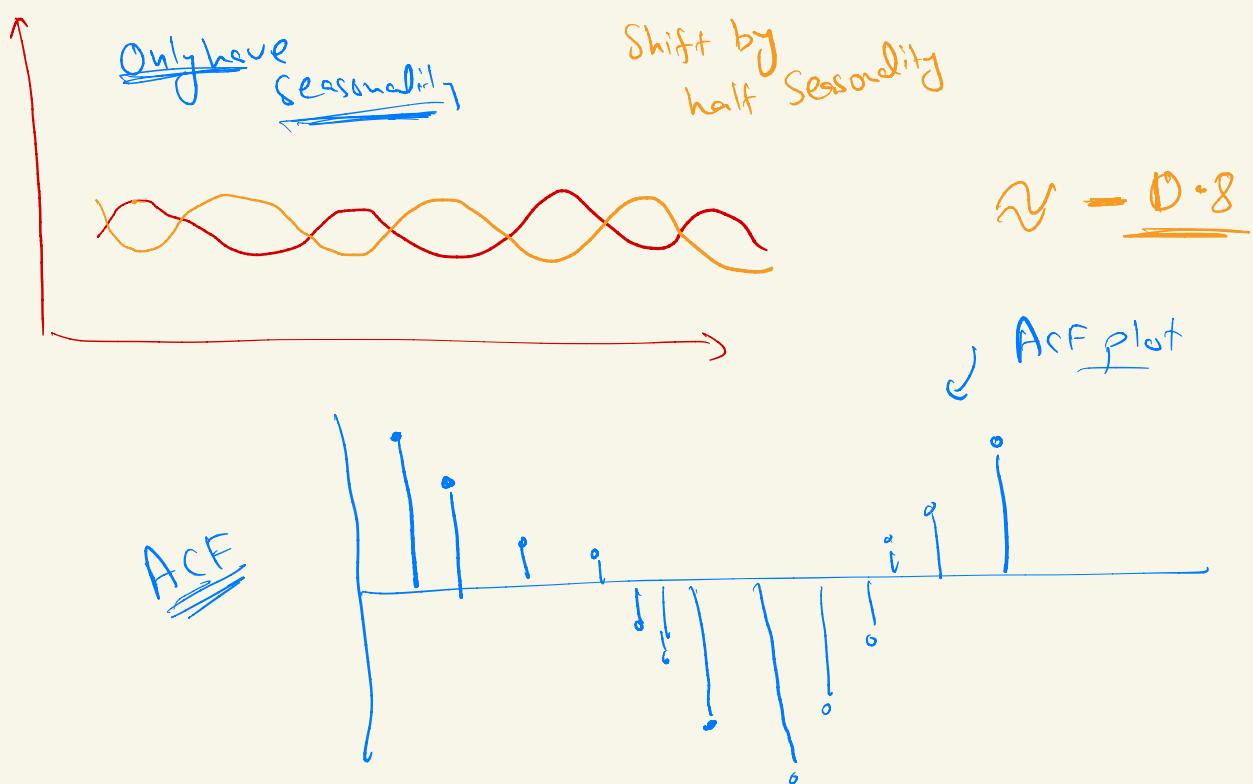
$\Rightarrow ACF /$ $\iff TS$
PACF

① TS \rightarrow Find ACF

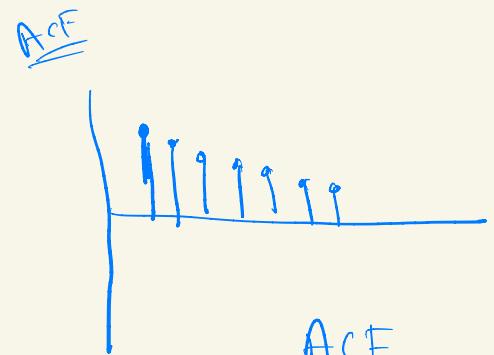
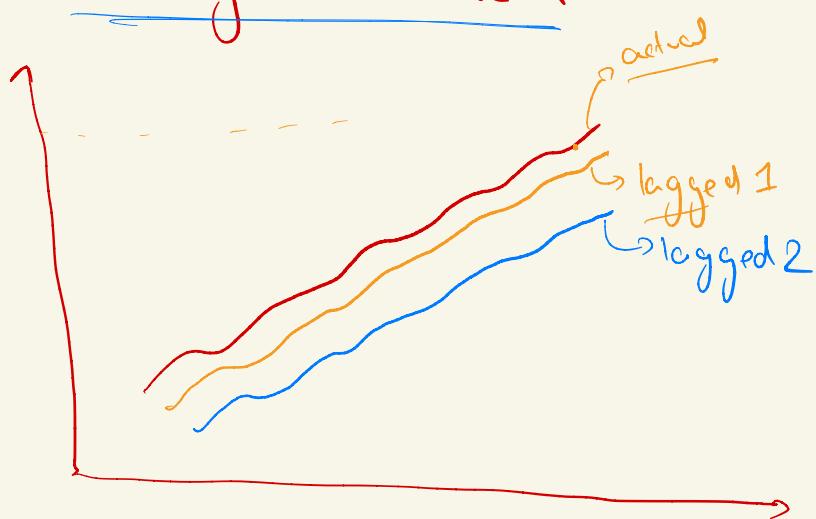
auto correlation



$$\begin{aligned} \text{Corr} &= 1 & \text{Lag} &= 0 \\ &= 0.8 & \text{Lag} &= 1 \end{aligned}$$



② TS only have trend



Slowly decaying graph

Trended chart will have slowly decaying ACF graph

But slow decay ACF does not mean a trended chart

Congratulations

Now You are a TS

Expert

