ACF, PACF, Auto Regression

ACF ⇒ auto correlation function

PACF ⇒ Partial auto correlation function

timeseries

D_1	10
D_2	20
D_3	30
D_4	40
D_5	50

ACF ⇒ AUTO + CORRELATION

Correlation itself in the feature

it's a relationship b/w two feature

$= X_1 \mid X_2$

Pearson
Spearman rank
kendall

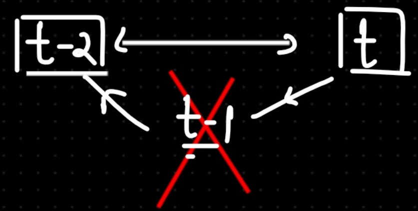
ACF measure the correlation between time series and it's lag value

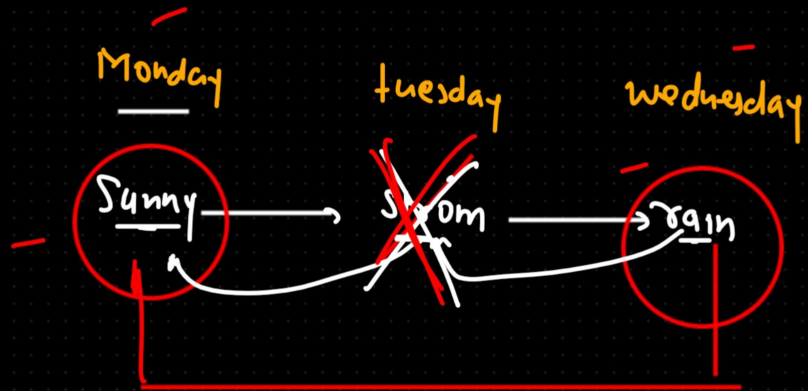
	timeseries	1st lag	2nd lag	3rd lag
D_1	10	NA	NA	NA
D_2	25	D_1 - 10	NA	NA
D_3	14	D_2 → 25	D_1 → 10	NA
D_4	16	D_3 → 14	D_2 → 25	D_1
D_5	20	D_4 → 16	D_3 → 14	D_2
D_6	32	D_5 → 20	D_4 → 16	D_3
	$\boxed{Y_t}$	$\boxed{Y_{t-1}}$	$\boxed{Y_{t-2}}$	$\boxed{Y_{t-3}}$

$$\mathrm{corr}(Y_t, Y_{t-1})$$
$$\mathrm{corr}(Y_t, Y_{t-2})$$
$$\mathrm{corr}(Y_t, Y_{t-3})$$

$\boxed{\text{Pearson}}$, Spareman rank, kendall

PACF ⇒ Partial auto correlation f/n





	YEAR	PROFIT
t-10	2010	76
t-9	2011	[illegible]
t-8	2012	90
t-7	2013	[illegible]
t-6	2014	81
t-5	2015	[illegible]
t-4	2016	94
t-3	2017	[illegible]
t-2	2018	93
t-1	2019	[illegible]
t	2020	82

14
-9
13
-1
-11

$\boxed{Y_t - Y_{t-2}}$

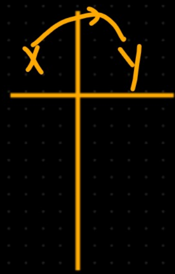
90	14
81	-9
94	13
93	-1
82	-11

$\boxed{Y_t - Y_{t-3}}$

Autoregression

$\boxed{\text{Auto}}$ $\boxed{\text{regression}}$

$\Rightarrow$ regression itself in the var.



$X \to$ Independent
$Y \to$ Dependent

Datapoint

$\boxed{Y = mx + c}$

Slope intercept

$\boxed{Y = m_1x_1 + m_2x_2 + m_3x_3 + \dots m_nx_n + c}$

$Y_t \Rightarrow$ Value at current timestamp
$\Psi \Rightarrow$ coff term
$C \Rightarrow$ constant
$\varepsilon \Rightarrow$ error

ACF | PACF

$$\boxed{Y_t = \Psi Y_{t-1} + c}$$

$$\boxed{Y_t = \Psi_1 Y_{t-1} + \Psi_2 Y_{t-2} + c}$$

$$= \boxed{Y_t = \Psi_1 Y_{t-1} + \Psi_2 Y_{t-2} + \Psi_3 Y_{t-3} + \dots \Psi_n Y_{t-n} + c}$$

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