Sales Jan 2013 Jan2 Jan3 → Jan 2019

Jan → Sum Jan

Sum → Sales → avg 13 – 19

Jan → 12 → Represent pm

(Total sales)

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1) → Smoothing → Trend → Trend → S&L

2) Models → Trend
Model → Stationary
→ Difference (1)

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1) AR – I – MA

AR → Auto Regressive models

Series is
1) Stationarity → What is Stationary?
↳ Why do it important?
↳ How do I check if my series stationary?

1) What is stationarity?

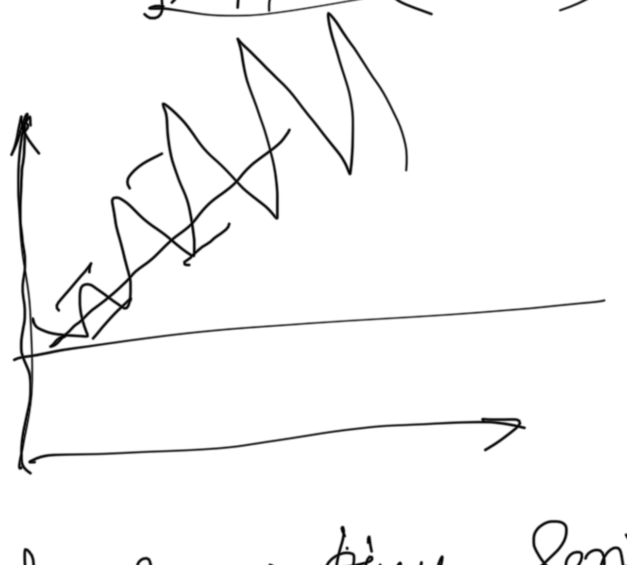
Normal distributed

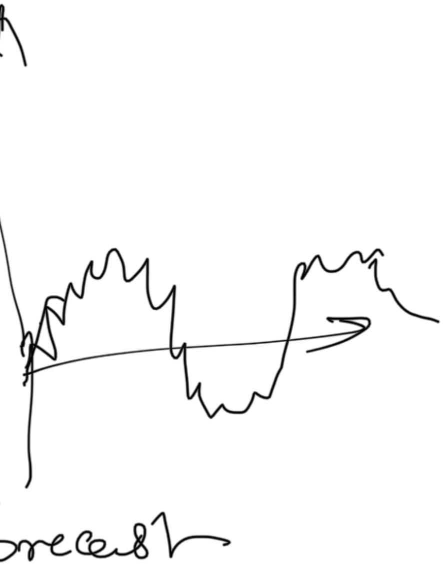
Law of large numbers / Central limit thm /
defined stat. prop / sampling

Stationarity → depends structure ←

Constant ↓ — (1) mean → constant
(2) Stand. dev. – constant
(3) seasonality in the data less

Constantly changing





→ Why? → time series forecast

3 properties we are ...
(1) Expected value → Mean
(2) Variance.
(3) Correlation between ... $E(f - \mu)$ ... value,

mean across diff ... is only helpful.
is same (or) little & less across periods.

Stationarity requires the population quantities to be ~~same~~ constant across time / making our estimate a reasonable measure

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(3) How do we know if data is Static

(1) By graph

(2) Hypothesis tests (Descriptive tests)

→ Augmented Dickey-Fuller Test.

— Granger Causality

→ Differencing → n^{th} order will make the data static.. (d)

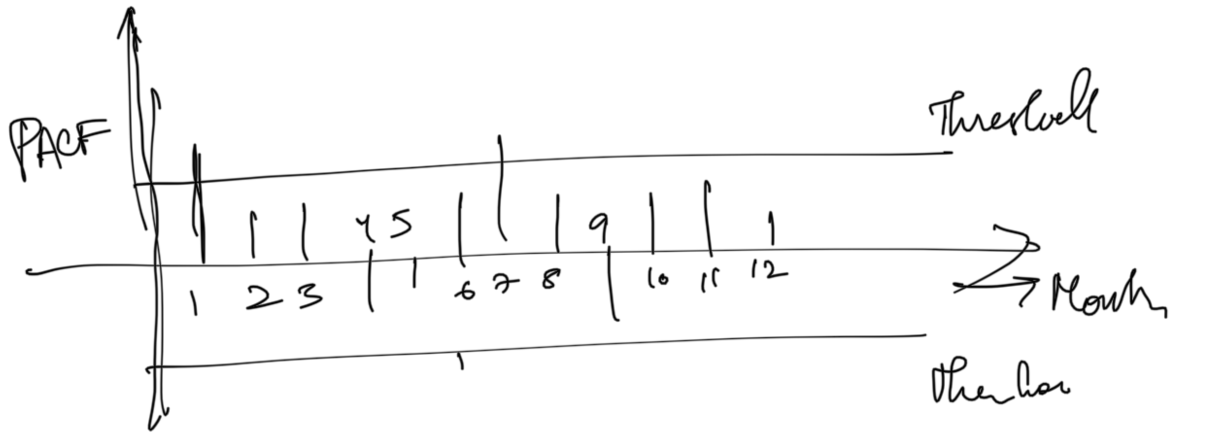
(1)

1	50 → 60
2	80 → 30
3	80 → 20
4	90
5	

→ Make the Series Stationary

AR I MA

AR → Auto Regressive Models



Calculates the regression of the past value & calculate the present or future value

Regressive model

Cols1 Cols2 Col3 Col4 Term Error

$y = m_1 x_1 + m_2 x_2 + m_3 x_3 + m_4 x_4 + \epsilon + c$

Linear Regression Model

Regression → Auto Regressive Model — of itself on n-1 time period

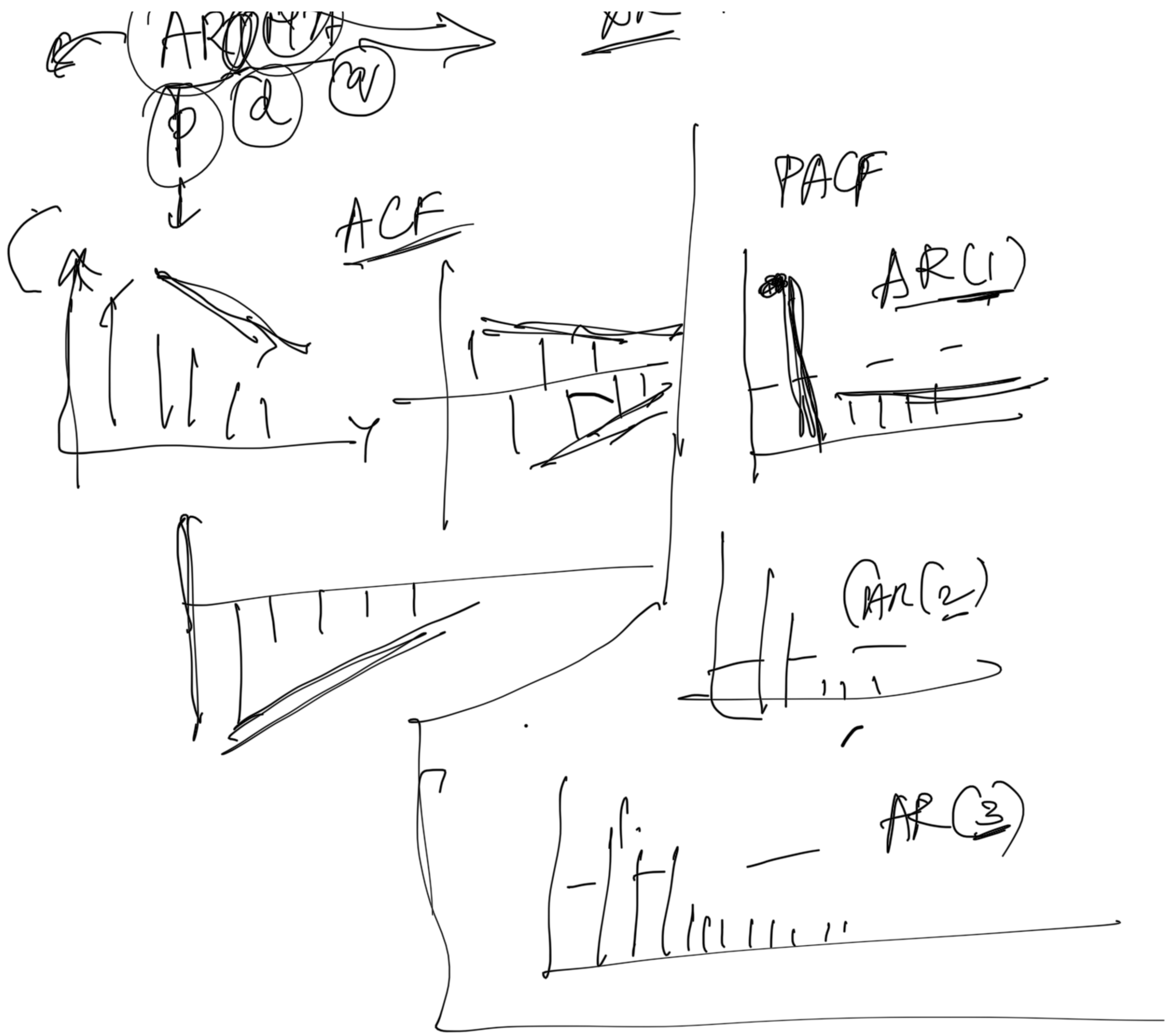
→ Regression with itself

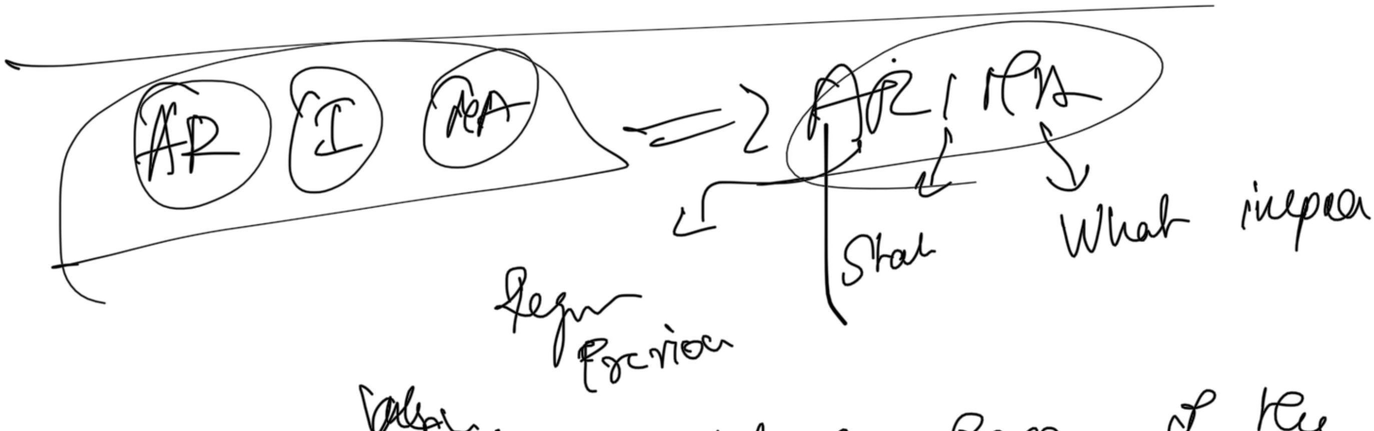
$Y_t = B_1 * Y_{t-1} + B_2 * Y_{t-2} + B_3 Y_{t-3} \ldots B_k Y_{t-k}$

(time step)   k-th time lag

ACF - what time step is the most eff.

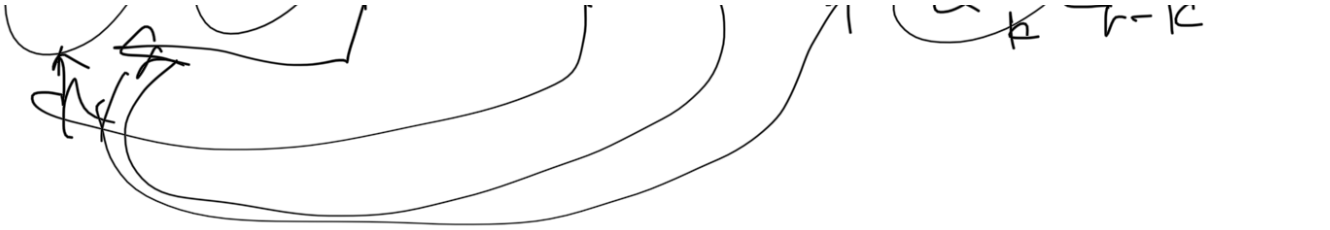
AR I MA



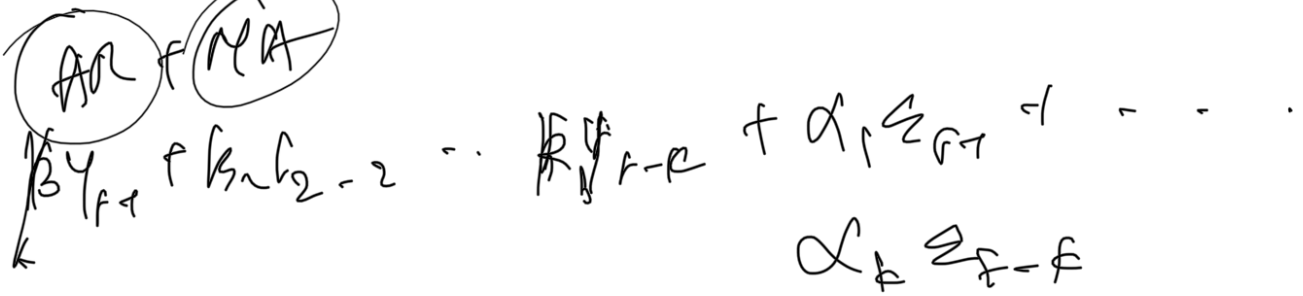


~~What is the~~ values, the residual errors of the past → present future values

$$Y_t = \alpha_1 \varepsilon_{t-1} + \alpha_2 \varepsilon_{t-2} + \alpha_3 \varepsilon_{t-3}$$



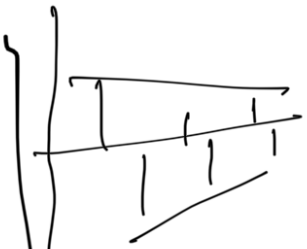
AR + MA

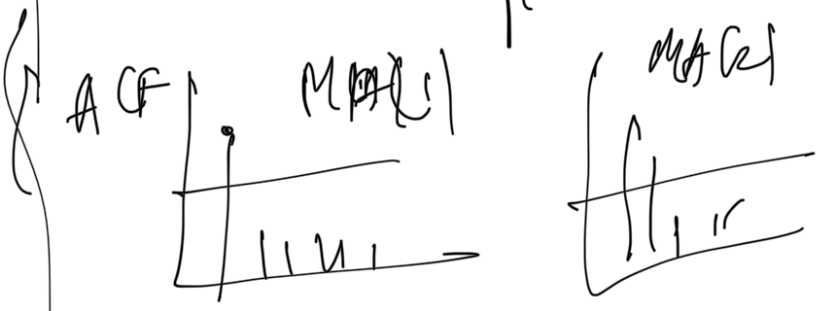


AR (PACF)

ACF

PACF





Seasonality

S-ARIMA

SARIMA