ARMAX Demo: Events and Forecast

Dr. Goutam Chakraborty

Using Weekly Rose Sales Data (Program2_ARIMA_Models)

```
/* Using a different data set - roseseires*/
Ods graphics on/imagemap=on TIPMAX=600;
Title 'Generating plots on weekly sales of roses';
Proc Timeseries data=course.roseseries seasonality=52 Plots=(series acf
pacf wn);
        id DATE interval=week;
        var Sales4;
Run;
ods graphics off;

Ods graphics on/imagemap=on TIPMAX=600;
Title1 'Generating plots on weekly sales of roses and relating to RAMP
variable';
Title2 'Restricting data to last 3 years to see RAMP pattern clearly';
proc sgplot data=COURSE.roseseries;
where date >= '01JAN2013'd;
   series x=date y=sales4 / markers;
   series x=date y=ramp / markers;
run;
ods graphics off;
```

Forecasting using SolarPV Data

- We have seen how to do it in ARIMA
  - Now, we will extend this to ARMAX
- We will use last 6 periods as holdout
  - First, we will build ARMA(1,0) model
  - Then, we will build ARMAX(1,0) with both cloud_cover
  - Then, compare the two models
- Finally, we will do out of sample forecasts using the best model from the above

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SAS Code for ARMA and ARMAX Forecasts

```
/* Back to SolarPV data*/
Ods graphics on/imagemap=on;
Title 'Forecasting iusing ARIMA  and saving forecast in AR1 , a temporary data set';
proc arima data=Course.SOLARPV plots
     (only)=(forecast(forecast forecastonly) )
      out=WORK.ar1_forecast;
         identify var=kW_Gen;
         estimate p=(1) method=ML;
         forecast lead=6 back=6 alpha=0.05 id=EDT interval=week;
         run;

Title 'Forecasting using ARMAX  and saving forecast in ARMAX1 , a temporary data set';
proc arima data=Course.SOLARPV plots
     (only)=(forecast(forecast forecastonly) )
      out=WORK.ar1_forecast;
         identify var=kW_Gen Crosscorr=(Cloud_Cover);
            estimate p=(1) input=(Cloud_Cover) method=ML;
   forecast lead=6 back=6 id=EDT out=WORK.ARMAX1_Forecast;
   run;
ODS Graphics off;
```

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SAS Code ARMAX Forecasts Out of Sample

```
/* Forecasting the next period - using SOLARPV_F data */
   Title 'Forecasting Future Values in SOLARPV_F Data';
proc arima data=COURSE.SOLARPV_F
           plots(only)=forecast(forecast forecastonly)
           out=WORK.forecast_out;
   identify var=kW_Gen crosscorr=(Cloud_Cover);
   estimate p=(1) input=(Cloud_Cover) method=ML;
   forecast lead=1 back=0 interval=week id=EDT printall;
run;
```

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Recommended Books on Time Series

- **Applied Data Mining for Forecasting Using SAS** 1st Edition by Tim Rey (Author), Arthur Kordon (Author), Chip Wells (Author)
- **SAS for Forecasting Time** 3rd Edition by John C., Ph.D. Brocklebank (Author), David A., Ph.D. Dickey (Author), Bong, Ph.d. Choi (Author)

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