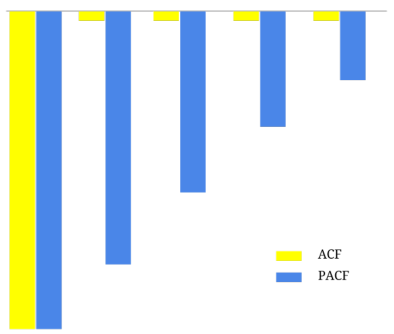
(http://rinterested.github.io/statistics/index.html)

READING ACF AND PACF PLOTS:

From this youtube post (https://www.youtube.com/watch?v=-vSzKfqcTDg). Also, here is a more extensive document with simulations (https://drive.google.com/file/d/0Bwl-HpVJ_5PeSDdnX3lEWENidE0/view?usp=sharing) found online.

	ACF	PACF
AR	Geometric	p significant lags (order)
MA	q significant lags (order)	Geometric
ARMA	Geometric	Geometric

Examples:

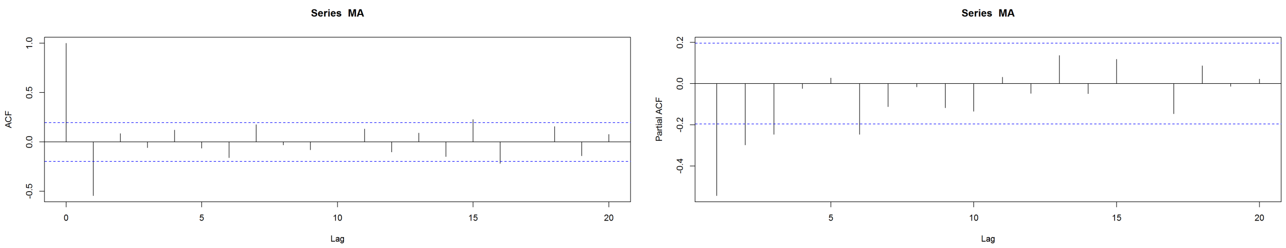


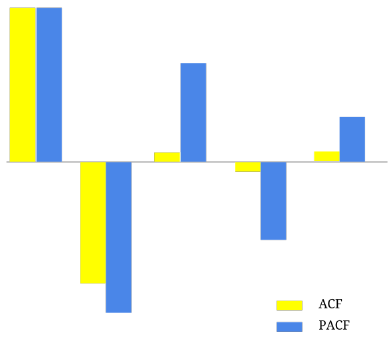
On this plot the ACF is significant only once (in reality the first entry in the ACF is always significant, since there is no lag in the first entry - it's the correlation with itself), while the PACF is geometric. Hence it is an MA(1) process.

The negative values in the plot respond to a process of the form $y_t = k - \theta\,\epsilon_{t-1} + \epsilon_t$.

Here is a simulation of an MA(1) process with $\theta = -0.7$:

```
set.seed(2017)
MA = arima.sim(model=list(ma = - 0.7), n = 100)
par(mfrow = c(1,2)); acf(MA); pacf(MA)
```

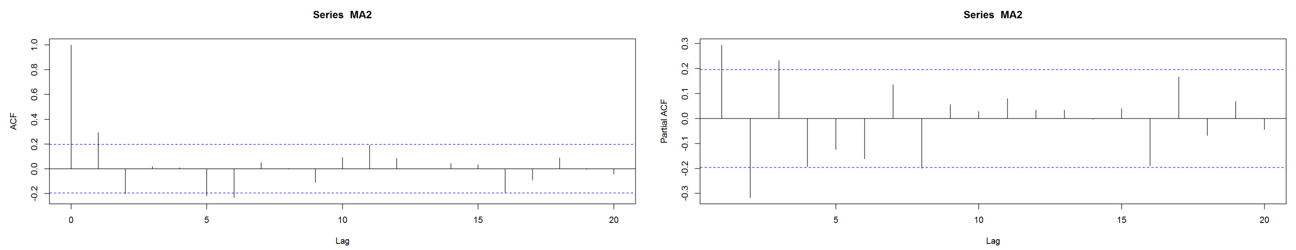


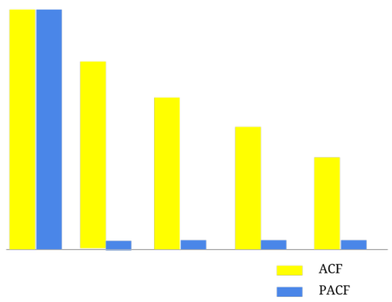


In this example the ACF is significant in the first and second lags, while the PACF follows a geometric decay. It is again a MA process, but this time an MA(2) of the form: $y_t = k + \theta_1 \, \epsilon_{t-1} - \theta_2 \, \epsilon_{t-2} + \epsilon_t.$

Here's an R simulation with $\theta_1 = 0.9$ and $\theta_2 = -0.2$:

```
set.seed(2017)
MA2 = arima.sim(list(ma= c(0.9, - 0.2)), n = 100)
par(mfrow = c(1,2));acf(MA2);pacf(MA2)
```

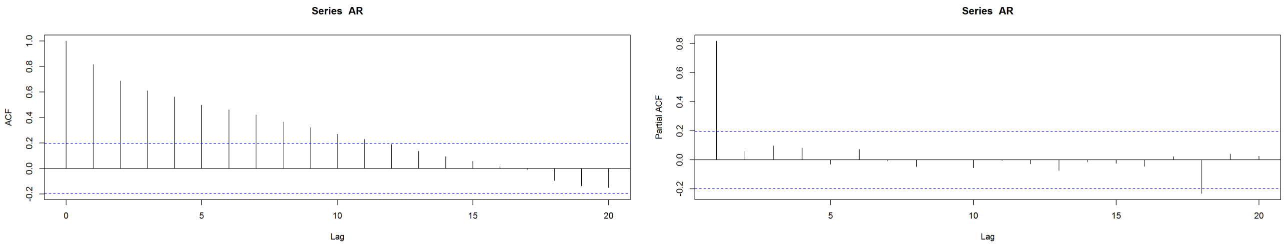


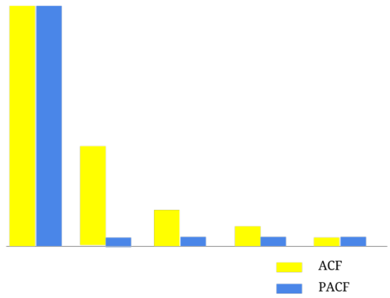


Here the ACF decays geometrically, and the PACF shows only one significant lag. This is a AR(1) process of the form: $y_t = c + \rho \, y_{t-1} + \epsilon_t.$

Here is the simulation in R with $\rho = 0.9$:

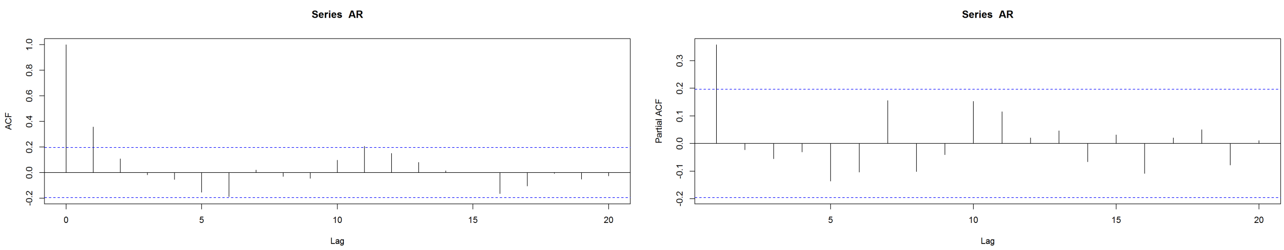
```
set.seed(2017)
AR = arima.sim(model=list(ar = .9), n = 100)
par(mfrow = c(1,2));acf(AR);pacf(AR)
```





This is again an AR(1) process, but with a faster decay, $\rho = 0.5$:

```
set.seed(2017)
AR = arima.sim(model=list(ar = .5), n = 100)
par(mfrow = c(1,2));acf(AR);pacf(AR)
```



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