Run S-5 With Retained Values

Automatic Forecasting Systems Inc.

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```
# Save the current working directory.
saveWd <- getwd()

# Move to the Documents\AutoboxR directory.
setwd("~/AutoboxR")

# Load the library.
library(autobox)

# Initialize the autobox package.
autoboxInitPackage()
```

```
## [[1]]
## [1] 0
##
## [[2]]
## [1] "License status: active license, will expire on Fri Aug 18 14:30:57 2017."
```

```
# Set the S_5 values.
dblHistoricalValues_S_5 <- c(
 5,1.6863,15.65859,12.64733,20.71753,34.20801,46.61443,38.06243,62.63438,
 11.08147,39.50784,36.01477,13.37003,32.88305,13.61093,9.39516,6.98614,
 2.52947,8.91335,9.39516,39.86919,51.79381,37.33973,7.46795,10.59966,
 5.66118,4.93848,39.50784,2.77037,15.05634,41.3146,14.45409,0,
 55.04598,36.49657,34.32846,41.7964,6.62479,11.32237,5.29983,
 1.08406,2.16811,52.27562,4.09532,26.37871,21.19933,35.77387,26.25826,
 7.10659,14.21319,7.22704,9.39516,13.85183,4.21578,8.91335,0,
 4.33623,7.22704,14.33364,1.20451,22.28338,7.22704,3.61352,0.4818,
 1.80676,36.97837,0,0,0,3.37262,12.88823)

# Create a matrix with one column of S_5 values.
mS_5 <- matrix(dblHistoricalValues_S_5,
        ncol=1,
        dimnames=list(c(1:length(dblHistoricalValues_S_5)),c("S_5")))

# Create a time series from the matrix.
tsS_5 <- ts(mS_5,start=c(1980,1),frequency=12)

# Make an S-5 autobox object with retained data.
objS_5_retained <- autobox(tsS_5,
             iDataType=c(0),
             iObjective=c(0,0,0),
             iNumberOfRetainedValues=10,
             iNumberOfForecastValues=10,
             cPath=".\\Output")
```

```
# Run the calculation.
objS_5_retained <- autoboxRun(objS_5_retained)

# Print the status.
print(objS_5_retained$cStatus)
```

```
## [1] "S_5: Autobox calculation complete, return code = 0."
```

```
# Print the results
# The selection parameter selects the values to print:
# a = Actual,
# c = Cleansed (Adjusted),
# e = Equations,
# f = Forecast,
# h = Historical,
# i = Interventions,
# r = Residual,
# s = Statistics,
# t = Fitted.
autoboxPrint(objS_5_retained,selection="acefhirst")
```

```
##  [1] "                                                                                "
##  [2] " AUTOMATIC FORECASTING SYSTEMS                                                  "
##  [3] "        HATBORO PA 19040                                                        "
##  [4] "          215-675-0652                                                          "
##  [5] "     VERSION: 08/10/2017 16:33                                                  "
##  [6] "                                                                                "
##  [7] "                           GENERALIZED LINEAR MODEL                             "
##  [8] "                                                                                "
##  [9] "                                                                                "
## [10] "MODELLING OUTPUT SERIES:S_5                                                     "
## [11] "                                                                                "
## [12] "                                                                                "
## [13] "                                                                                "
## [14] "Y(T) =  26.169                                 S_5                              "
## [15] "       +[X1(T)][(+ 46.4273)]                :PULSE          1983/  7    43   I~ "
## [16] "       +[X2(T)][(+ 37.3119)]                :PULSE          1980/  9     9   I~ "
## [17] "       +[X3(T)][(+ 46.4590)]                :PULSE          1982/ 10    34   I~ "
## [18] "       +[X4(T)][(+ 20.0034)]                :SEASONAL PULSE 1980/ 11    11   I~ "
## [19] "       +[X5(T)][(+ 33.2703)]                :PULSE          1982/  4    28   I~ "
## [20] "       +[X6(T)][(+ 40.3601)]                :PULSE          1981/ 10    22   I~ "
##  [1] "S_5                  1980    1   12   13
##  [2] "     1
##  [3] "  0.1854D+02
##  [4] "  0.1000D+01  0.0000D+00
##  [5] "     1     0     0     0
##  [6] "     1
##  [7] "     1
##  [8] "  0.2914D+00
##  [9] "I~P00043S_5
## [10] "  0.1000D+01  0.0000D+00
## [11] "     0     0     1     0
## [12] "     1
```

```
## [13] "     0
## [14] "  0.4643D+02
## [15] "I~P00009S_5
## [16] "  0.1000D+01  0.0000D+00
## [17] "     0     0     1     0
## [18] "     1
## [19] "     0
## [20] "  0.3731D+02
## [21] "I~P00034S_5
## [22] "  0.1000D+01  0.0000D+00
## [23] "     0     0     1     0
## [24] "     1
## [25] "     0
## [26] "  0.4646D+02
## [27] "I~S00011S_5
## [28] "  0.1000D+01  0.0000D+00
## [29] "     0     0     1     0
## [30] "     1
## [31] "     0
## [32] "  0.2000D+02
## [33] "I~P00028S_5
## [34] "  0.1000D+01  0.0000D+00
## [35] "     0     0     1     0
## [36] "     1
## [37] "     0
## [38] "  0.3327D+02
## [39] "I~P00022S_5
## [40] "  0.1000D+01  0.0000D+00
## [41] "     0     0     1     0
## [42] "     1
## [43] "     0
## [44] "  0.4036D+02
## [45] "I~P00031S_5
## [46] "  0.1000D+01  0.0000D+00
## [47] "     0     0     1     0
## [48] "     1
## [49] "     0
## [50] "  0.2923D+02
## [51] "I~P00021S_5
## [52] "  0.1000D+01  0.0000D+00
## [53] "     0     0     1     0
## [54] "     1
## [55] "     0
## [56] "  0.3011D+02
## [57] "I~P00037S_5
## [58] "  0.1000D+01  0.0000D+00
## [59] "     0     0     1     0
## [60] "     1
## [61] "     0
## [62] "  0.3290D+02
## [63] "I~L00015S_5
## [64] "  0.1000D+01  0.0000D+00
## [65] "     0     0     1     0
## [66] "     1
```

```
## [67] "     0
## [68] " -0.1717D+02
## [69] "I~P00036S_5
## [70] "  0.1000D+01  0.0000D+00
## [71] "     0     0     1     0
## [72] "     1
## [73] "     0
## [74] "  0.2335D+02
## [75] "I~P00045S_5
## [76] "  0.1000D+01  0.0000D+00
## [77] "     0     0     1     0
## [78] "     1
## [79] "     0
## [80] "  0.1543D+02
```

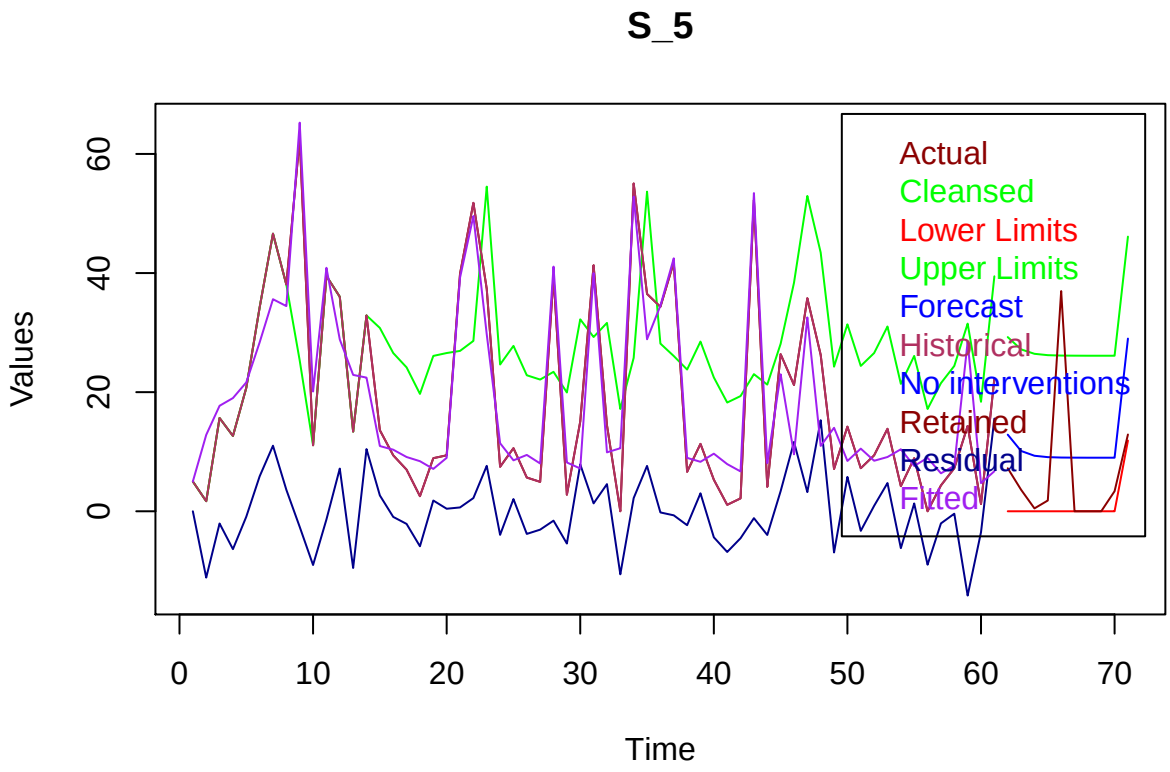
	Period	Actual	Adjusted	Forecast	LowerLimits	UpperLimits	S_5
1	1980 1	5.00000	5.00000	NA	NA	NA	5.00000
2	1980 2	1.68630	1.68630	NA	NA	NA	1.68630
3	1980 3	15.65859	15.65859	NA	NA	NA	15.65859
4	1980 4	12.64733	12.64733	NA	NA	NA	12.64733
5	1980 5	20.71753	20.71753	NA	NA	NA	20.71753
6	1980 6	34.20801	34.20801	NA	NA	NA	34.20801
7	1980 7	46.61443	46.61443	NA	NA	NA	46.61443
8	1980 8	38.06243	38.06243	NA	NA	NA	38.06243
9	1980 9	62.63438	25.32248	NA	NA	NA	62.63438
10	1980 10	11.08147	11.08147	NA	NA	NA	11.08147
11	1980 11	39.50784	39.50784	NA	NA	NA	39.50784
12	1980 12	36.01477	36.01477	NA	NA	NA	36.01477
13	1981 1	13.37003	13.37003	NA	NA	NA	13.37003
14	1981 2	32.88305	32.88305	NA	NA	NA	32.88305
15	1981 3	13.61093	30.78555	NA	NA	NA	13.61093
16	1981 4	9.39516	26.56978	NA	NA	NA	9.39516
17	1981 5	6.98614	24.16076	NA	NA	NA	6.98614
18	1981 6	2.52947	19.70409	NA	NA	NA	2.52947
19	1981 7	8.91335	26.08797	NA	NA	NA	8.91335
20	1981 8	9.39516	26.56978	NA	NA	NA	9.39516
21	1981 9	39.86919	26.93022	NA	NA	NA	39.86919
22	1981 10	51.79381	28.60829	NA	NA	NA	51.79381
23	1981 11	37.33973	54.51435	NA	NA	NA	37.33973
24	1981 12	7.46795	24.64257	NA	NA	NA	7.46795
25	1982 1	10.59966	27.77428	NA	NA	NA	10.59966
26	1982 2	5.66118	22.83580	NA	NA	NA	5.66118
27	1982 3	4.93848	22.11310	NA	NA	NA	4.93848
28	1982 4	39.50784	23.41221	NA	NA	NA	39.50784
29	1982 5	2.77037	19.94499	NA	NA	NA	2.77037
30	1982 6	15.05634	32.23096	NA	NA	NA	15.05634
31	1982 7	41.31460	29.26018	NA	NA	NA	41.31460
32	1982 8	14.45409	31.62871	NA	NA	NA	14.45409
33	1982 9	0.00000	17.17462	NA	NA	NA	0.00000
34	1982 10	55.04598	25.76165	NA	NA	NA	55.04598
35	1982 11	36.49657	53.67119	NA	NA	NA	36.49657
36	1982 12	34.32846	28.15662	NA	NA	NA	34.32846
37	1983 1	41.79640	26.06829	NA	NA	NA	41.79640
38	1983 2	6.62479	23.79941	NA	NA	NA	6.62479
39	1983 3	11.32237	28.49699	NA	NA	NA	11.32237

```
## 40  1983 4  5.29983 22.47445       NA          NA          NA  5.29983
## 41  1983 5  1.08406 18.25868       NA          NA          NA  1.08406
## 42  1983 6  2.16811 19.34273       NA          NA          NA  2.16811
## 43  1983 7 52.27562 23.02291       NA          NA          NA 52.27562
## 44  1983 8  4.09532 21.26994       NA          NA          NA  4.09532
## 45  1983 9 26.37871 28.12254       NA          NA          NA 26.37871
## 46 1983 10 21.19933 38.37395       NA          NA          NA 21.19933
## 47 1983 11 35.77387 52.94849       NA          NA          NA 35.77387
## 48 1983 12 26.25826 43.43288       NA          NA          NA 26.25826
## 49  1984 1  7.10659 24.28121       NA          NA          NA  7.10659
## 50  1984 2 14.21319 31.38781       NA          NA          NA 14.21319
## 51  1984 3  7.22704 24.40166       NA          NA          NA  7.22704
## 52  1984 4  9.39516 26.56978       NA          NA          NA  9.39516
## 53  1984 5 13.85183 31.02645       NA          NA          NA 13.85183
## 54  1984 6  4.21578 21.39040       NA          NA          NA  4.21578
## 55  1984 7  8.91335 26.08797       NA          NA          NA  8.91335
## 56  1984 8  0.00000 17.17462       NA          NA          NA  0.00000
## 57  1984 9  4.33623 21.51085       NA          NA          NA  4.33623
## 58 1984 10  7.22704 24.40166       NA          NA          NA  7.22704
## 59 1984 11 14.33364 31.50826       NA          NA          NA 14.33364
## 60 1984 12  1.20451 18.37913       NA          NA          NA  1.20451
## 61  1985 1 22.28338 39.45800       NA          NA          NA 22.28338
## 62  1985 2       NA       NA 12.86700     0.00000    29.24600  7.22704
## 63  1985 3       NA       NA 10.12300     0.00000    27.18400  3.61352
## 64  1985 4       NA       NA  9.32300     0.00000    26.44100  0.48180
## 65  1985 5       NA       NA  9.09000     0.00000    26.21300  1.80676
## 66  1985 6       NA       NA  9.02300     0.00000    26.14500 36.97837
## 67  1985 7       NA       NA  9.00300     0.00000    26.12500  0.00000
## 68  1985 8       NA       NA  8.99700     0.00000    26.12000  0.00000
## 69  1985 9       NA       NA  8.99500     0.00000    26.11800  0.00000
## 70 1985 10       NA       NA  8.99500     0.00000    26.11800  3.37262
## 71 1985 11       NA       NA 28.99800    11.87500    46.12100 12.88823
##    Residuals   Fitted
## 1    0.00000  5.00000
## 2  -11.13636 12.82266
## 3   -2.05322 17.71181
## 4   -6.35988 19.00721
## 5   -0.91916 21.63669
## 6    5.85400 28.35401
## 7   11.00762 35.60681
## 8    3.60929 34.45314
## 9   -2.62214 65.25652
## 10  -9.02428 20.10575
## 11  -1.37936 40.88720
## 12   7.16757 28.84720
## 13  -9.52716 22.89719
## 14  10.44332 22.43973
## 15   2.65999 10.95094
## 16  -0.94460 10.33976
## 17  -2.12520  9.11134
## 18  -5.87991  8.40938
## 19   1.80258  7.11077
## 20   0.42421  8.97095
## 21   0.64426 39.22493
```

```
## 22   2.21730 49.57651
## 23   7.63097 29.70876
## 24  -3.95734 11.42529
## 25   2.04988  8.54978
## 26  -3.80114  9.46232
## 27  -3.08483  8.02331
## 28  -1.57514 41.08298
## 29  -5.42090  8.19127
## 30   7.87537  7.18097
## 31   1.32462 39.98998
## 32   4.55880  9.89529
## 33 -10.58545 10.58545
## 34   2.21331 52.83267
## 35   7.61729 28.87928
## 36  -0.19760 34.52606
## 37  -0.68006 42.47646
## 38  -2.34042  8.96521
## 39   3.01828  8.30409
## 40  -4.37307  9.67290
## 41  -6.83396  7.91802
## 42  -4.52149  6.68960
## 43  -1.15719 53.43281
## 44  -3.98251  8.07783
## 45   3.38087 22.99784
## 46  11.63554  9.56379
## 47   3.21953 32.55434
## 48  15.28925 10.96901
## 49  -6.91843 14.02502
## 50   5.76871  8.44448
## 51  -3.28821 10.51525
## 52   0.91558  8.47958
## 53   4.74049  9.11134
## 54  -6.19418 10.40996
## 55   1.31121  7.60214
## 56  -8.97095  8.97095
## 57  -2.03749  6.37372
## 58  -0.41020  7.63724
## 59 -14.14936 28.48300
## 60  -3.51711  4.72162
## 61  15.55869  6.72469
## 62        NA       NA
## 63        NA       NA
## 64        NA       NA
## 65        NA       NA
## 66        NA       NA
## 67        NA       NA
## 68        NA       NA
## 69        NA       NA
## 70        NA       NA
## 71        NA       NA
##                                  Statistic        Value
## 1                                      RSQ    0.7838584
## 2  RMSE (VARIANCE OF ERRORS)    8.6405211
## 3                 STD DEV OF ERRORS    0.0000000
```

```
## 4                                                          MAPE    0.6511059
## 5                                                SUM OF FORECASTS  115.4140000
## 6                                      DAYS LEFT IN TRIAL PERIOD    4.0000000
## 7                                                      NOT ACTIVE    0.0000000
## 8                                    FORECAST CONFIDENCE INTERVAL   95.0000000
## 9                                     SUM OF SQUARES OF RESIDUALS 3508.9544363
## 10                                   DEGREES OF FREEDOM FOR MODEL   47.0000000
## 11                                  NUMBER OF PARAMETERS IN MODEL   14.0000000
## 12 SEASONAL INDICATOR (1 IF THERE ARE ANY SEASONAL ELEMENTS)    1.0000000
## 13                                                         NULL    0.0000000
```

```r
# Plot the result.
# The selection parameter selects the values to plot:
# a = Actual,
# c = Cleansed (Adjusted),
# f = Forecast,
# h = Historical,
# i = Interventions,
# n = Retained,
# r = Residual,
# t = Fitted,
# u = Future.
autoboxPlot(objS_5_retained,selection="acfhinrtu")
```



```r
# Unload the autobox library.
unloadNamespace("autobox")

# Restore the working directory.
setwd(saveWd)
```