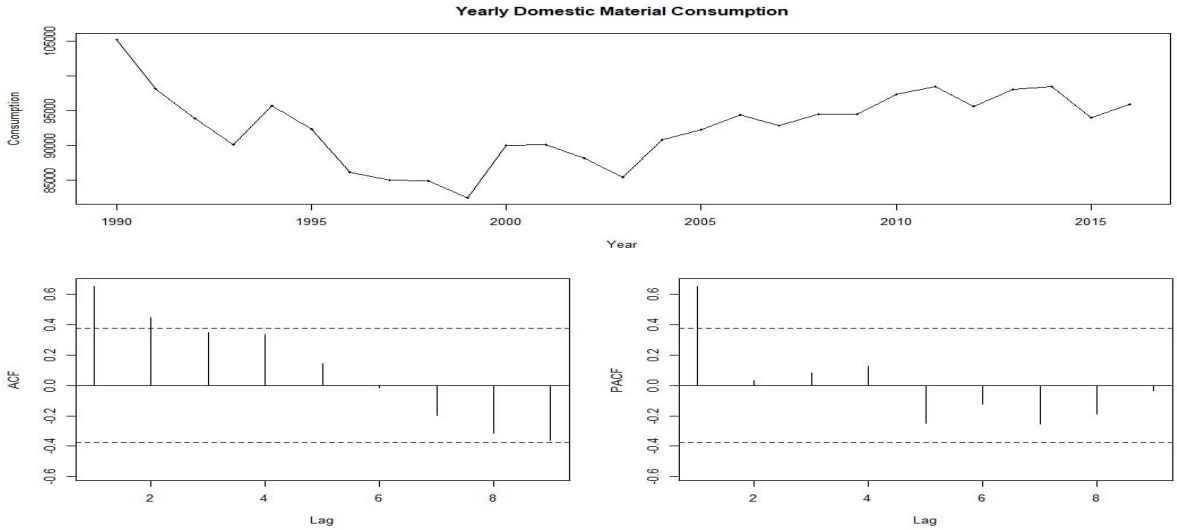
FORECASTING ASSIGNMENT
EXERCISE 1 (dmc_ch Data) Ravi Shankar

Data set : dmc_ch contains yearly data on domestic material consumption (in thousand tonnes) for Switzerland from 1990 to 2016.

VISUALIZATION



- Non seasonal data
- Increasing and decreasing trend
- Non stationary data

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.

	AICc	MASE_train	MASE_test	RMSE_train	RMSE_test	Damping
AAN	423.2965	0.9946192	0.5834944	3725.262	2074.092	0
AMN	421.8353	0.9067382	1.0183884	3597.887	3870.136	0
MAN	423.5865	1.0051628	0.5181176	3720.140	1722.215	0
MMN	423.5777	0.8992168	1.0025049	3600.030	3815.697	0
AAN	426.1649	0.9841416	0.5015751	3626.238	1643.319	1
AMN	423.5930	0.9116304	0.8489322	3410.844	3246.759	1
MAN	426.7450	0.9996347	0.5068132	3650.373	1658.640	1
MMN	424.4039	0.9312584	0.5394759	3431.250	1810.373	1

ARIMA model

Stationary data: Number of diff comes as 1 and 0. We will inspect booth.

Depending on ACF and PACF ARIMA(0,1,0) is initial expected model for d = 1

Depending on ACF and PACF ARIMA(1,0,1) is initial expected model for d = 0

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	p	d	q	AICc	MASE_train	MASE_test	RMSE_train	RMSE_test
m1	0	1	0	388.6518	0.9540	0.5141	3704.946	1763.811
m2	0	1	1	391.0964	0.9503	0.5141	3701.081	1812.190
m3	0	1	2	393.8182	0.9622	0.5058	3694.053	1724.735
m4	1	1	0	391.1031	0.9502	0.5144	3701.782	1806.181
m5	1	1	1	393.8921	0.9415	0.5365	3700.697	2001.982
m6	1	1	2	396.9538	0.9626	0.5039	3690.966	1704.105
m7	2	1	0	393.7347	0.9669	0.5011	3685.047	1694.215
m8	2	1	1	396.8481	0.9668	0.4993	3679.343	1661.739
m9	2	1	2	396.8556	0.8090	0.5799	3096.752	2032.578

	p	d	q	AICc	MASE_train	MASE_test	RMSE_train	RMSE_test
m1	0	0	0	423.6649	1.3459	1.6735	5204.142	5383.384
m2	0	0	1	418.2144	1.1207	1.3941	4244.001	4524.313
m3	0	0	2	415.6286	0.9868	1.1411	3645.845	3921.075
m4	1	0	0	412.5208	1.0389	0.5109	3643.664	1727.720
m5	1	0	1	415.3469	1.0338	0.5319	3620.172	1835.016
m6	1	0	2	418.8101	1.0224	0.5690	3617.537	2045.123
m7	2	0	0	415.3470	1.0296	0.5403	3620.271	1874.001
m8	2	0	1	418.8403	1.0313	0.5376	3619.684	1863.887
m9	2	0	2	415.3477	0.6715	0.7717	2539.282	2800.472

MODEL SELECTION

SR	MODEL	Aicc	MASE TRAIN	MASE TEST	RMSE TRAIN	RMSE TEST	Damping	d
1	AMN	421.835	0.907	1.018	3597.887	3870.136	0	
2	AAN	426.165	0.984	0.502	3626.238	1643.319	1	
3	AMN	423.593	0.912	0.849	3410.844	3246.759	1	
4	ANN	416.478	0.953	0.514	3704.890	1763.727		Auto
5	2,1,2	396.856	0.809	0.580	3096.752	2032.578		1
6	2,1,1	396.848	0.967	0.499	3679.343	1661.739		1
7	1,0,0	412.521	1.039	0.511	3643.664	1727.720		0
8	2,0,2	415.348	0.672	0.772	2539.282	2800.472		0

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

Final Forecast with best model