lstr_dat2

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preparing data

```
zz <- read.csv("OxfordManRealizedVolatilityIndices.csv", stringsAsFactors = FALSE, skip = 3)
grep("[.]rv$",colnames(zz), value=TRUE)
```

```
##  [1] "SPX2.rv"     "FTSE2.rv"    "N2252.rv"    "GDAXI2.rv"   "RUT2.rv"
##  [6] "AORD2.rv"    "DJI2.rv"     "IXIC2.rv"    "FCHI2.rv"    "HSI2.rv"
## [11] "KS11.rv"     "AEX.rv"      "SSMI.rv"     "IBEX2.rv"    "NSEI.rv"
## [16] "MXX.rv"      "BVSP.rv"     "GSPTSE.rv"   "STOXX50E.rv" "FTSTI.rv"
## [21] "FTSEMIB.rv"
```

```
rr <- zz %>% select(DateID,RUT2.rv) %>% mutate(rv = 100 * sqrt(252*RUT2.rv))
rv1 <- na.omit(rr$rv)
rv2 <- mls(rv1, 1:20, 1)
dat <- na.omit(cbind("y" = rv1, rv2))
```

lstr function

```
lstr_m <- function(y, x, z=NULL, weight, startx, method=c("Nelder-Mead","BFGS")){
  d <- ncol(x)

  # weight function
  all_coef <- function(p) {
    weight(p,d)
  }

  GG <- function(p){
   b3 <- p[4]; b4 <- p[5]; sdd <- p[6]
    xm <- x%*%(all_coef(p))
    (1 + exp(-b3 * (xm - b4) / sd(x)))^{-1}
  }
  # midasr
  lstr <- function(p){
    b0 <- p[1]; b1 <- p[2]; b2 <- p[3]
    xm <- x%*%(all_coef(p))
    mod <- b0 + b1*xm*(1 + b2 * GG(p))
    sum((y-mod)^2)
  }

  cc <- optimx(par=startx, lstr, method=method)
  ccmin <- which.min(cc$value)
  cc <- cc[ccmin, ]
  par <- as.numeric(cc[ ,1:length(startx)])
  fitt <- x%*%all_coef(par)
  ress <- y - x%*%all_coef(par)
```

```
  out1 <- list("data" = cbind(y,x),
               "coef" = par,
               "mid_coef" = all_coef(par),
               "RSS" = cc$value,
               "fitted" = fitt,
               "residuals" = y-fitt,
               "mse" = mean((y-fitt) ^ 2))

  # Galvao
  lstr <- function(p){
    b0 <- p[1]; b1 <- p[2]; b2 <- p[3]
    xm <- x%*%(all_coef(p))
    mod <- b0 + b1*xm + (b2-b1)*GG(p)
    sum((y-mod)^2)
  }

  cc <- optimx(par=startx, lstr, method=method)
  ccmin <- which.min(cc$value)
  cc <- cc[ccmin, ]
  par <- as.numeric(cc[ ,1:length(startx)])
  fitt <- x%*%all_coef(par)
  ress <- y - x%*%all_coef(par)

  out2 <- list("data" = cbind(y,x),
               "coef" = par,
               "mid_coef" = all_coef(par),
               "RSS" = cc$value,
               "fitted" = fitt,
               "residuals" = y-fitt,
               "mse" = mean((y-fitt) ^ 2))

  list("midasr" = out1, "galvao" = out2)
}
```

```
mr <- lstr_m(dat[,1], dat[,-1], weight = nbeta, startx = c(1,1,1,1,1,1))
mrs <- midas_r_simple(dat[,1], dat[,-1], weight = nbeta, startx = c(1,1,1))
```

```
mr$midasr[-c(1,5:6)]
```

```
## $coef
## [1]  0.3931016  0.9319727  1.6283565 10.2541905 -6.6800671 28.0799357
##
## $mid_coef
##  [1] 1.924644e-01 1.957566e-02 1.801524e-02 1.687008e-02 1.588568e-02
##  [6] 1.498255e-02 1.412459e-02 1.329164e-02 1.247064e-02 1.165198e-02
## [11] 1.082767e-02 9.990266e-03 9.132018e-03 8.243954e-03 7.314625e-03
## [16] 6.327901e-03 5.258319e-03 4.058894e-03 2.615561e-03 2.418049e-12
##
## $RSS
## [1] 115093.9
##
## $mse
## [1] 115.0904
```

```
mr$galvao[-c(1,5:6)]
```

```
## $coef
## [1]  0.9080754  0.9509853  3.0466098  0.3078050  3.4204781 -3.1369069
##
## $mid_coef
##  [1] 4.402608e-01 7.781724e-02 6.691396e-02 5.794295e-02 5.006254e-02
##  [6] 4.299717e-02 3.661755e-02 3.085059e-02 2.564972e-02 2.098267e-02
## [11] 1.682558e-02 1.315988e-02 9.970408e-03 7.244279e-03 4.970093e-03
## [16] 3.137320e-03 1.735738e-03 7.547509e-04 1.821780e-04 6.913948e-34
##
## $RSS
## [1] 114099.9
##
## $mse
## [1] 27.04218
```

```
list("coef"=mrs$coefficients, "mid_coef"=mrs$midas_coefficients, "mse"=mean((mrs$model[,1]-mrs$model[,-1
```

```
## $coef
## [1] 0.9840919 0.9691233 4.4716877
##
## $mid_coef
##  [1] 4.260296e-01 1.270793e-01 1.020000e-01 8.161261e-02 6.465359e-02
##  [6] 5.053327e-02 3.885057e-02 2.928513e-02 2.156088e-02 1.543066e-02
## [11] 1.066881e-02 7.067281e-03 4.433591e-03 2.589786e-03 1.372074e-03
## [16] 6.309736e-04 2.319516e-04 5.665662e-05 5.098026e-06 6.336356e-56
##
## $mse
## [1] 25.44749
```

mse

```
mr$midasr$mse
```

```
## [1] 115.0904
```

```
mr$galvao$mse
```

```
## [1] 27.04218
```

```
mean((mrs$model[,1]-mrs$model[,-1]%*%mrs$midas_coefficients)^2)
```

```
## [1] 25.44749
```

data

```
summary(mr$midasr$data[ ,1])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   8.897  11.766  14.030  16.351 121.404
```

residuals

```
summary(mr$midasr$residuals)
```

```
##        V1
##  Min.   : -3.440
##  1st Qu.:  4.669
##  Median :  6.971
##  Mean   :  8.514
##  3rd Qu.: 10.313
##  Max.   :101.357
```

```
summary(mr$galvao$residuals)
```

```
##        V1
##  Min.   :-28.6862
##  1st Qu.: -1.3014
##  Median :  0.6085
##  Mean   :  1.2879
##  3rd Qu.:  3.1194
##  Max.   : 73.0823
```

```
summary(mrs$residuals)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -33.7126  -2.2995  -0.3146   0.2217   2.1374  67.6913
```

graphs

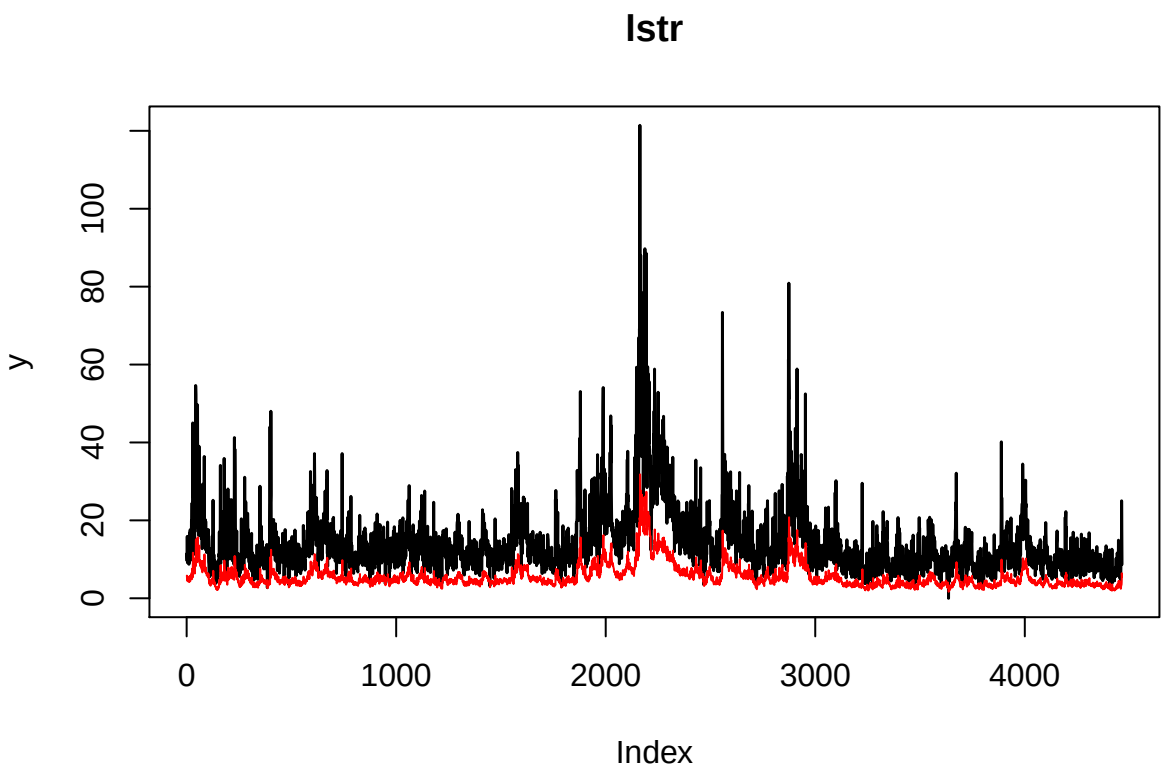
```
y <- mrs$model[,1]
length(y[y<=mr$midasr$fitted])
```

```
## [1] 17
```

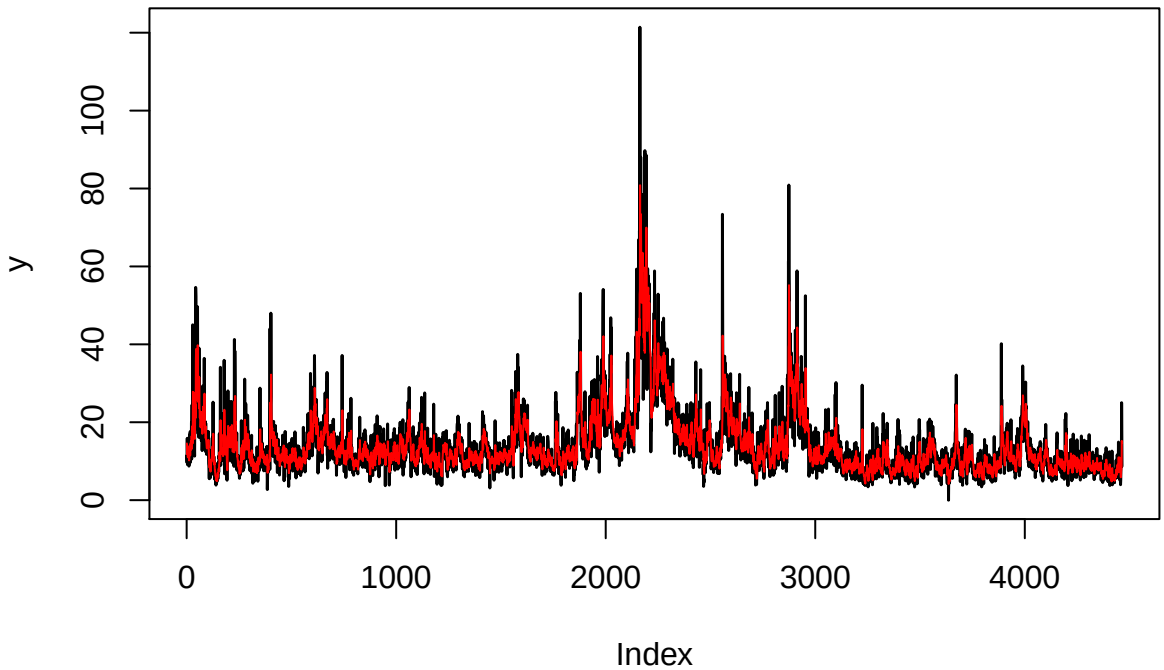
```
length(y[y<=mrs$fitted.values])
```

```
## [1] 2422
```

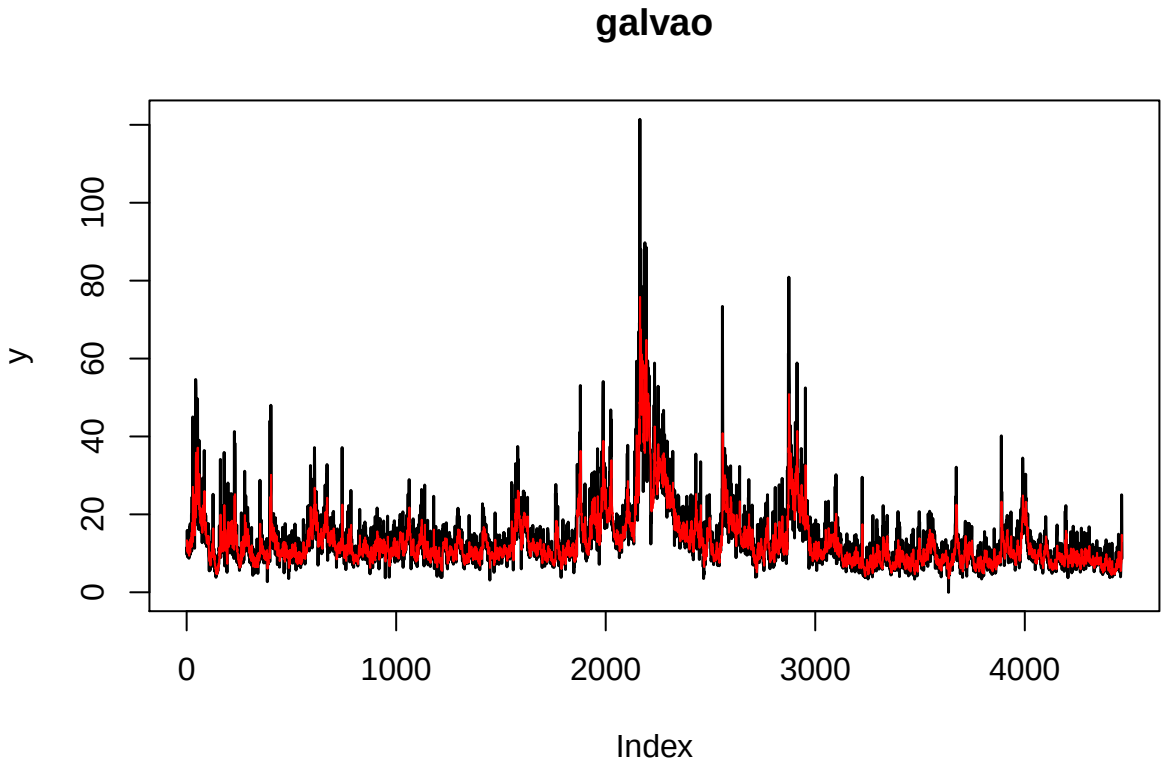
```
plot(y,type = "l", lwd = 1.5, main = "lstr"); lines(mr$midasr$fitted, col = "red")
```



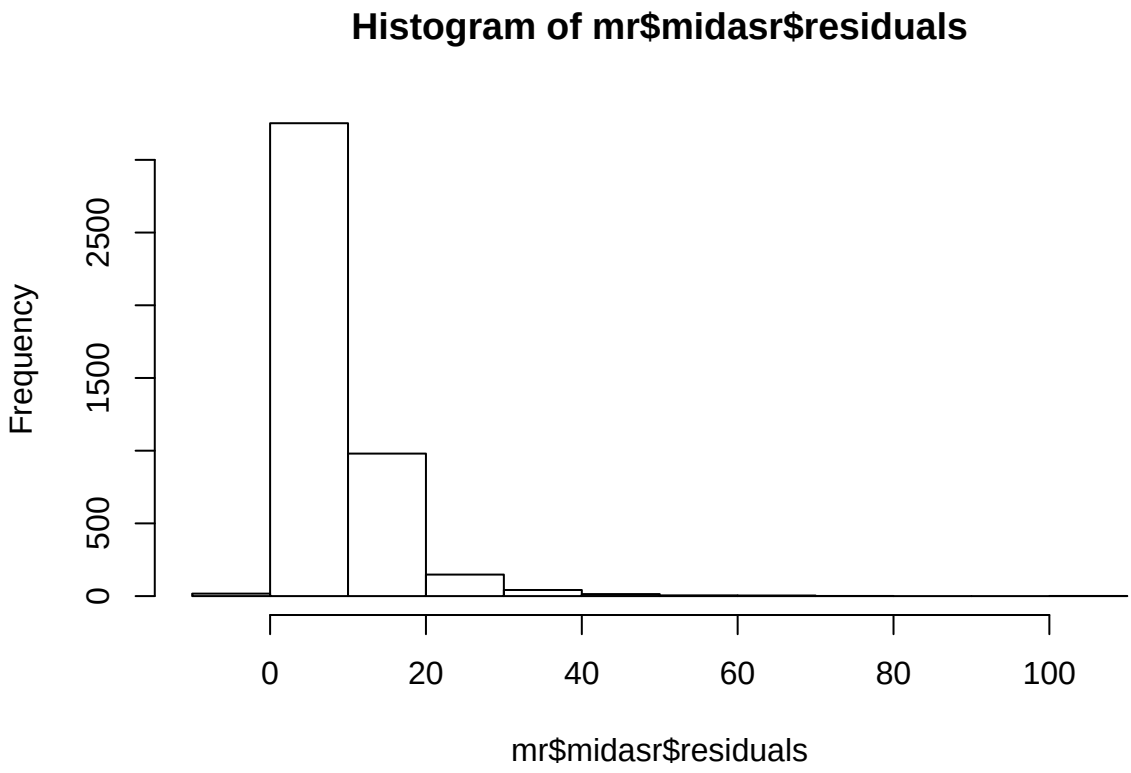

```
plot(y,type = "l", lwd = 1.5, main = "simple"); lines(mrs$fitted.values, col = "red")
```



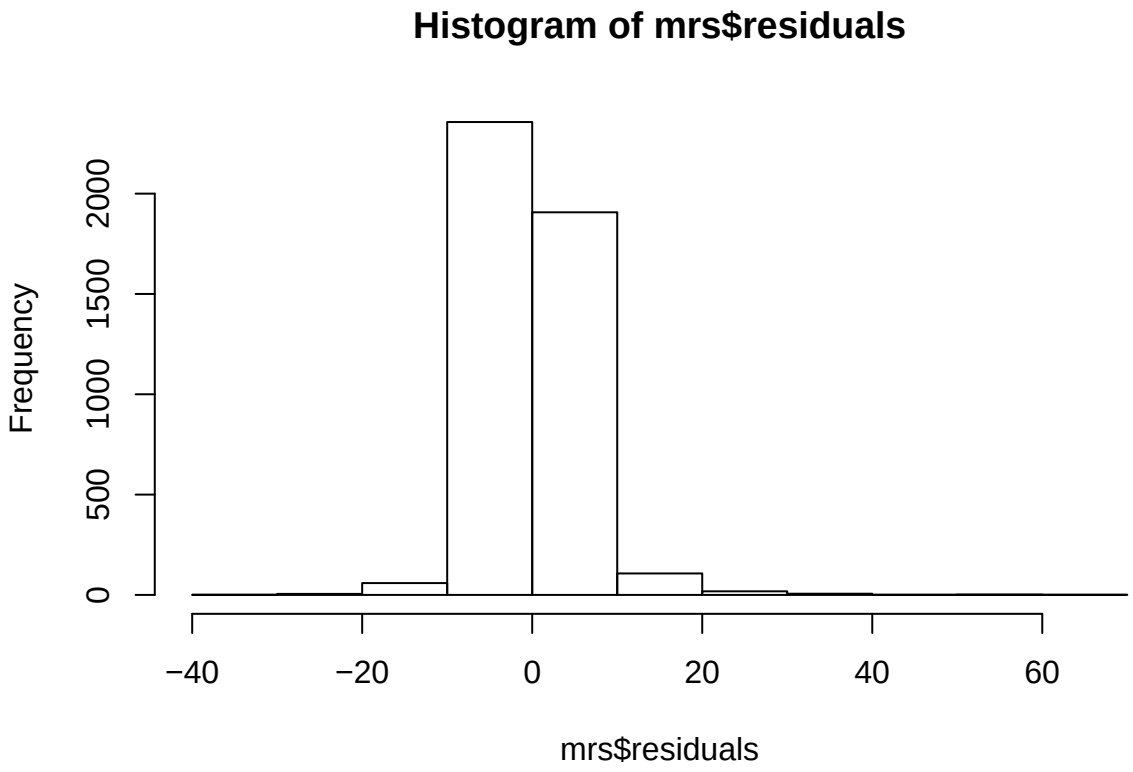

```
plot(y,type = "l", lwd = 1.5, main = "galvao"); lines(mr$galvao$fitted, col = "red")
```




```
hist(mr$midasr$residuals)
```




```
hist(mrs$residuals)
```


Histogram of mrs$residuals
Frequency
0
500
1000
1500
2000
−40
−20
0
20
40
60
mrs$residuals