Agenda

1) Recap
2) SARIMAX
3) Can we use Linear Regression
4) Introduction to Prophet

$\boxed{\text{Exogeneous Variable}}$

Variables which can add additional useful information for model to learn the pattern

Example:

1) A new model launch

2) Flash Sale / promotional Events / advertisement Campaigns

3) Big Billion Sale / Republic Day Sales / Festival Sales

SARIMAX

* SARIMA : p (AR)
  d (I)
  q (MA)
  P (seasonal AR)
  D (seasonal Diff)
  Q (Seasonal MA)
  S (Seasonality)

↓

SARIMA + Exogenous Variable

⇓

SARIMAX

$$\hat{y}_{t+1} = AR + MA + diff + Diff + AR\text{-}Seasonality + MA\_Seasonality + \boxed{w_i \times V_i}$$

Linear Regression on Time-Series

D	H	W.D	Target
d_1	0	S	300
d_2	1	M	312
	0		

Features Target

Feature Engineering

1) W.D ⇒ Numerical ⇒ weekend(0,1)

2) lag-Information ⇒ 31 days

y_t
y_{t-1}
t_{t-2}
y_{t-3}

⇒

lag1	lag2	- ---- --	T
y_{t-1}	y_{t-2}	- - ---	y_t
y_{t-3}	y_{t-4}	- ---	y_{t-2}

③ Avg Values :

⇒ lag information to Calculate :

- monthly
- weekly
- Bi-weekly

④ Features from Date-Column

FB Prophet

- Easy to use library for TS fore-casting
- Robust to Outliers, to missing value and can be used with minimal pre-processing
- It can account for multiple Seasonality

$$y(t) = g(t) + s(t) + h(t) + e(t)$$

$g(t) \rightarrow$ Trend

$s(t) \rightarrow$ Seasonality

$h(t) \rightarrow$ Holiday

$e(t) \rightarrow$ residual

* Pre-processing

  date ⟹ ds

  Target_col ⟹ y

* Advantage :

  1) CI out of the Box

  2) Changepoint Detection

  3) Multi-seasonality Support

  4) Holiday + Exogeneous Vars

Important Interview Topics

1) Trend , Seasonality
2) Stationary and How to make?
3) AR and MA
4) ACF and PACF