stmHurricanes

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```r
library("stm")
```

```
## stm v1.3.6 successfully loaded. See ?stm for help.
##  Papers, resources, and other materials at structuraltopicmodel.com
```

```r
data <- read.csv("D:\\Princeton\\BSPL\\df_combined.csv")
processed <- textProcessor(data$text_field, metadata = data)
```

```
## Building corpus...
## Converting to Lower Case...
## Removing punctuation...
## Removing stopwords...
## Removing numbers...
## Stemming...
## Creating Output...
```
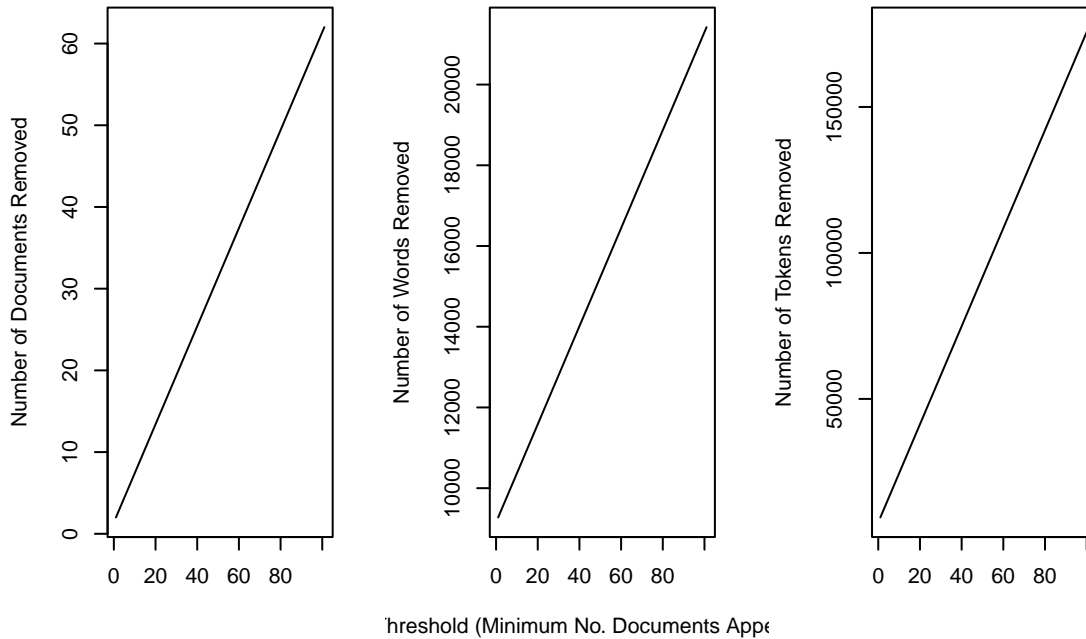
```r
out <- prepDocuments(processed$documents, processed$vocab, processed$meta)
```

```
## Removing 9275 of 23158 terms (9275 of 1549861 tokens) due to frequency
## Removing 2 Documents with No Words
## Your corpus now has 47298 documents, 13883 terms and 1540586 tokens.
```

```r
docs <- out$documents
vocab <- out$vocab
meta <- out$meta
```

```r
plotRemoved(processed$documents, lower.thresh = seq(1, 200, by = 100))
```

Documents Removed by Thres   **Words Removed by Thresho**   **Tokens Removed by Thresho**

Number of Documents Removed

Number of Words Removed

Number of Tokens Removed

Threshold (Minimum No. Documents Appe

```r
out <- prepDocuments(processed$documents, processed$vocab, processed$meta,
                     lower.thresh = 30)
```

```
## Removing 19872 of 23158 terms (80766 of 1549861 tokens) due to frequency
## Removing 36 Documents with No Words
## Your corpus now has 47264 documents, 3286 terms and 1469095 tokens.
```

```r
hurricaneModel <- stm(documents = out$documents, vocab = out$vocab, K = 30,
                      prevalence =~ FOX + MSNBC + ARTHUR + BARRY + DELTA +
                      DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
                      IRMA + LAURA + MICHAEL + SALLY,
                      max.em.its = 75, data = out$meta, init.type = "Spectral")
```

```
## Beginning Spectral Initialization
##    Calculating the gram matrix...
##    Finding anchor words...
##       .............................
##    Recovering initialization...
##       ..................................
## Initialization complete.
## ....................................................................................................
## Completed E-Step (28 seconds).
## Completed M-Step.
## Completing Iteration 1 (approx. per word bound = -6.809)
## ....................................................................................................
```

```
## Completed E-Step (29 seconds).
## Completed M-Step.
## Completing Iteration 2 (approx. per word bound = -6.683, relative change = 1.856e-02)
## ...........................................................................................
## Completed E-Step (27 seconds).
## Completed M-Step.
## Completing Iteration 3 (approx. per word bound = -6.618, relative change = 9.672e-03)
## ...........................................................................................
## Completed E-Step (25 seconds).
## Completed M-Step.
## Completing Iteration 4 (approx. per word bound = -6.591, relative change = 4.099e-03)
## ...........................................................................................
## Completed E-Step (23 seconds).
## Completed M-Step.
## Completing Iteration 5 (approx. per word bound = -6.576, relative change = 2.369e-03)
## Topic 1: florida, hurrican, governor, counti, now
##  Topic 2: michael, hurrican, panhandl, florida, death
##  Topic 3: fox, news, hurrican, alert, affect
##  Topic 4: harvey, texa, houston, hurrican, flood
##  Topic 5: harvey, hurrican, relief, will, presid
##  Topic 6: hurrican, storm, hour, center, mile
##  Topic 7: puerto, rico, hurrican, maria, presid
##  Topic 8: minut, road, hurrican, water, just
##  Topic 9: hurrican, peopl, can, get, help
##  Topic 10: power, evacu, hurrican, peopl, mandatori
##  Topic 11: hurrican, level, save, peopl, water
##  Topic 12: carolina, north, florenc, storm, hurrican
##  Topic 13: look, see, come, hurrican, pictur
##  Topic 14: dorian, bahama, hurrican, now, hour
##  Topic 15: presid, hurrican, trump, say, former
##  Topic 16: chang, hurrican, climat, easi, now
##  Topic 17: hurrican, peopl, dorian, get, now
##  Topic 18: peopl, hurrican, get, lot, stay
##  Topic 19: north, hurrican, test, korea, nuclear
##  Topic 20: thank, much, join, well, hurrican
##  Topic 21: irma, hurrican, florida, storm, island
##  Topic 22: hurrican, storm, gulf, louisiana, landfal
##  Topic 23: presid, trump, hurrican, alabama, dorian
##  Topic 24: storm, wind, surg, hurrican, florida
##  Topic 25: unit, state, world, hurrican, around
##  Topic 26: help, hurrican, get, peopl, can
##  Topic 27: hurrican, happen, know, like, thing
##  Topic 28: hurrican, island, prepar, irma, peopl
##  Topic 29: morn, news, good, break, hurrican
##  Topic 30: hurrican, storm, now, get, will
## ...........................................................................................
## Completed E-Step (22 seconds).
## Completed M-Step.
## Completing Iteration 6 (approx. per word bound = -6.564, relative change = 1.706e-03)
## ...........................................................................................
## Completed E-Step (21 seconds).
## Completed M-Step.
## Completing Iteration 7 (approx. per word bound = -6.556, relative change = 1.328e-03)
## ...........................................................................................
```

```
## Completed E-Step (21 seconds).
## Completed M-Step.
## Completing Iteration 8 (approx. per word bound = -6.549, relative change = 1.042e-03)
## ....................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 9 (approx. per word bound = -6.544, relative change = 8.281e-04)
## ....................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 10 (approx. per word bound = -6.539, relative change = 6.498e-04)
## Topic 1: florida, governor, rick, counti, hurrican
##  Topic 2: michael, death, panhandl, hurrican, toll
##  Topic 3: fox, news, hurrican, alert, steve
##  Topic 4: harvey, texa, houston, flood, hurrican
##  Topic 5: harvey, relief, will, hurrican, fund
##  Topic 6: hurrican, hour, mile, storm, center
##  Topic 7: puerto, rico, hurrican, maria, respons
##  Topic 8: minut, water, home, road, town
##  Topic 9: hurrican, better, one, can, man
##  Topic 10: power, evacu, without, order, peopl
##  Topic 11: build, hurrican, level, rescu, water
##  Topic 12: carolina, north, florenc, storm, south
##  Topic 13: look, see, can, show, come
##  Topic 14: dorian, bahama, hurrican, island, now
##  Topic 15: presid, trump, former, joe, senat
##  Topic 16: chang, hurrican, climat, fire, futur
##  Topic 17: bill, peopl, hurrican, miss, karin
##  Topic 18: peopl, stay, get, hurrican, lot
##  Topic 19: plus, north, will, test, korea
##  Topic 20: thank, much, well, join, back
##  Topic 21: irma, florida, hurrican, storm, hit
##  Topic 22: hurrican, storm, gulf, landfal, louisiana
##  Topic 23: presid, trump, hurrican, white, hous
##  Topic 24: storm, wind, surg, rain, hurrican
##  Topic 25: state, unit, around, world, hurrican
##  Topic 26: help, can, need, hurrican, peopl
##  Topic 27: hurrican, know, happen, like, think
##  Topic 28: prepar, hurrican, island, readi, andrew
##  Topic 29: morn, news, good, break, new
##  Topic 30: hurrican, now, will, get, storm
## ....................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 11 (approx. per word bound = -6.536, relative change = 5.023e-04)
## ....................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 12 (approx. per word bound = -6.533, relative change = 3.883e-04)
## ....................................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 13 (approx. per word bound = -6.531, relative change = 2.973e-04)
## ....................................................................................................
```

```
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 14 (approx. per word bound = -6.530, relative change = 2.257e-04)
## ..........................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 15 (approx. per word bound = -6.529, relative change = 1.716e-04)
## Topic 1: florida, governor, counti, rick, hurrican
##  Topic 2: michael, death, florida, panhandl, hurrican
##  Topic 3: fox, news, hurrican, alert, steve
##  Topic 4: harvey, texa, houston, flood, area
##  Topic 5: harvey, relief, will, fund, get
##  Topic 6: hour, hurrican, mile, categori, center
##  Topic 7: puerto, rico, hurrican, maria, respons
##  Topic 8: water, home, minut, report, road
##  Topic 9: better, famili, one, hurrican, love
##  Topic 10: power, evacu, million, peopl, without
##  Topic 11: rescu, build, water, level, hurrican
##  Topic 12: carolina, north, florenc, storm, south
##  Topic 13: look, see, can, right, show
##  Topic 14: dorian, bahama, hurrican, island, florida
##  Topic 15: trump, former, joe, polit, senat
##  Topic 16: chang, hurrican, climat, fire, store
##  Topic 17: bill, peopl, still, miss, karin
##  Topic 18: peopl, stay, get, hurrican, lot
##  Topic 19: plus, north, will, price, test
##  Topic 20: thank, much, well, join, back
##  Topic 21: irma, florida, hurrican, storm, hit
##  Topic 22: hurrican, gulf, storm, louisiana, coast
##  Topic 23: presid, trump, hurrican, hous, white
##  Topic 24: storm, wind, surg, rain, area
##  Topic 25: state, unit, around, day, world
##  Topic 26: help, need, can, peopl, way
##  Topic 27: know, hurrican, like, thing, think
##  Topic 28: prepar, hurrican, readi, island, andrew
##  Topic 29: morn, new, good, news, break
##  Topic 30: hurrican, will, now, get, storm
## ..........................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 16 (approx. per word bound = -6.528, relative change = 1.296e-04)
## ..........................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 17 (approx. per word bound = -6.527, relative change = 9.818e-05)
## ..........................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 18 (approx. per word bound = -6.527, relative change = 7.580e-05)
## ..........................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 19 (approx. per word bound = -6.527, relative change = 6.000e-05)
## ..........................................................................................
```

```
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 20 (approx. per word bound = -6.526, relative change = 4.640e-05)
## Topic 1: governor, florida, counti, rick, scott
##  Topic 2: michael, death, florida, hurrican, panhandl
##  Topic 3: fox, news, hurrican, alert, steve
##  Topic 4: harvey, texa, houston, flood, area
##  Topic 5: harvey, relief, will, fund, get
##  Topic 6: hour, hurrican, mile, categori, center
##  Topic 7: puerto, rico, hurrican, maria, respons
##  Topic 8: water, home, minut, report, damag
##  Topic 9: better, famili, one, love, care
##  Topic 10: power, evacu, million, peopl, without
##  Topic 11: rescu, build, level, hurrican, water
##  Topic 12: carolina, north, florenc, south, storm
##  Topic 13: look, see, can, right, eye
##  Topic 14: dorian, bahama, florida, hurrican, island
##  Topic 15: polit, former, joe, senat, investig
##  Topic 16: chang, hurrican, fire, climat, call
##  Topic 17: bill, still, peopl, recov, miss
##  Topic 18: peopl, get, stay, theyr, hurrican
##  Topic 19: plus, north, will, anoth, price
##  Topic 20: thank, well, much, back, join
##  Topic 21: irma, florida, hurrican, key, storm
##  Topic 22: hurrican, gulf, louisiana, coast, storm
##  Topic 23: presid, trump, hurrican, hous, white
##  Topic 24: storm, wind, surg, rain, tropic
##  Topic 25: state, around, unit, day, world
##  Topic 26: help, need, can, way, american
##  Topic 27: hurrican, know, like, thing, one
##  Topic 28: prepar, readi, hurrican, andrew, emerg
##  Topic 29: new, morn, good, news, break
##  Topic 30: hurrican, will, now, get, come
## ................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 21 (approx. per word bound = -6.526, relative change = 3.589e-05)
## ................................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 22 (approx. per word bound = -6.526, relative change = 2.634e-05)
## ................................................................................................
## Completed E-Step (19 seconds).
## Completed M-Step.
## Completing Iteration 23 (approx. per word bound = -6.526, relative change = 1.993e-05)
## ................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Completing Iteration 24 (approx. per word bound = -6.526, relative change = 1.297e-05)
## ................................................................................................
## Completed E-Step (20 seconds).
## Completed M-Step.
## Model Converged
```

```
labelTopics(hurricaneModel, c(3, 16, 26))
```

```
## Topic 3 Top Words:
##      Highest Prob: fox, news, hurrican, alert, live, steve, will
##      FREX: alert, fox, ainsley, janic, pete, heather, todd
##      Lift: gutfeld, hanniti, perino, bream, ainsley, baier, carlson
##      Score: fox, gutfeld, alert, news, janic, steve, tucker
## Topic 16 Top Words:
##      Highest Prob: chang, hurrican, call, fire, climat, today, store
##      FREX: climat, chang, awesom, xfiniti, scienc, california, click
##      Lift: caucus, climat, xfi, awesom, wifi, scienc, xfiniti
##      Score: chang, caucus, climat, xfiniti, awesom, wildfir, fire
## Topic 26 Top Words:
##      Highest Prob: help, need, can, way, american, effort, affect
##      FREX: help, cross, donat, sleep, beyond, breath, pain
##      Lift: gum, tempur-ped, cnncomimpact, sugar, chew, blood, sleep
##      Score: help, gum, need, effort, cross, donat, american
```

```
thoughts3 <- findThoughts(hurricaneModel, texts = out$meta$text_field, n = 2,
                          topics = 3)$docs[[1]]
thoughts16 <- findThoughts(hurricaneModel, texts = out$meta$text_field, n = 2,
                          topics = 16)$docs[[1]]
thoughts26 <- findThoughts(hurricaneModel, texts = out$meta$text_field, n = 2,
                          topics = 26)$docs[[1]]
```

outdocuments$text

```
par(mfrow = c(1, 2),mar = c(.5, .5, 1, .5))
plotQuote(thoughts3, width = 30, main = "Topic 3")
plotQuote(thoughts16, width = 30, main = "Topic 16")
```

Topic 3

FOX NEWS WILL CONTINUE TO TRACK HURRICANE IRMA. THAT IS IT FOR US TONIGHT. TUNE IN EVERY NIGHT AT 8:00. THE FIVE IS NEXT. GREG: HI, I AM GREG GUTFELD. AND DANA PERINO.

- -

WELCOME TO FOX NEWS @ NIGHT. I AM SHANNON BREAM IN WASHINGTON. THIS IS A FOX NEWS WEATHER ALERT.

Topic 16

BE A CONSERVATIVE ESTIMATE. MEANWHILE, DONALD TRUMP WARNS THAT NEGATION IS THREATENING OUR SUBURBS. IT'S RIDICULOUS. YOU KNOW WHAT IS ACTUALLY THREATENING OUR SUBURBS? WILDFIRES ARE BURNING THE SUBURBS AND THE WEST. FLOODS ARE WIPING OUT SUBURBAN NEIGHBORHOODS IN THE MIDWEST. HURRICANES ARE IMPERILING SUBURBAN LIFE ALONG OUR COAST. IF WE HAVE FOUR MORE YEARS OF TRUMP'S CLIMATE DENIAL, HOW MANY SUBURBS WILL BE BURNED IN

```
plotQuote(thoughts26, width = 30, main = "Topic 26")
```

Topic 26

IF YOU LIKE TO SUPPORT THE
RELIEF EFFORT, YOU CAN DONATE
TO THE RED CROSS, SALVATION
ARMY OR GO TO WWW.FOXNEWS.COM
FOR MORE WAYS TO HELP. THAT IS
IT FOR TODAY.. . .

IF YOU LIKE TO SUPPORT THE
RELIEF EFFORT, YOU CAN DONATE
TO THE RED CROSS, SALVATION
ARMY OR GO TO WWW.FOXNEWS.COM
FOR MORE WAYS TO HELP. THAT IS
IT FOR TODAY.. . .

```
prep <- estimateEffect(1:30 ~ FOX + MSNBC + ARTHUR + BARRY + DELTA +
                       DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
                       IRMA + LAURA + MICHAEL + SALLY,
                       hurricaneModel, meta = out$meta, uncertainty = "Global")
summary(prep, topics=3)
```

```
##
## Call:
## estimateEffect(formula = 1:30 ~ FOX + MSNBC + ARTHUR + BARRY +
##     DELTA + DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
##     IRMA + LAURA + MICHAEL + SALLY, stmobj = hurricaneModel,
##     metadata = out$meta, uncertainty = "Global")
##
##
## Topic 3:
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.0046466  0.0059765  -0.777   0.4369
## FOX          0.0623416  0.0009234  67.510   <2e-16 ***
## MSNBC        0.0013628  0.0007359   1.852   0.0641 .
## ARTHUR       0.0097815  0.0062228   1.572   0.1160
## BARRY        0.0111637  0.0079847   1.398   0.1621
## DELTA        0.0094760  0.0067142   1.411   0.1582
## DORIAN       0.0094352  0.0059354   1.590   0.1119
```

```
## ETA          -0.0091352  0.0080616  -1.133   0.2571
## FLORENCE      0.0114114  0.0061075   1.868   0.0617 .
## HANNA         0.0060446  0.0069164   0.874   0.3821
## HARVEY        0.0079453  0.0060719   1.309   0.1907
## HERMINE       0.0122215  0.0074729   1.635   0.1020
## IRMA          0.0063776  0.0059630   1.070   0.2848
## LAURA         0.0039005  0.0062422   0.625   0.5321
## MICHAEL       0.0070842  0.0061825   1.146   0.2519
## SALLY         0.0058886  0.0064159   0.918   0.3587
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(prep, topics=16)
```

```
##
## Call:
## estimateEffect(formula = 1:30 ~ FOX + MSNBC + ARTHUR + BARRY +
##     DELTA + DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
##     IRMA + LAURA + MICHAEL + SALLY, stmobj = hurricaneModel,
##     metadata = out$meta, uncertainty = "Global")
##
##
## Topic 16:
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.0234509  0.0052670   4.452 8.51e-06 ***
## FOX         -0.0060390  0.0006330  -9.541  < 2e-16 ***
## MSNBC       -0.0008160  0.0006527  -1.250    0.211
## ARTHUR      -0.0070350  0.0053906  -1.305    0.192
## BARRY        0.0016691  0.0060257   0.277    0.782
## DELTA        0.0008361  0.0056776   0.147    0.883
## DORIAN       0.0029308  0.0052710   0.556    0.578
## ETA          0.0072363  0.0071920   1.006    0.314
## FLORENCE    -0.0040605  0.0053310  -0.762    0.446
## HANNA       -0.0066955  0.0059440  -1.126    0.260
## HARVEY      -0.0056588  0.0053041  -1.067    0.286
## HERMINE     -0.0069959  0.0058108  -1.204    0.229
## IRMA        -0.0051219  0.0052363  -0.978    0.328
## LAURA        0.0039750  0.0054640   0.727    0.467
## MICHAEL     -0.0024734  0.0053661  -0.461    0.645
## SALLY        0.0317518  0.0059474   5.339 9.40e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
summary(prep, topics=26)
```

```
##
## Call:
## estimateEffect(formula = 1:30 ~ FOX + MSNBC + ARTHUR + BARRY +
##     DELTA + DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
##     IRMA + LAURA + MICHAEL + SALLY, stmobj = hurricaneModel,
##     metadata = out$meta, uncertainty = "Global")
```

```
## 
## 
## Topic 26:
## 
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.0132593  0.0045367   2.923  0.00347 **
## FOX         0.0019171  0.0005870   3.266  0.00109 **
## MSNBC       0.0006356  0.0005722   1.111  0.26671
## ARTHUR      0.0018988  0.0046825   0.405  0.68511
## BARRY       0.0055143  0.0052448   1.051  0.29309
## DELTA       0.0009262  0.0049334   0.188  0.85109
## DORIAN      0.0072108  0.0046095   1.564  0.11775
## ETA         0.0048167  0.0063909   0.754  0.45104
## FLORENCE    0.0071612  0.0046005   1.557  0.11957
## HANNA       0.0021940  0.0049426   0.444  0.65711
## HARVEY      0.0134537  0.0045153   2.980  0.00289 **
## HERMINE     0.0020733  0.0052095   0.398  0.69064
## IRMA        0.0089286  0.0045801   1.949  0.05125 .
## LAURA       0.0080231  0.0047543   1.688  0.09150 .
## MICHAEL     0.0052631  0.0046786   1.125  0.26063
## SALLY       0.0027207  0.0047298   0.575  0.56514
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
par(fig = c(0, 1, 0, 1))  # Set the figure region (left, right, bottom, top)
par(plt = c(0, 1, 0, 1))  # Set the plot region (left, right, bottom, top)
plot(hurricaneModel, type = "summary", xlim = c(0, .2))
```

Topic 27: hurrican, know, like
Topic 6: hour, hurrican, categori
Topic 24: storm, wind, surg
Topic 20: thank, well, much
Topic 13: see, look, can
Topic 29: new, morn, good
Topic 18: peopl, get, stay
Topic 21: irma, florida, hurrican
Topic 12: carolina, north, florenc
Topic 8: water, home, damag
Topic 23: presid, trump, hurrican
Topic 4: harvey, texa, houston
Topic 22: hurrican, gulf, louisiana
Topic 5: harvey, relief, will
Topic 9: better, famili, one
Topic 15: polit, former, joe
Topic 28: prepar, readi, hurrican
Topic 14: dorian, bahama, florida
Topic 3: fox, news, hurrican
Topic 10: power, evacu, million
Topic 2: michael, death, florida
Topic 7: puerto, rico, hurrican
Topic 26: help, need, can
Topic 11: rescu, build, level
Topic 1: governor, florida, counti
Topic 25: state, around, day
Topic 16: chang, hurrican, call
Topic 19: plus, north, will
Topic 30: hurrican, will, now
Topic 17: bill, still, recov

```
plot(prep, covariate = "MSNBC", topics = c(3, 16, 26),
model = hurricaneModel, method = "difference",
cov.value1 = 1, cov.value2 = 0,
xlab = "Other Networks ... MSNBC",
main = "Effect of MSNBC",
xlim = c(-.1, .1), labeltype = "custom",
custom.labels = c('FOX', 'Climate Change','Help'))
```

Effect of MSNBC
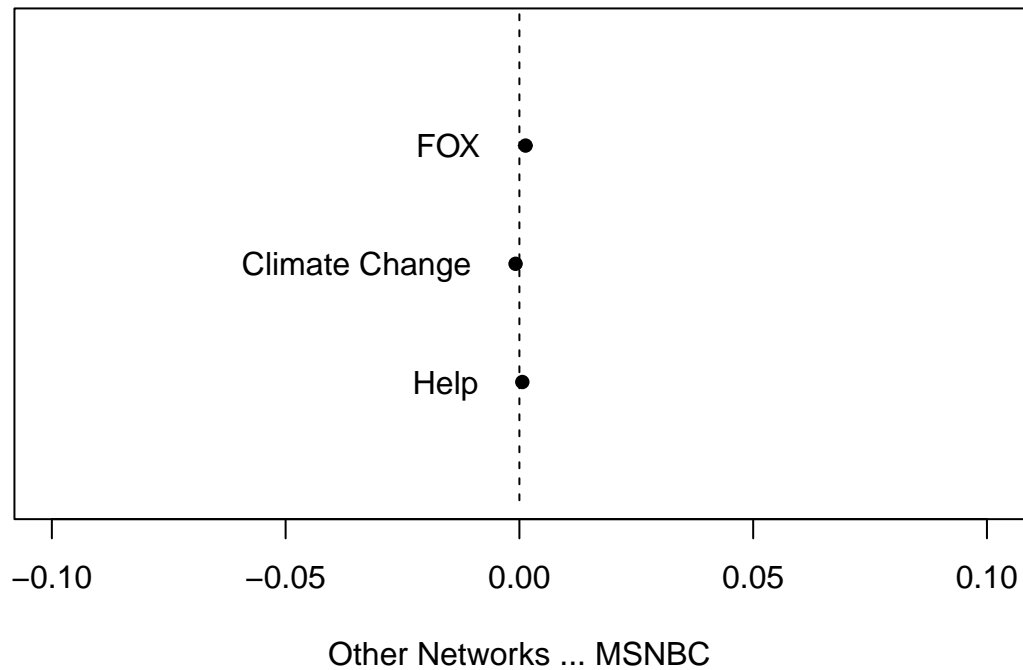

```
plot(prep, covariate = "FOX", topics = c(3, 16, 26),
model = hurricaneModel, method = "difference",
cov.value1 = 1, cov.value2 = 0,
xlab = "Other Networks ... FOX",
main = "Effect of FOX",
xlim = c(-.1, .1), labeltype = "custom",
custom.labels = c('FOX', 'Climate Change','Help'))
```

Effect of FOX
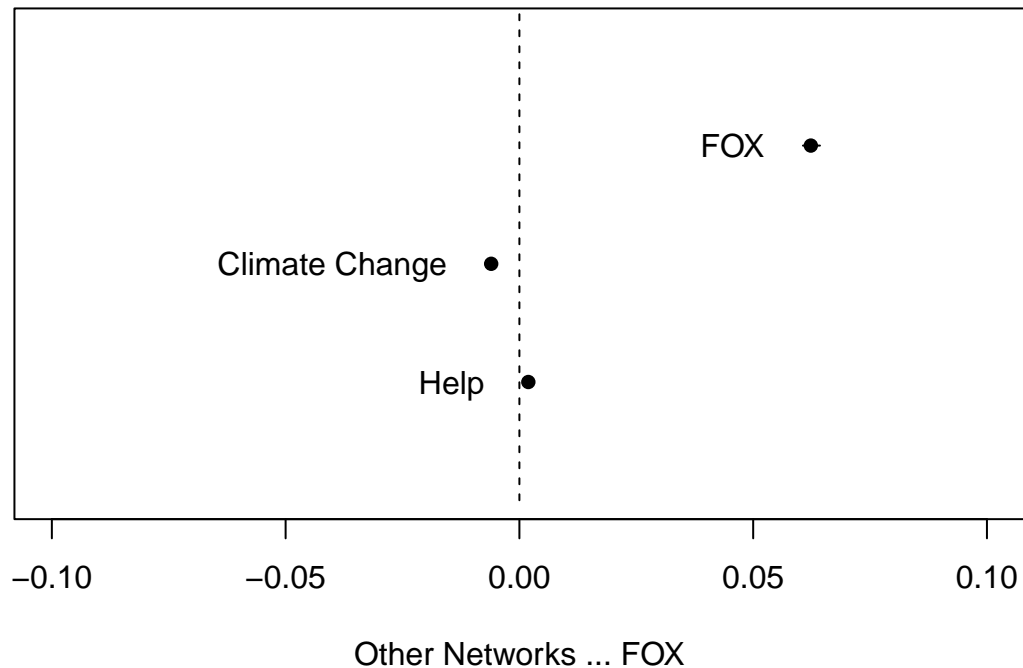

```
hurricaneContent <- stm(out$documents, out$vocab, K = 30,
                        prevalence =~ FOX + MSNBC + ARTHUR + BARRY + DELTA +
                        DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
                        IRMA + LAURA + MICHAEL + SALLY,
                        content =~ MSNBC, max.em.its = 75, data = out$meta,
                        init.type = "Spectral")
```

```
## Beginning Spectral Initialization
##    Calculating the gram matrix...
##    Finding anchor words...
##        ..............................
##    Recovering initialization...
##        ...............................
## Initialization complete.
## ...................................................................................................
## Completed E-Step (27 seconds).
## ...................................................................................................
## Completed M-Step (22 seconds).
## Completing Iteration 1 (approx. per word bound = -6.809)
## ...................................................................................................
## Completed E-Step (28 seconds).
## ...................................................................................................
## Completed M-Step (19 seconds).
## Completing Iteration 2 (approx. per word bound = -6.691, relative change = 1.745e-02)
## ...................................................................................................
```

```
## Completed E-Step (27 seconds).
## .......................................................................................................
## Completed M-Step (19 seconds).
## Completing Iteration 3 (approx. per word bound = -6.628, relative change = 9.384e-03)
## .......................................................................................................
## Completed E-Step (25 seconds).
## .......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 4 (approx. per word bound = -6.599, relative change = 4.359e-03)
## .......................................................................................................
## Completed E-Step (22 seconds).
## .......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 5 (approx. per word bound = -6.582, relative change = 2.623e-03)
## Topic 1: liberti, safelit, mutual, couch, harri
##  Topic 2: jamal, saudi, disappear, khashoggi, consul
##  Topic 3: william, juan, fake, kimber, greg
##  Topic 4: corpus, arpaio, crosbi, beaumont, pardon
##  Topic 5: debt, ceil, budget, legisl, packag
##  Topic 6: west-northwest, european, outward, comput, model
##  Topic 7: boss, unsung, towel, studi, success
##  Topic 8: road, impass, moder, minut, mattress
##  Topic 9: prevagen, brain, terrorist, patienc, healthier
##  Topic 10: light, pole, shine, sun, visitor
##  Topic 11: zoo, xfinitymobilecom, anim, save, exercis
##  Topic 12: myrtl, wilmington, nova, morehead, devil
##  Topic 13: pictur, newest, drone, paint, lull
##  Topic 14: grand, abaco, minist, prime, bahama
##  Topic 15: humanitarian, crisi, ballot, constitut, clinton
##  Topic 16: caucus, midwest, oregon, climat, burn
##  Topic 17: iowa, impeach, ferri, prefer, trust
##  Topic 18: wire, collect, plywood, bus, heed
##  Topic 19: mount, nuclear, missil, launch, weapon
##  Topic 20: pleasur, appreci, luck, thank, sir
##  Topic 21: dominican, barbuda, caribbean, dominica, rubbl
##  Topic 22: zeta, alphabet, season, greek, covid-
##  Topic 23: birmingham, ross, poland, golf, contradict
##  Topic 24: dora, backsid, gust, biscayn, narrow
##  Topic 25: lexus, auto, wound, fascin, edit
##  Topic 26: chew, gum, prevent, deep, midst
##  Topic 27: nois, knew, didnt, afterward, explain
##  Topic 28: croix, thoma, forgotten, virgin, british
##  Topic 29: hello, acosta, york, jim, rnc
##  Topic 30: cool, hurrican, will, get, right
## Aspect 1: chicken, recommend, bounc, advantag, heartburn
##  Aspect 2: julia, joy, philip, besid, presenc
## .......................................................................................................
## Completed E-Step (21 seconds).
## .......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 6 (approx. per word bound = -6.569, relative change = 1.925e-03)
## .......................................................................................................
## Completed E-Step (20 seconds).
## .......................................................................................................
```

```
## Completed M-Step (18 seconds).
## Completing Iteration 7 (approx. per word bound = -6.559, relative change = 1.480e-03)
## ................................................................................................
## Completed E-Step (20 seconds).
## ................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 8 (approx. per word bound = -6.552, relative change = 1.098e-03)
## ................................................................................................
## Completed E-Step (20 seconds).
## ................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 9 (approx. per word bound = -6.546, relative change = 8.619e-04)
## ................................................................................................
## Completed E-Step (19 seconds).
## ................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 10 (approx. per word bound = -6.542, relative change = 6.538e-04)
## Topic 1: desanti, liberti, safelit, mutual, repair
##  Topic 2: jamal, michael, saudi, nikki, khashoggi
##  Topic 3: william, juan, dan, kimber, fake
##  Topic 4: corpus, christi, crosbi, arpaio, beaumont
##  Topic 5: budget, debt, fund, packag, ceil
##  Topic 6: comput, advisori, west-northwest, northwest, european
##  Topic 7: boss, maria, studi, rican, unsung
##  Topic 8: road, minut, blew, roadway, mattress
##  Topic 9: prevagen, brain, websit, healthier, incid
##  Topic 10: outag, restor, light, util, pole
##  Topic 11: built, code, sea, level, zoo
##  Topic 12: myrtl, wilmington, bank, hattera, nova
##  Topic 13: pictur, nasa, satellit, aerial, imageri
##  Topic 14: abaco, grand, freeport, bahama, jensen
##  Topic 15: chairman, crisi, manafort, journal, ballot
##  Topic 16: climat, chang, xfiniti, suburb, midwest
##  Topic 17: impeach, iowa, struggl, ferri, prefer
##  Topic 18: hunker, gas, heed, window, anxious
##  Topic 19: launch, weapon, plant, nuclear, stake
##  Topic 20: pleasur, appreci, thank, sir, luck
##  Topic 21: nurs, caribbean, haiti, maarten, dominican
##  Topic 22: pandem, zeta, hanna, barri, alphabet
##  Topic 23: poland, birmingham, sharpi, golf, contradict
##  Topic 24: tide, storm-forc, surg, biscayn, gust
##  Topic 25: unit, wound, auto, lexus, fascin
##  Topic 26: prevent, swirl, deep, beyond, gum
##  Topic 27: didnt, knew, afterward, explain, happen
##  Topic 28: croix, thoma, virgin, british, forgotten
##  Topic 29: york, hello, welcom, break, coverag
##  Topic 30: cool, will, right, well, get
## Aspect 1: dell, recommend, lean, deeper, leagu
##  Aspect 2: joy, besid, presenc, scale, paus
## ................................................................................................
## Completed E-Step (19 seconds).
## ................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 11 (approx. per word bound = -6.539, relative change = 4.809e-04)
```

```
## ..............................................................................
## Completed E-Step (19 seconds).
## ..............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 12 (approx. per word bound = -6.537, relative change = 3.626e-04)
## ..............................................................................
## Completed E-Step (19 seconds).
## ..............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 13 (approx. per word bound = -6.535, relative change = 2.871e-04)
## ..............................................................................
## Completed E-Step (18 seconds).
## ..............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 14 (approx. per word bound = -6.533, relative change = 2.124e-04)
## ..............................................................................
## Completed E-Step (19 seconds).
## ..............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 15 (approx. per word bound = -6.532, relative change = 1.549e-04)
## Topic 1: desanti, liberti, safelit, mutual, class
##  Topic 2: cohen, jamal, michael, saudi, nikki
##  Topic 3: william, juan, brian, prayer, dan
##  Topic 4: corpus, christi, crosbi, houston, beaumont
##  Topic 5: budget, dreamer, daca, debt, fund
##  Topic 6: comput, maximum, per, northwest, advisori
##  Topic 7: rico, puerto, maria, rican, boss
##  Topic 8: road, drive, minut, blew, mattress
##  Topic 9: prevagen, brain, websit, student, healthier
##  Topic 10: outag, without, restor, power, light
##  Topic 11: code, built, sea, level, zoo
##  Topic 12: myrtl, wilmington, hattera, cod, arthur
##  Topic 13: pictur, satellit, imageri, nasa, sky
##  Topic 14: abaco, grand, bahama, freeport, bahamian
##  Topic 15: manafort, chairman, committe, campaign, former
##  Topic 16: climat, xfiniti, chang, suburb, click
##  Topic 17: struggl, iowa, impeach, ferri, prefer
##  Topic 18: hunker, window, gas, heed, shutter
##  Topic 19: plant, korea, launch, plus, weapon
##  Topic 20: pleasur, appreci, champion, sam, thank
##  Topic 21: barbuda, caico, turk, nurs, caribbean
##  Topic 22: pandem, zeta, hanna, barri, cameron
##  Topic 23: poland, sharpi, birmingham, trip, contradict
##  Topic 24: surg, biscayn, tampa, feet, bay
##  Topic 25: unit, wound, auto, lexus, state
##  Topic 26: beyond, harm, chew, deep, prevent
##  Topic 27: didnt, knew, someth, anyth, afterward
##  Topic 28: croix, virgin, thoma, british, forgotten
##  Topic 29: york, welcom, hello, coverag, break
##  Topic 30: cool, will, right, get, back
## Aspect 1: leagu, dell, recommend, lean, spark
##  Aspect 2: besid, presenc, scale, paus, regardless
## ..............................................................................
## Completed E-Step (18 seconds).
```

```
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 16 (approx. per word bound = -6.532, relative change = 1.149e-04)
## ....................................................................................................
## Completed E-Step (18 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 17 (approx. per word bound = -6.531, relative change = 7.539e-05)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 18 (approx. per word bound = -6.531, relative change = 3.742e-05)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 19 (approx. per word bound = -6.531, relative change = 1.516e-05)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Model Converged
```
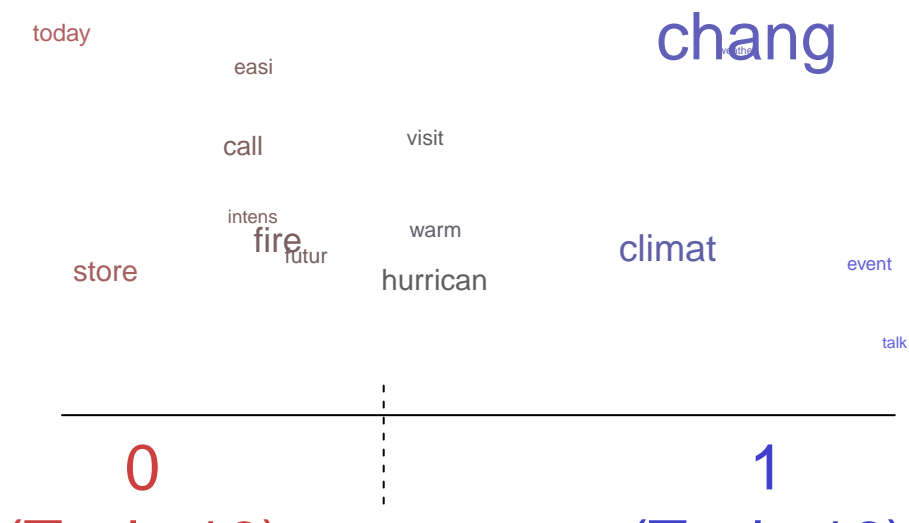
```
plot(hurricaneContent, type = "perspectives", topics = 16)
```

```
hurricaneContent <- stm(out$documents, out$vocab, K = 30,
                        prevalence =~ FOX + MSNBC + ARTHUR + BARRY + DELTA +
                        DORIAN + ETA + FLORENCE + HANNA + HARVEY + HERMINE +
                        IRMA + LAURA + MICHAEL + SALLY,
                        content =~ FOX, max.em.its = 75, data = out$meta,
                        init.type = "Spectral")
```

```
## Beginning Spectral Initialization
##    Calculating the gram matrix...
##    Finding anchor words...
##       ............................
##    Recovering initialization...
##       ...............................
## Initialization complete.
## ....................................................................................................
## Completed E-Step (26 seconds).
## ....................................................................................................
## Completed M-Step (19 seconds).
## Completing Iteration 1 (approx. per word bound = -6.809)
## ....................................................................................................
## Completed E-Step (28 seconds).
## ....................................................................................................
## Completed M-Step (19 seconds).
## Completing Iteration 2 (approx. per word bound = -6.681, relative change = 1.884e-02)
## ....................................................................................................
## Completed E-Step (27 seconds).
## ....................................................................................................
## Completed M-Step (19 seconds).
## Completing Iteration 3 (approx. per word bound = -6.619, relative change = 9.321e-03)
## ....................................................................................................
## Completed E-Step (24 seconds).
## ....................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 4 (approx. per word bound = -6.591, relative change = 4.201e-03)
## ....................................................................................................
## Completed E-Step (22 seconds).
## ....................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 5 (approx. per word bound = -6.575, relative change = 2.395e-03)
## Topic 1: liberti, mutual, couch, harri, safelit
##  Topic 2: michael, avenatti, unaccount, arabia, kavanaugh
##  Topic 3: william, lisa, juan, fewer, fake
##  Topic 4: chemic, galveston, beaumont, abbott, corpus
##  Topic 5: debt, reform, tax, ceil, bipartisanship
##  Topic 6: west-northwest, circul, advisori, intensif, rappaport
##  Topic 7: rican, puerto, rico, maria, towel
##  Topic 8: road, cap, moder, closur, minut
##  Topic 9: terrorist, brain, patienc, healthier, terror
##  Topic 10: light, shine, voluntari, visitor, util
##  Topic 11: save, anim, zoo, cruis, exercis
##  Topic 12: carolina, wrightsvill, myrtl, wilmington, morehead
##  Topic 13: pictur, newest, paint, lull, aerial
##  Topic 14: church, grand, abaco, bahama, forev
```

```
##   Topic 15: ballot, constitut, humanitarian, crisi, journal
##   Topic 16: xfiniti, awesom, burn, wildfir, climat
##   Topic 17: iowa, impeach, hampshir, ferri, trust
##   Topic 18: shutter, wire, collect, plywood, lauderdal
##   Topic 19: nuclear, missil, mount, korean, launch
##   Topic 20: luck, pleasur, appreci, sir, expertis
##   Topic 21: rampag, hollywood, maarten, turk, rubbl
##   Topic 22: delta, season, covid-, teddi, peak
##   Topic 23: penc, poland, confront, trip, vice
##   Topic 24: quadrant, dora, narrow, storm-forc, hurricane-forc
##   Topic 25: lexus, world, wound, dealer, auto
##   Topic 26: deep, gum, choic, prevent, chew
##   Topic 27: explain, spike, nois, didnt, knew
##   Topic 28: virgin, forgotten, british, croix, humira
##   Topic 29: hermin, hello, edit, mask, headquart
##   Topic 30: cool, one, get, hurrican, right
## Aspect 1: report, journey, presenc, access, julia
##   Aspect 2: jon, deck, veteran, commerci, leventh
## ......................................................................................................
## Completed E-Step (21 seconds).
## ......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 6 (approx. per word bound = -6.564, relative change = 1.695e-03)
## ......................................................................................................
## Completed E-Step (21 seconds).
## ......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 7 (approx. per word bound = -6.555, relative change = 1.335e-03)
## ......................................................................................................
## Completed E-Step (20 seconds).
## ......................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 8 (approx. per word bound = -6.549, relative change = 1.041e-03)
## ......................................................................................................
## Completed E-Step (20 seconds).
## ......................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 9 (approx. per word bound = -6.543, relative change = 8.053e-04)
## ......................................................................................................
## Completed E-Step (20 seconds).
## ......................................................................................................
## Completed M-Step (18 seconds).
## Completing Iteration 10 (approx. per word bound = -6.539, relative change = 6.110e-04)
## Topic 1: liberti, desanti, safelit, mutual, couch
##   Topic 2: panama, michael, avenatti, nikki, alleg
##   Topic 3: william, lisa, wreak, juan, fewer
##   Topic 4: galveston, abbott, houston, harvey, corpus
##   Topic 5: reform, debt, tax, agenda, ceil
##   Topic 6: advisori, west-northwest, maximum, center, cone
##   Topic 7: puerto, rico, maria, rican, studi
##   Topic 8: road, wash, minut, block, drive
##   Topic 9: terrorist, dog, terror, arrest, brain
##   Topic 10: mandatori, restor, light, shine, visitor
##   Topic 11: anim, ship, save, cruis, zoo
```

```
##   Topic 12: carolina, florenc, wrightsvill, myrtl, wilmington
##   Topic 13: video, imag, space, pictur, nasa
##   Topic 14: dorian, bahama, church, bahamian, grand
##   Topic 15: biden, clinton, homeland, elect, ballot
##   Topic 16: burn, simpl, control, awesom, wildfir
##   Topic 17: trust, labor, iowa, impeach, heartburn
##   Topic 18: lauderdal, shutter, decid, plywood, hunker
##   Topic 19: nuclear, bomb, missil, launch, korea
##   Topic 20: sir, luck, thank, appreci, pleasur
##   Topic 21: hollywood, caribbean, nurs, caico, maarten
##   Topic 22: delta, hanna, charl, season, greek
##   Topic 23: penc, camp, trip, vice, poland
##   Topic 24: biscayn, bay, quadrant, surg, gust
##   Topic 25: world, dealer, lexus, wound, auto
##   Topic 26: onlin, prevent, choic, deep, chew
##   Topic 27: didnt, ive, afterward, nois, explain
##   Topic 28: virgin, reiter, asset, british, croix
##   Topic 29: hermin, hello, headquart, edit, welcom
##   Topic 30: cool, one, just, right, will
## Aspect 1: journey, meat, presenc, familiar, report
##  Aspect 2: deck, lawn, commerci, mouth, anniversari
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 11 (approx. per word bound = -6.536, relative change = 4.663e-04)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 12 (approx. per word bound = -6.534, relative change = 3.496e-04)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 13 (approx. per word bound = -6.532, relative change = 2.446e-04)
## ....................................................................................................
## Completed E-Step (19 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 14 (approx. per word bound = -6.531, relative change = 1.583e-04)
## ....................................................................................................
## Completed E-Step (18 seconds).
## ....................................................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 15 (approx. per word bound = -6.531, relative change = 1.039e-04)
## Topic 1: liberti, desanti, safelit, mutual, harri
##  Topic 2: panama, michael, avenatti, apalachicola, nikki
##  Topic 3: william, wreak, lisa, chariti, juan
##  Topic 4: refineri, galveston, abbott, houston, harvey
##  Topic 5: reform, debt, agenda, tax, ceil
##  Topic 6: maximum, advisori, cone, west-northwest, mile
##  Topic 7: puerto, rico, maria, rican, studi
##  Topic 8: road, wash, block, drive, minut
```

```
##   Topic 9: terrorist, dog, social, facebook, terror
##   Topic 10: mandatori, order, evacu, restor, outag
##   Topic 11: anim, ship, save, helicopt, zoo
##   Topic 12: carolina, florenc, wrightsvill, myrtl, wilmington
##   Topic 13: video, space, imag, camera, pictur
##   Topic 14: dorian, bahama, minist, bahamian, abaco
##   Topic 15: biden, clinton, fbi, homeland, elect
##   Topic 16: burn, awesom, simpl, control, climat
##   Topic 17: labor, iowa, impeach, trust, heartburn
##   Topic 18: shutter, plywood, decid, sandbag, safe
##   Topic 19: nuclear, missil, bomb, site, korea
##   Topic 20: sir, luck, thank, appreci, pleasur
##   Topic 21: caribbean, hollywood, nurs, maarten, caico
##   Topic 22: delta, charl, hanna, covid-, season
##   Topic 23: penc, trip, camp, tweet, vice
##   Topic 24: quadrant, surg, biscayn, bay, tide
##   Topic 25: world, dealer, lexus, wound, auto
##   Topic 26: onlin, prevent, gum, choic, harm
##   Topic 27: ive, didnt, nois, afterward, anyth
##   Topic 28: virgin, personnel, reiter, british, croix
##   Topic 29: hermin, headquart, hello, edit, goodby
##   Topic 30: cool, will, back, one, right
## Aspect 1: journey, meat, vast, familiar, phase
##  Aspect 2: deck, commerci, mouth, anniversari, lean
## ...............................................................................
## Completed E-Step (19 seconds).
## ...............................................................................
## Completed M-Step (16 seconds).
## Completing Iteration 16 (approx. per word bound = -6.530, relative change = 7.488e-05)
## ...............................................................................
## Completed E-Step (19 seconds).
## ...............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 17 (approx. per word bound = -6.530, relative change = 5.466e-05)
## ...............................................................................
## Completed E-Step (19 seconds).
## ...............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 18 (approx. per word bound = -6.530, relative change = 4.009e-05)
## ...............................................................................
## Completed E-Step (19 seconds).
## ...............................................................................
## Completed M-Step (16 seconds).
## Completing Iteration 19 (approx. per word bound = -6.529, relative change = 3.672e-05)
## ...............................................................................
## Completed E-Step (19 seconds).
## ...............................................................................
## Completed M-Step (17 seconds).
## Completing Iteration 20 (approx. per word bound = -6.529, relative change = 3.151e-05)
## Topic 1: liberti, desanti, safelit, mutual, couch
##  Topic 2: panama, avenatti, michael, badda, nikki
##  Topic 3: william, wreak, lisa, chariti, havoc
##  Topic 4: refineri, galveston, abbott, houston, harvey
##  Topic 5: reform, debt, agenda, tax, ceil
```

```
##   Topic 6: maximum, advisori, cone, west-northwest, per
##   Topic 7: puerto, rico, maria, rican, fema
##   Topic 8: wash, road, block, car, apart
##   Topic 9: social, terrorist, dog, daughter, terror
##   Topic 10: mandatori, order, evacu, restor, outag
##   Topic 11: anim, ship, save, helicopt, rescu
##   Topic 12: wrightsvill, florenc, carolina, myrtl, wilmington
##   Topic 13: video, space, imag, camera, pictur
##   Topic 14: dorian, bahama, minist, odessa, prime
##   Topic 15: biden, clinton, homeland, obama, elect
##   Topic 16: burn, awesom, simpl, control, climat
##   Topic 17: labor, trust, impeach, heartburn, iowa
##   Topic 18: safe, shutter, plywood, ride, lauderdal
##   Topic 19: nuclear, missil, korea, site, launch
##   Topic 20: sir, luck, thank, appreci, join
##   Topic 21: caribbean, caico, hollywood, maarten, irma
##   Topic 22: delta, charl, hanna, barri, covid-
##   Topic 23: penc, trip, camp, tweet, vice
##   Topic 24: quadrant, surg, storm-forc, biscayn, wind
##   Topic 25: world, lexus, dealer, wound, auto
##   Topic 26: onlin, harm, deep, pro, prevent
##   Topic 27: ive, didnt, compar, nois, afterward
##   Topic 28: governor, virgin, scott, personnel, andrew
##   Topic 29: hermin, headquart, hello, edit, morn
##   Topic 30: cool, will, back, right, get
## Aspect 1: journey, meat, vast, inflict, familiar
##  Aspect 2: deck, commerci, blake, mouth, anniversari
## ................................................................................
## Completed E-Step (19 seconds).
## ................................................................................
## Completed M-Step (16 seconds).
## Completing Iteration 21 (approx. per word bound = -6.529, relative change = 2.496e-05)
## ................................................................................
## Completed E-Step (20 seconds).
## ................................................................................
## Completed M-Step (16 seconds).
## Completing Iteration 22 (approx. per word bound = -6.529, relative change = 1.268e-05)
## ................................................................................
## Completed E-Step (20 seconds).
## ................................................................................
## Completed M-Step (16 seconds).
## Model Converged
```

```r
plot(hurricaneContent, type = "perspectives", topics = 16)
```

increas

warm

futur

chang

fire hurrican

bigger

control

call

fact

visit
today

store
climat

blame

xfiniti

awesom
easi

0

1