Stationary and Non-stationary time Series

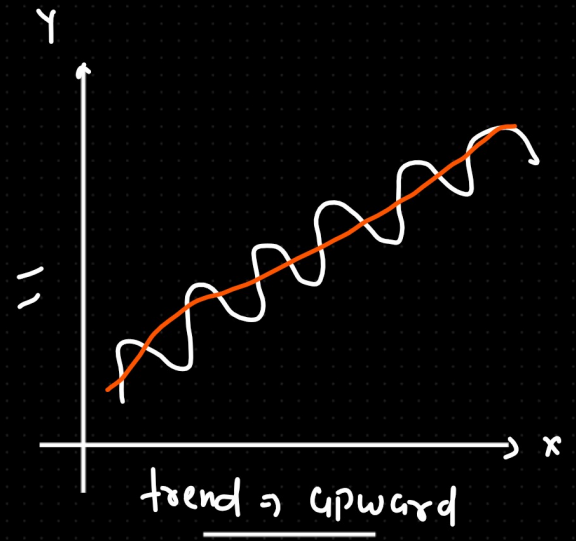
Time Series data

Components

Moving avg

ST and non-ST

D_1	40
D_2	50
D_3	60
D_4	65
D_5	70
⋮	⋮
D_n	75



trend ⇒ upward

- time axis ⇒ window
- average

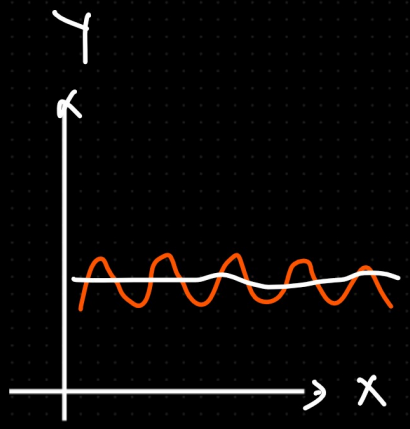
⇒ my moving avg is not constant over the time

⇒ Var is not constant over the time

[Not stationary time ⇒ mean, Var will not be a Const]

[stationary time series ⇒ mean, Var will be const]

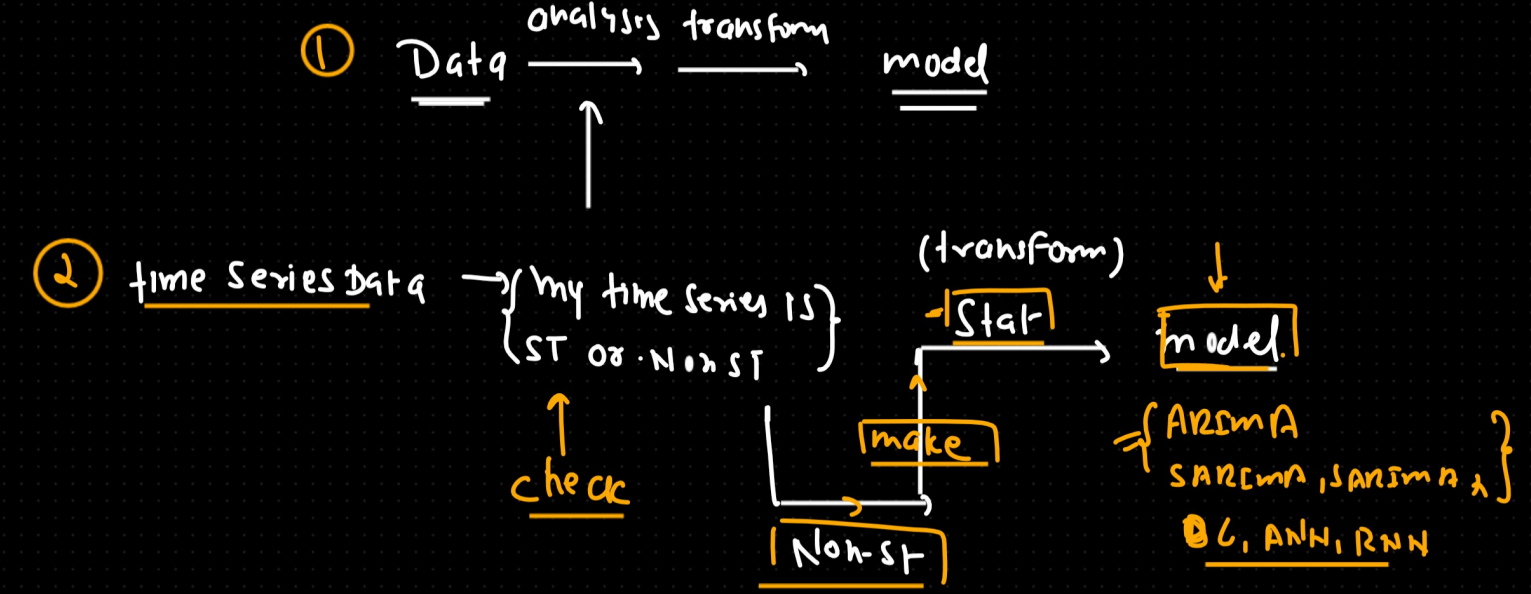
Y-Constant ⇒ over the time axis value is not varying (changing)



trend is flat or Horizontal

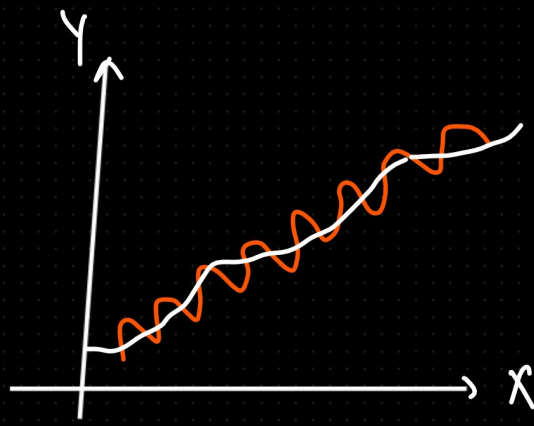
machine learning

1. Data ingestion
2. EDA
3. Processing (FE)
4. model building
5. model evaluation



1. for checking is my TS ST or Non-ST
   - 1. Visualization -
   - 2. Stats based test -
2. to convert Non-ST TS to ST
   - 1. Differencing
   - 2. log
   - 3. root
   - 4. Adjustment of seasonal - Data

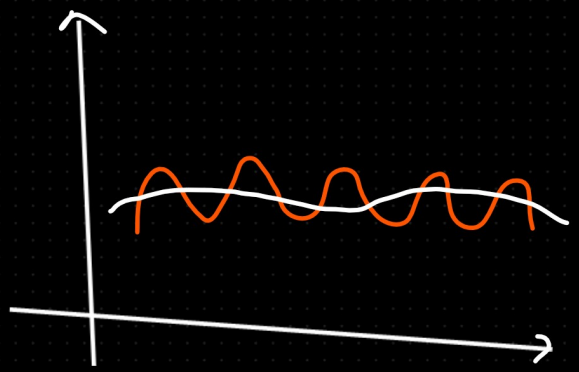
① To Check my TS is ST or Non-ST



⇐ { trend ⇒ upward
  moving average ⇒ It is increasing over the time

⇓

* my time TS is Non-ST



Trend ⇒ flat

moving avg ⇒ moving average is constant over time

** my time series is ST

② Stats Based test-

ADF ⇒ Augumented dickey fullar test

1. Static test
2. P-value ⇒
3. Critical value

$P \leq 0.05$

→ I am going to reject my Null hypothesis

$P > 0.05$

→ I am going to accept my Null hypothesis

H_0 = Null hypothesis → my data is Non-stationary

H_a = alternative hypothesis → my data is stationary

(2) Convert Data (Non-Stationary data) to Stationary

ARIMA
↑
- Differencing

1. Differencing
2. log
3. sqrt
4. Seasonal adjustment

current − previous

$t - (t-1)$

		first Differencing	2nd diff
D_1	5	NA	NA
D_2	10	5	NA
D_3	6	-4	-9
D_4	8	2	6
D_5	15	7	5
D_6	7	8	1

test my TS is ST or non-ST

Check

if ST then fine else go for the Diff