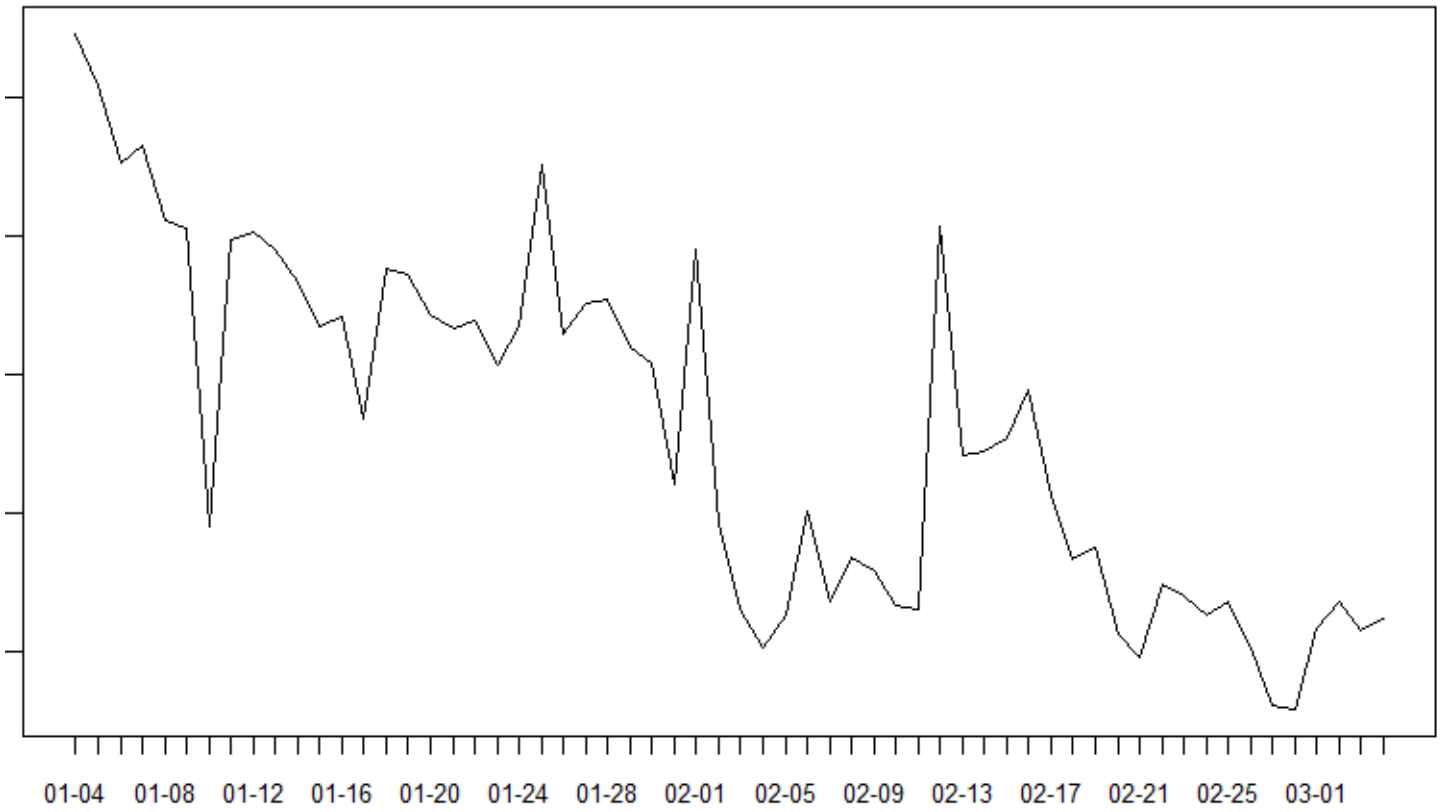
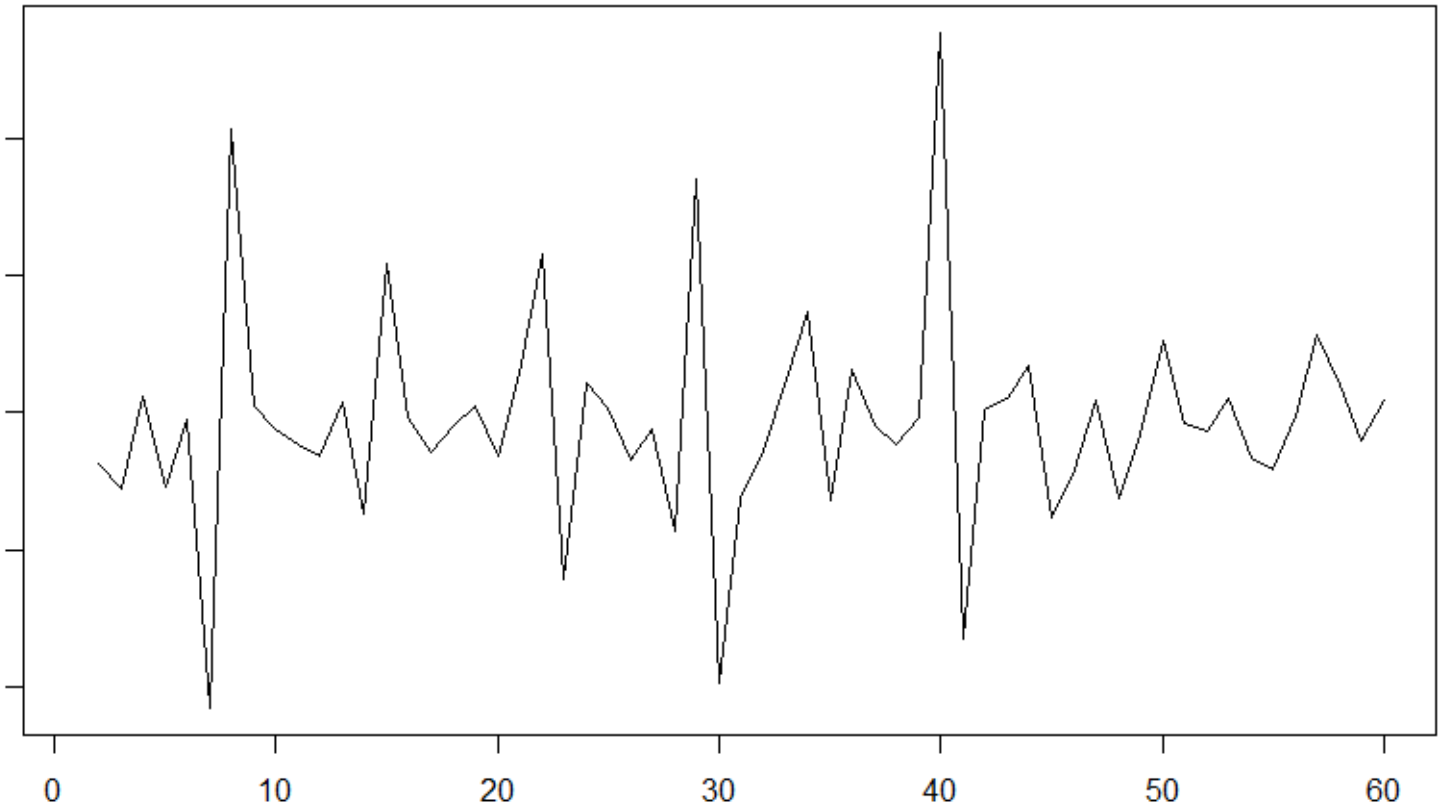
Interpreting ACF and PACF Plot

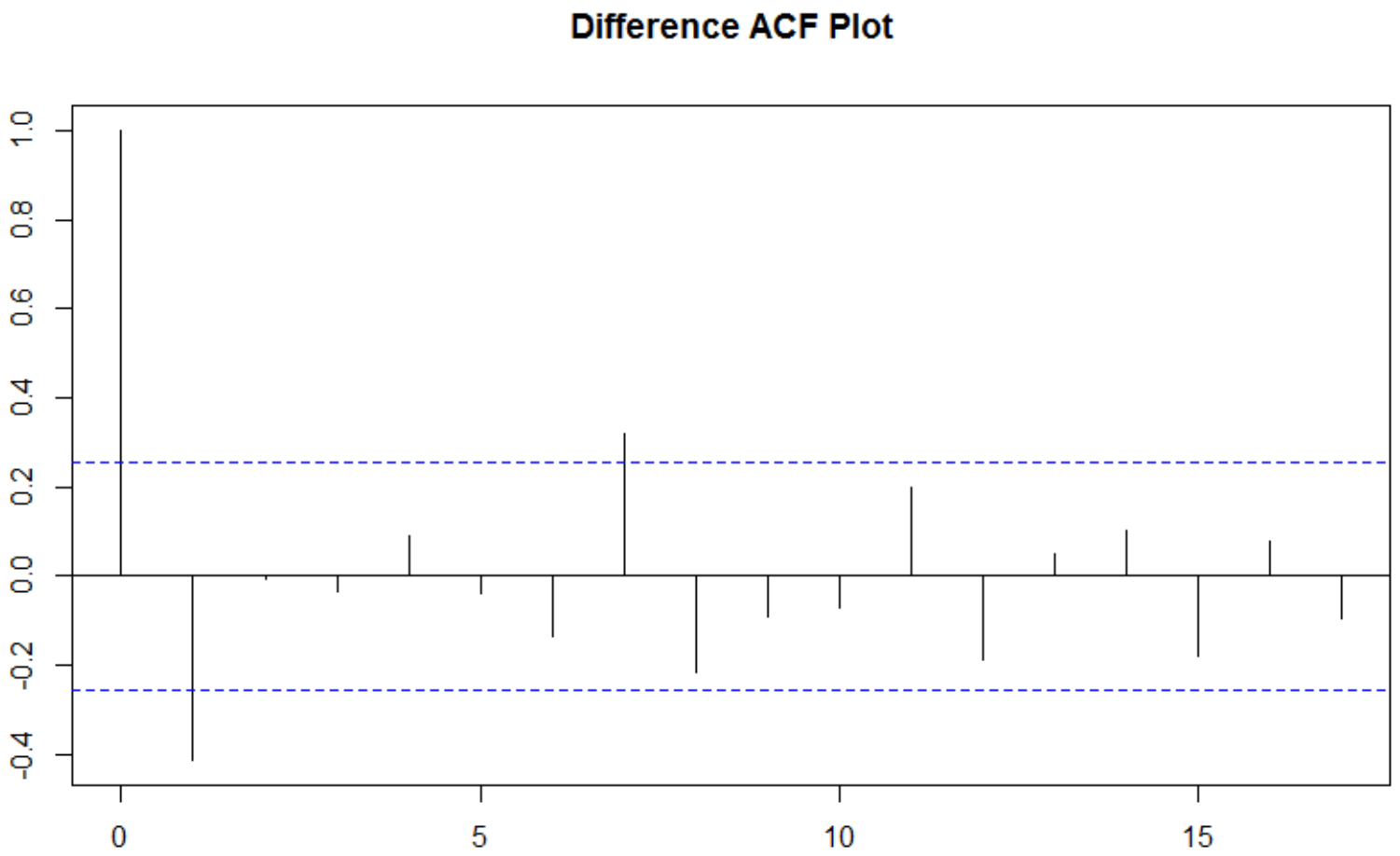
My raw data consists of a 60-day time series with a downward trend. The data is weekly so the frequency is set to 7.

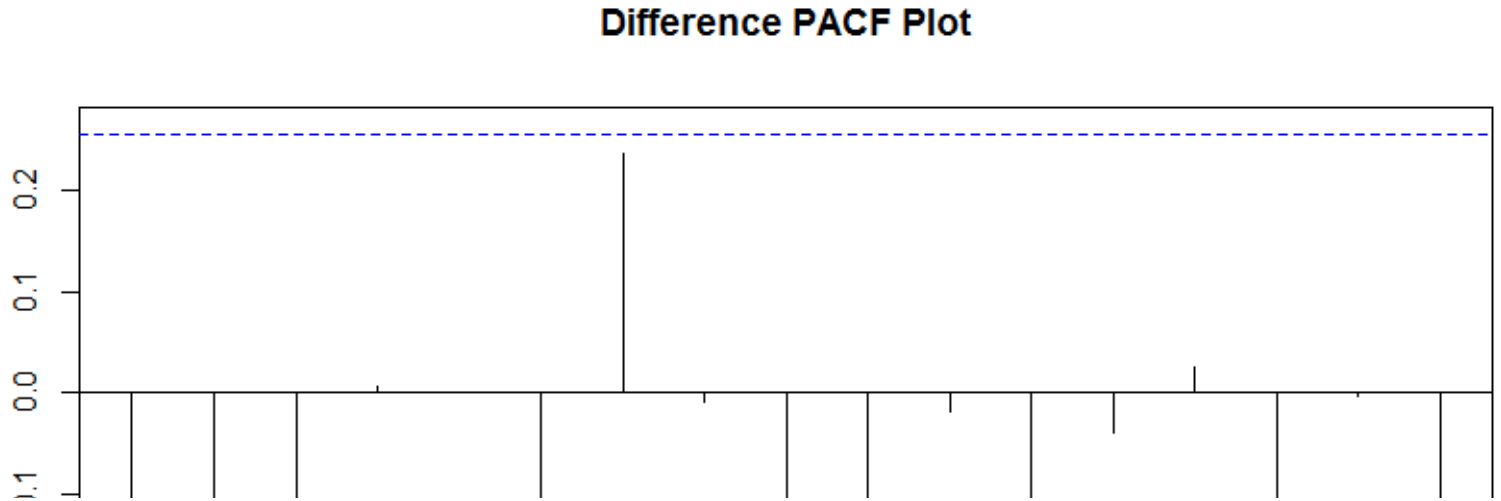


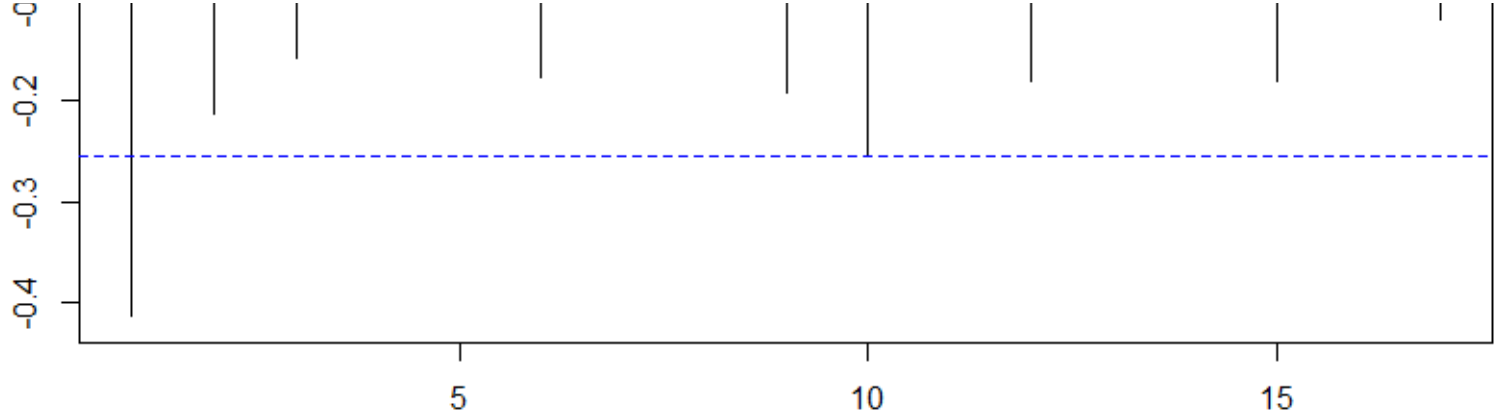
I calculated the difference of the data which looks like this



When I run ACF and PACF plots on the difference, I seem to get contradictory results? The ACF shows a positive impact of the first lagged term while the PACF shows a negative impact? Could someone help me interpret this? I'm trying to better understand ARIMA. The examples I've seen about PACF and ACF always seem to show the two at least agreeing in direction.


Difference ACF Plot
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
0
5
10
15


Difference PACF Plot
0.2
0.1
0.0



r | time-series | autocorrelation

asked Mar 6 '15 at 15:58

ElPresidente
169 1 8

2 Answers

In R `acf` starts with lag 0, that is the correlation of a value with itself. `pacf` starts at lag 1.

Just a peculiarity of her R implementation. You can use the `Acf` function of the package `forecast` which does not show the lag 0 if that bothers you.

answered Mar 6 '15 at 16:58

Dr G
809 7 10

The putative contradiction is based on the different lag-representation for PACF- and ACF- plots in R: ACF starts at lag 0 and PACF starts at lag 1.

In principal, PACF and ACF at lag 1 should be equal. The theoretical ACF for a stationary time series Y_t is just the autocorrelation, so $ACF(1) = Corr(Y_t, Y_{t-1})$.

The PACF of lag j is the autocorrelation between Y_t and Y_{t-j} with the linear dependence of Y_{t-1} and Y_{t-j+1} removed. Since for PACF(1) there is no intermediary dependence, its value reduces to the simple autocorrelation: $PACF(1) = Corr(Y_t, Y_{t-1})$.

answered Mar 8 '15 at 23:28

statchrist
187 8