Nowcasting

Bibek

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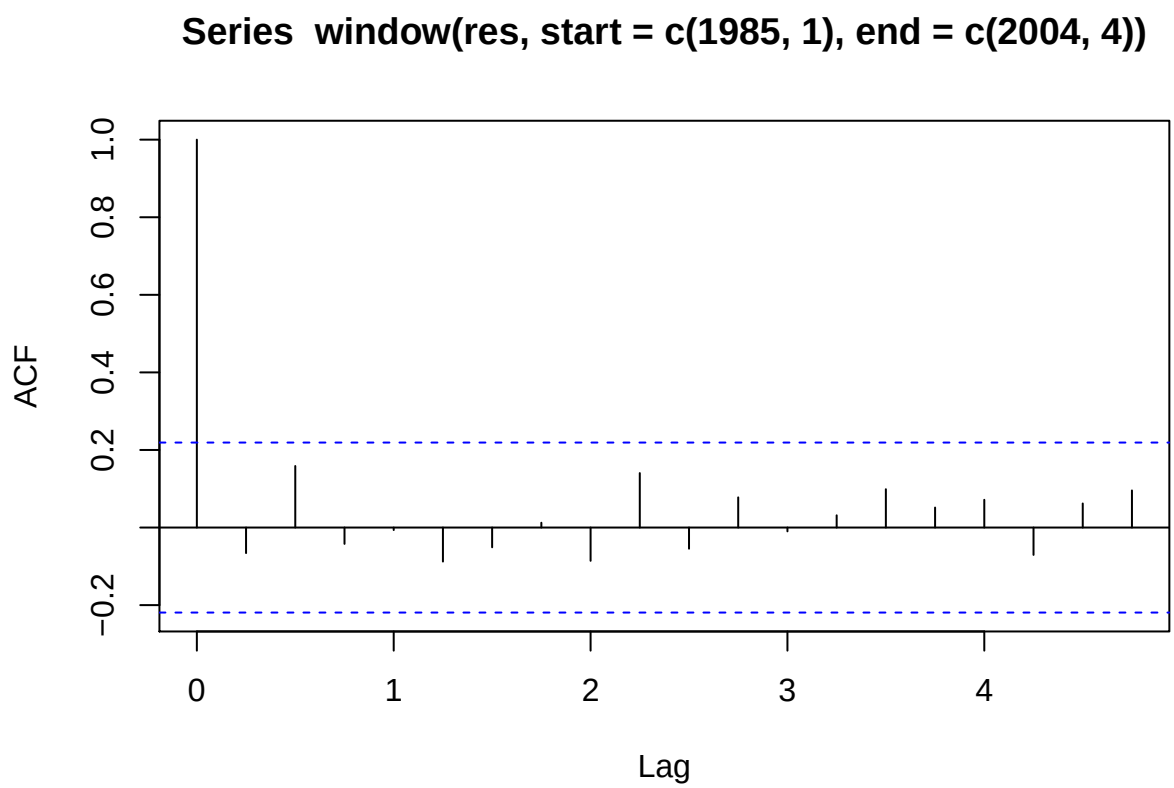
```
library(nowcasting)
data(USGDP)
data <- Bpanel(base = USGDP$base,
               trans = USGDP$legend$Transformation,
               aggregate = FALSE)
```

```
## Warning in Bpanel(base = USGDP$base, trans = USGDP$legend$Transformation, :
## 3 series ruled out due to lack in observations (more than 33.33 % NA).
```

```
## [1] "AVGWKLYCL" "CPOUT"     "M3"
```

```
frequency <- c(rep(12, ncol(data) -1), 4)
nowcastUSGDP <- nowcast(formula = RGDPGR ~ ., data = data, r = 2, p = 2, q = 2,
                        method = '2s_agg', frequency = frequency)
res <- ts(nowcastUSGDP$reg$residuals, start = start(data), frequency = 4)
acf(window(res, start = c(1985,1), end = c(2004,4)))
```



```r
# y forecasts
tail(nowcastUSGDP$yfcst,8)
```

```
##                y       in       out
## [101,] 0.6009174 2.168328        NA
## [102,] 3.8211850 3.387375        NA
## [103,] 4.9076300 3.419095        NA
## [104,]        NA       NA 0.7952106
## [105,]        NA       NA 2.9532171
## [106,]        NA       NA 3.1480427
## [107,]        NA       NA 3.2282179
## [108,]        NA       NA 3.2562524
```

```r
# the regression between y and its factors can be accessed using `$reg`.
summary(nowcastUSGDP$reg)
```

```
##
## Call:
## stats::lm(formula = Y ~ ., data = Balanced_panel)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6244 -1.1502 -0.0173  1.2253  4.4249
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.270610   0.156114  20.950  < 2e-16 ***
## Factor1     -0.052065   0.004937 -10.545  < 2e-16 ***
## Factor2     -0.028212   0.009194  -3.068  0.00278 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.577 on 99 degrees of freedom
## Multiple R-squared:  0.5343, Adjusted R-squared:  0.5249
## F-statistic: 56.79 on 2 and 99 DF,  p-value: < 2.2e-16
```

```r
# the results related to the estimation of factors
tail(nowcastUSGDP$factors$dynamic_factors) # factors
```

```
##           Factor1      Factor2
## [319,] 0.10038717 -0.024964179
## [320,] 0.06596743 -0.018850123
## [321,] 0.04797822 -0.012143349
## [322,] 0.03237832 -0.008330949
## [323,] 0.02302585 -0.005682253
## [324,] 0.01592197 -0.004029648
```

```r
head(nowcastUSGDP$factors$Lambda) # Lambda matrix
```

```
##             [,1]        [,2] [,3] [,4]
## [1,] -0.17731638 -0.05639066    0    0
```

```
## [2,] -0.16155633 -0.05741695    0    0
## [3,] -0.15099064 -0.05882722    0    0
## [4,] -0.11685030 -0.06122270    0    0
## [5,] -0.10878078 -0.05889357    0    0
## [6,] -0.06542987 -0.03136407    0    0
```

```
nowcastUSGDP$factors$A # A matrix
```

```
##            [,1]       [,2]       [,3]       [,4]
## [1,]  0.3491592 -0.2053947 0.28271634  0.2927282
## [2,] -0.1636227  0.3429858 0.01814772 -0.1319467
## [3,]  1.0000000  0.0000000 0.00000000  0.0000000
## [4,]  0.0000000  1.0000000 0.00000000  0.0000000
```

```
nowcastUSGDP$factors$BB # BB': u's variance covariance matrix (factor equation)
```

```
##           [,1]      [,2] [,3] [,4]
## [1,] 16.501113  2.543649    0    0
## [2,]  2.543649 10.098401    0    0
## [3,]  0.000000  0.000000    0    0
## [4,]  0.000000  0.000000    0    0
```

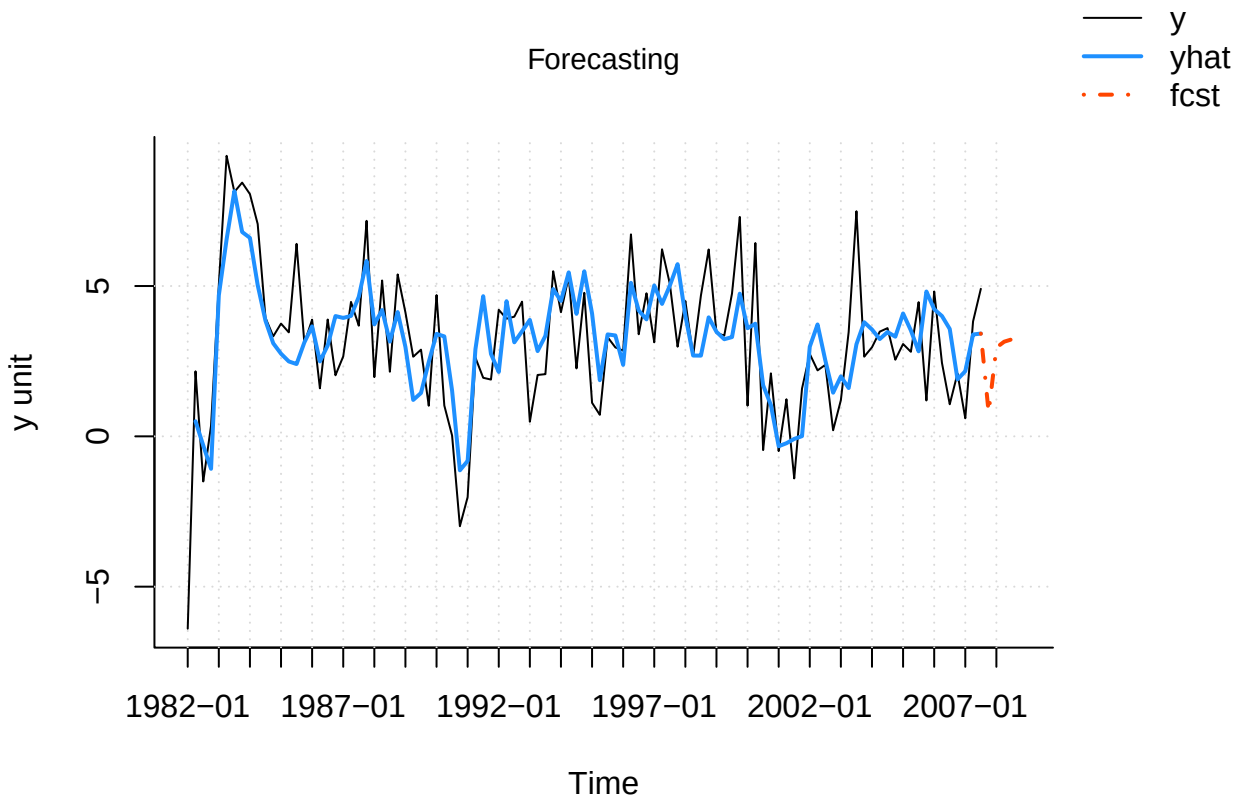
```
diag(nowcastUSGDP$factors$Psi) # Psi: epsilon's variance covariance matrix (x equation)
```

```
##   [1] 0.1734173 0.3060319 0.3869437 0.6129656 0.6619664 0.8809204 0.4101565
##   [8] 0.2821202 0.3115892 0.7162070 0.1434126 0.2504236 0.6070620 0.8472649
##  [15] 0.9974153 0.9713269 0.1465686 0.8179833 0.7703481 0.1904032 0.3298881
##  [22] 0.2196412 0.2078516 0.3024028 0.6309399 0.8331549 0.9967148 0.7862909
##  [29] 0.2391931 0.9648067 0.9639247 0.9430193 0.7527573 0.9984706 0.9610038
##  [36] 0.9923651 0.9247561 0.9025086 0.8001765 0.5416414 0.5014293 0.3929053
##  [43] 0.8802878 0.7351907 0.4567175 0.4701491 0.7289559 0.6981589 0.8535452
##  [50] 0.9939554 0.7943979 0.6207059 0.9599230 0.6166364 0.9645984 0.8914153
##  [57] 0.9097043 0.9948651 0.8857777 0.8565705 0.8760290 0.9637882 0.7242095
##  [64] 0.7960994 0.7967297 0.9115190 0.8138045 0.7912025 0.9318268 0.8955756
##  [71] 0.9104781 0.9418615 0.9427554 0.9942275 0.9756781 0.9913764 0.9563328
##  [78] 0.9699585 0.9637248 0.9359199 0.9375455 0.9172272 0.8617942 0.8649389
##  [85] 0.8892031 0.9063456 0.9551219 0.9815739 0.9272877 0.9986281 0.9867141
##  [92] 0.9897281 0.8793271 0.9407320 0.9164247 0.8095748 0.9619397 0.9138489
##  [99] 0.9291883 0.9216500 0.9048091 0.9058540 0.9767007 0.9184832 0.9102511
## [106] 0.8391620 0.9349202 0.9409947 0.9655696 0.9539825 0.9794725 0.7867350
## [113] 0.8203710 0.7597013 0.7783067 0.8249047 0.8284598 0.8496452 0.8191141
## [120] 0.8442006 0.8356869 0.9395455 0.9699219 0.9970842 0.9897302 0.9650583
## [127] 0.9921300 0.9739737 0.9511652 0.9348782 0.9436421 0.9608852 0.9992656
## [134] 0.9957577 0.9910738 0.4667771 0.9538215 0.4576739 0.5575508 0.7406083
## [141] 0.4352389 0.9838933 0.9956483 0.2455085 0.9080648 0.7319733 0.9514699
## [148] 0.4295028 0.9574439 0.3235169 0.9342930 0.8607524 0.2562122 0.9231898
## [155] 0.2548314 0.2582132 0.9724056 0.3846670 0.9730056 0.9775833 0.3551162
## [162] 0.9784701 0.9549399 0.9596652 0.9909712 0.9948924 0.9944121 0.9666600
## [169] 0.9990099 0.9566301 0.9854302 0.9715155 0.9139816 0.9178971 0.9888032
## [176] 0.8821020 0.8883088 0.9248915 0.9355732 0.9368083 0.9979341 0.9362254
## [183] 0.9777950 0.9624266 0.9461493 0.9655741 0.9960065 0.4149336 0.8886377
```

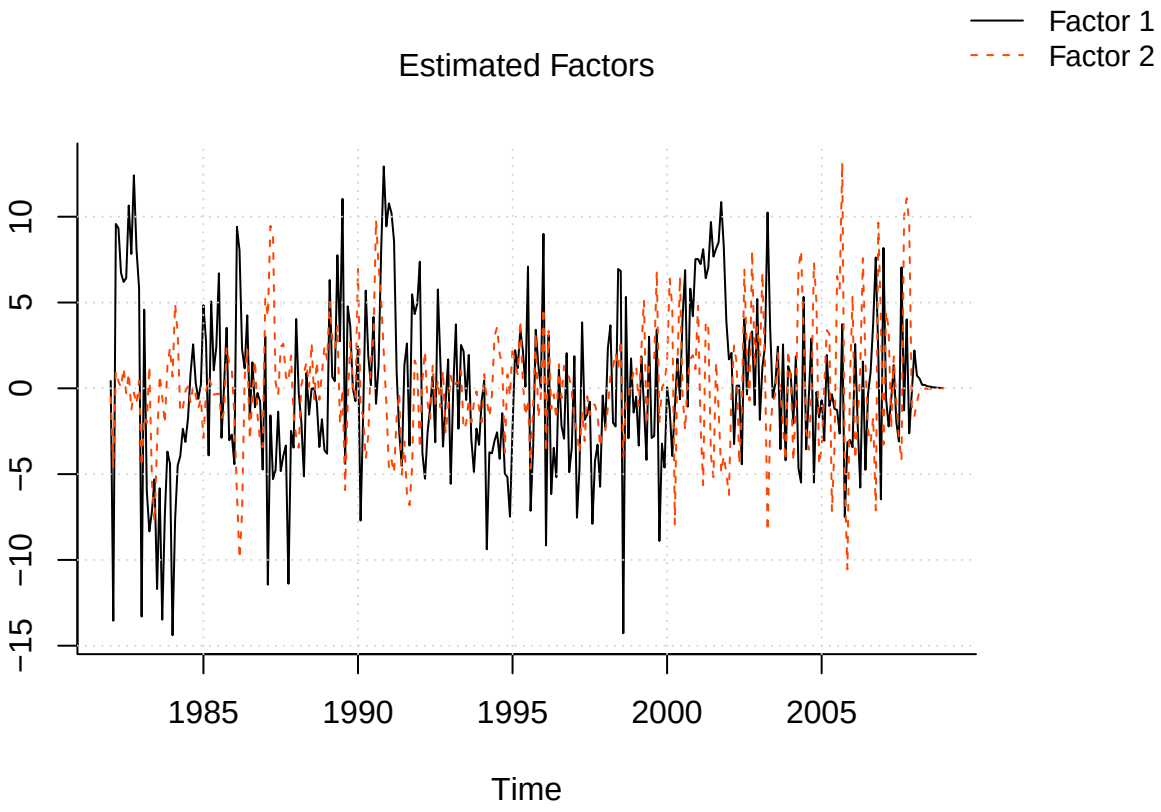
```r
# the forecasts of the explanatory variables are in `$xfcst`.
tail(nowcastUSGDP$xfcst[,1:5]) # x forecasts (first 5 variables)
```

```
##              IPTOT       IPFPS        IPFP        IPCG       IPDCG
## [319,] 0.002351413 0.002275988 0.002266541 0.001854169 0.002953852
## [320,] 0.002383969 0.002307400 0.002299758 0.001882174 0.003010343
## [321,] 0.002399866 0.002322601 0.002315700 0.001895160 0.003036416
## [322,] 0.002414289 0.002336477 0.002330334 0.001907363 0.003060995
## [323,] 0.002422821 0.002344670 0.002338961 0.001914508 0.003075374
## [324,] 0.002429415 0.002351018 0.002345659 0.001920104 0.003086649
```

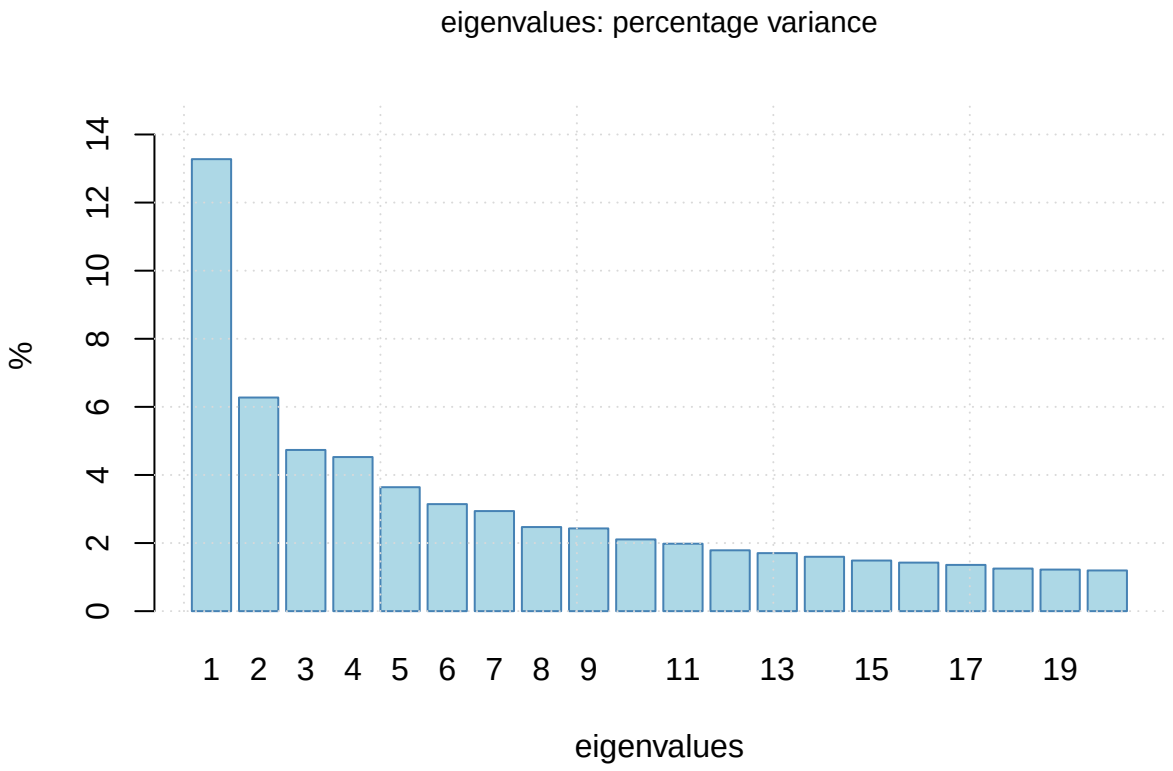
```r
 # y fcst
nowcast.plot(nowcastUSGDP, type = "fcst")
```



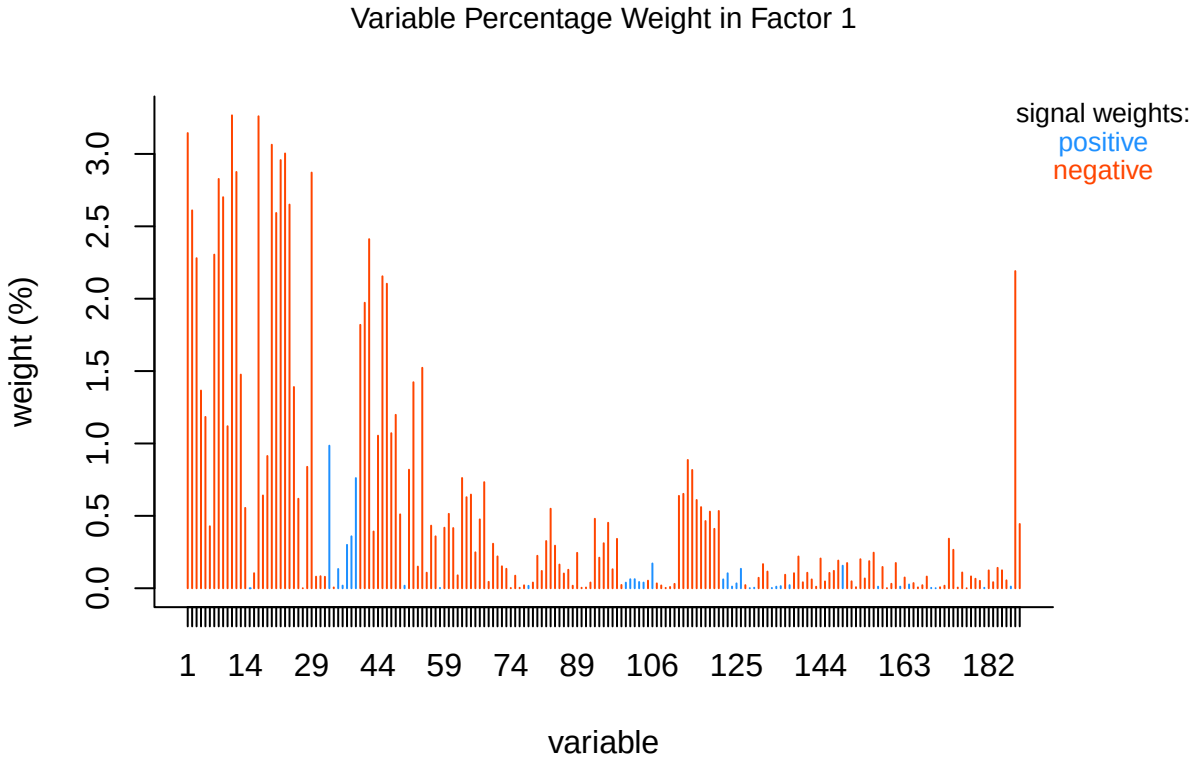

```r
# factors
nowcast.plot(nowcastUSGDP, type = "factors")
```




```
 # how much of the variability in the dataset is explained by each factor
nowcast.plot(nowcastUSGDP, type = "eigenvalues")
```




```
# importance of each variable in the first factor
nowcast.plot(nowcastUSGDP, type = "eigenvectors")
```


Variable Percentage Weight in Factor 1
signal weights:
positive
negative
weight (%)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1
14
29
44
59
74
89
106
125
144
163
182
variable