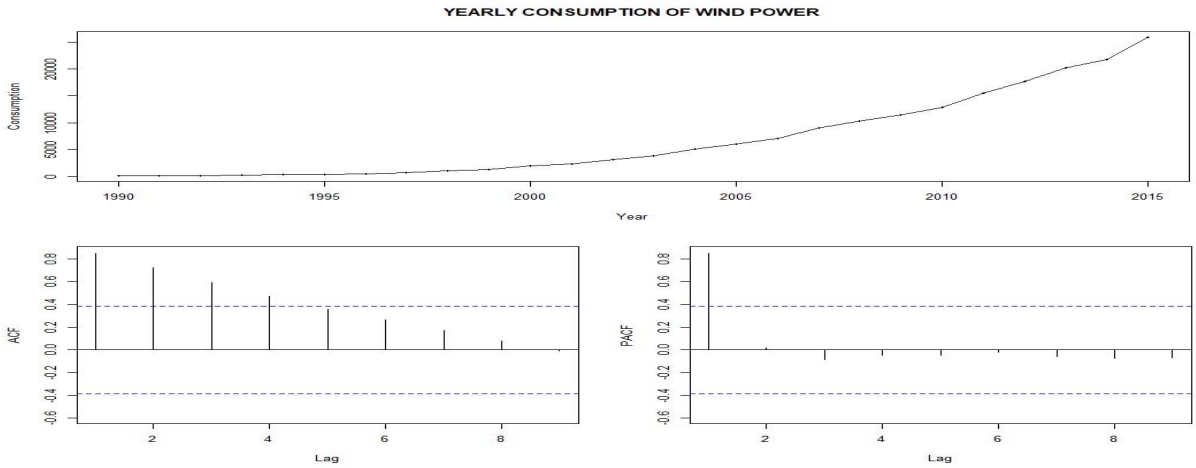
FORECASTING HOME ASSIGMENTS

Exercise 3 (Wind Power data) Ravi Shankar

Data set = “WindPower” data on the yearly gross inland consumption of wind power in the European Union (28 countries) for the years 1990-2015.

VISUALIZATION



- Upward Trending
- Non-Seasonal
- Non Stationary
- Need transformation by Log term

MODEL ESTIMATION

ETS MODEL

Model used ("AAN", "MAN", "MMN", "AAN", "MAN", "MMN") with and without damping. All relevant models performance are compared together with other models in the end.

```
> result
        AICc MASE_train MASE_test RMSE_train RMSE_test Damping
AAN 311.8620  0.2817250 5.5113303   262.3531  3964.239       0
MAN 330.3606  0.3764465 4.9870135   337.6678  3590.534       0
MMN 285.0893  0.4303645 0.9363107   423.9937   647.004       0
AAN 316.8447  0.2788007 5.8430610   268.5637  4209.793       1
MAN 344.9782  0.7600506 8.9479171   641.5516  6405.122       1
MMN 293.8405  0.3767885 3.3750552   371.2572  2788.797       1
>
```

ARIMA MODEL

Transformation of data : Boxcox method , Lambda = 0 (log transformation)

Stationary data: Number of diff = 2. (not any seasonal component)

FORECASTING HOME ASSIGMENTS

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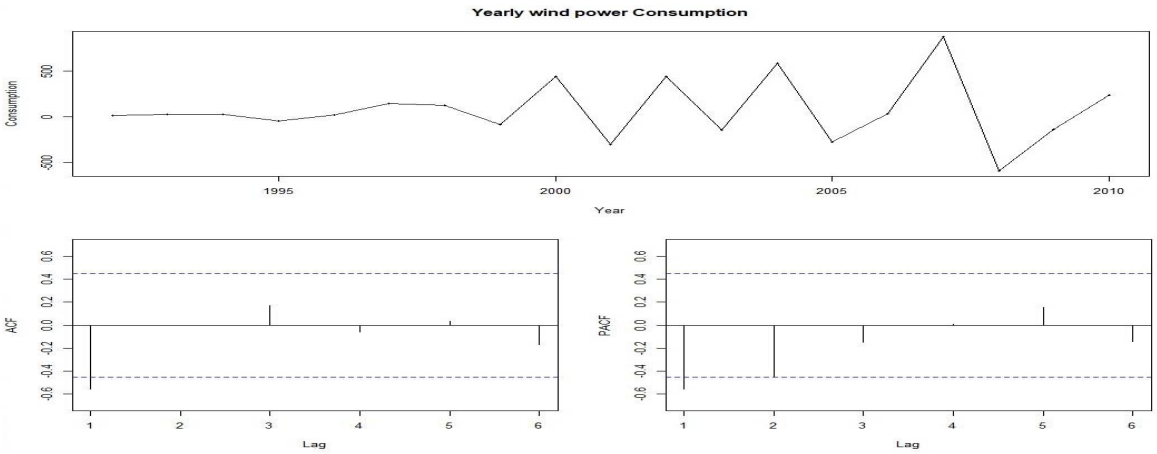

Based on ACF and PACF , a first model could be ARIMA(2,2,1). Testing other combination for p and q, for both from 0 to 3 range and d = 2.

```
> result
    p d q       AICc MASE_train MASE_test RMSE_train RMSE_test
m1  0 2 0 -20.404151     0.4441    2.8577   413.3443 1960.0497
m2  0 2 1 -25.961585     0.4350    1.2362   422.4592  981.6663
m3  0 2 2 -23.240020     0.4228    0.9496   412.1880  650.6212
m4  0 2 3 -20.351515     0.4074    1.1117   394.0277  795.8752
m5  1 2 0 -22.933113     0.3656    3.1339   347.1174 2153.2110
m6  1 2 1 -23.207101     0.4255    1.0412   415.3747  728.8921
m7  1 2 2 -21.348790     0.3642    5.1369   359.0021 3873.9727
m8  1 2 3 -17.688240     0.3524    6.1426   348.4475 4621.4465
m9  2 2 0 -21.700537     0.3918    2.8004   343.2749 1924.7571
m10 2 2 1 -20.073680     0.4255    0.8994   412.7069  622.7267
m11 2 2 2 -17.718967     0.3438    6.2709   340.7090 4698.9186
m12 2 2 3 -13.219392     0.3685    5.0548   361.9854 3811.7438
m13 3 2 0 -20.542739     0.3952    0.8973   377.5745  600.6352
m14 3 2 1 -16.878426     0.4162    0.6872   401.2521  508.5582
m15 3 2 2 -13.420790     0.3375    5.4260   341.2440 3916.7406
m16 3 2 3  -8.342288     0.3476    5.9911   345.9266 4435.6710
>
```

MODEL SELECTION

SR	MODEL	Aicc	MASE TRAIN	MASE TEST	RMSE TRAIN	RMSE TEST	Damping	d
1	MMN	285.089	0.430	0.936	423.994	647.004	0	
3	MMN	285.089	0.430	0.936	423.994	647.004	0	
5	AAN	311.862	0.282	5.511	262.353	3964.239	AUTO	
6	3,2,3	-8.342	0.348	5.991	345.927	4435.671		2
7	3,2,2	-13.421	0.338	5.426	341.244	3916.741		2
8	3,2,1	-16.878	0.416	0.687	401.252	508.558		2

Best model from all considered models is **ARIMA (3,2,1).** IT also Succeeded in LjungBox Test.

Final Forecast with best model