```r
#install.packages("qdap")
#install.packages("qdapDictionaries")
#install.packages("trinker")
#install.packages("qdapRegex")
#install.packages("qdapTools")
#install.packages("Rgraphviz")
#install.packages("testmineR")
#install.packages("rowSums")
install.packages("Hmisc")

## Installing package into 'C:/Users/yiyuh/Documents/R/win-library/3.5'
## (as 'lib' is unspecified)

## also installing the dependency 'data.table'

## package 'data.table' successfully unpacked and MD5 sums checked
## package 'Hmisc' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\yiyuh\AppData\Local\Temp\Rtmp4Ak68t\downloaded_packages

library(qdapDictionaries)
library(dendextend)
library(qdapRegex)
#library(qdapTools)
library(mclust)
#library(qdap)
library(MASS)
library(stringr)
#install.packages("cmeans")
#library(cmeans)
library(tm)
library("textmineR")
library(ggplot2)
#library("Rgraphviz")
library(wordcloud)
#install.packages("labels_color")
#library("labels_color")
library("mclust")
#install.packages("devtools")
#install.packages("SnowballC")
#install.packages("github")
#install.packages("trinker")
library("devtools")
library(tm)
```

```
library(SnowballC)
library(RColorBrewer)
#install.packages("kmeans")
#library("kmeans")
library(cluster)
#install_github("hadley/devtools")
#install_github("qdapDictionaries", "trinker")
#install_github("qdapRegex", "trinker")
#install_github("qdapTools", "trinker")
#install_github("qdap", "trinker")


library("ggplot2")
library("gridExtra")
library(plyr)
library(Hmisc)


##
## Attaching package: 'Hmisc'


## The following object is masked from 'package:e1071':
##
##      impute


## The following objects are masked from 'package:plyr':
##
##      is.discrete, summarize


## The following objects are masked from 'package:base':
##
##      format.pval, units


library(ROCR)
library(gbm)
library(MASS)
library(e1071)
library(irlba)
library(Matrix)
library(rms)


## Loading required package: SparseM


##
## Attaching package: 'SparseM'
```

```
## The following object is masked from 'package:base':
##
##     backsolve

##
## Attaching package: 'rms'

## The following object is masked from 'package:qdapRegex':
##
##     validate

library(class)
library(factoextra)
library(NbClust)
library(magrittr)
library('fpc')
#library('Mclust')
library(ngram)
library(dendextend)
library(textmineR)
library(clue)

library("ggplot2")
library("gridExtra")
library(plyr)
#install.packages("ROCR")
library(ROCR)
#install.packages("gbm")
library(gbm)
library(MASS)
library(e1071)
#install.packages("irlba")
library(irlba)
library(Matrix)
#install.packages("rms")
library(rms)
library(class)
install.packages("sp")

## Installing package into 'C:/Users/yiyuh/Documents/R/win-library/3.5'
## (as 'lib' is unspecified)

## package 'sp' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##   C:\Users\yiyuh\AppData\Local\Temp\Rtmp4Ak68t\downloaded_packages
```

```r
library(sp)
#install.packages("factoextra")
library(factoextra)
#install.packages("NbClust")
library(NbClust)
library(magrittr)
library('fpc')
#install.packages("ngram")
library(ngram)
library(dendextend)
#install.packages("textmineR")
library(textmineR)
#install.packages("clue")
library(clue)


ASV<-read.csv("http://www.webpages.uidaho.edu/~stevel/Datasets/bible_asv.csv",header=TRUE,se

dim(ASV)
```

```
## [1] 31103     8
```

```r
attach(ASV)
```

```
## The following objects are masked _by_ .GlobalEnv:
##
##     Books, Sections, Testaments
```

```r
txt.b=c()
for (i in 1:66)
  {
  txt.b[i]=paste(text[Books==as.character(unique(Books)[i])],collapse = " ")
  }

ASV_Books=data.frame(Books=unique(Books),Testaments=as.factor(c(rep("OT",39),rep("NT",27))),
                     Sections=as.factor(c(rep("Law",5),rep("History",12),rep("Wisdom",5),rep
                     text=txt.b)

dim(ASV_Books)
```

```
## [1] 66  4
```

```r
attach(ASV)
```

```
## The following objects are masked _by_ .GlobalEnv:
##
##      Books, Sections, Testaments


## The following objects are masked from ASV (pos = 3):
##
##      Books, Chapters, field, Sections, Testaments, text, Verses, X


txt.b = c()
txt.b.wc = c()
for (i in 1:66)
    {
    txt.b[i] = paste(text[Books == as.character(unique(Books)[i])], collapse = " ")
    txt.b.wc[i] = sapply((txt.b[i]), length)
}


text.Chapter = c()
text.Chapter.wc = c()
for (i in 1:1189)
    {
    text.Chapter[i] = paste(text[Chapters == as.character(unique(Chapters)[i])], collapse =
    text.Chapter.wc[i] = sapply((text.Chapter[i]), length)
}

Books = c()
for (i in unique(ASV$Books))
    {
    kend = length(unique(ASV[ASV$Books == i, ]$Chapters))
    print (i)
    print (kend)
    Books = c(Books, rep(i, kend))
}


## [1] "gen"
## [1] 50
## [1] "exod"
## [1] 40
## [1] "lev"
## [1] 27
## [1] "num"
## [1] 36
## [1] "deut"
## [1] 34
## [1] "josh"
```

```
## [1] 24
## [1] "judg"
## [1] 21
## [1] "ruth"
## [1] 4
## [1] "1sam"
## [1] 31
## [1] "2sam"
## [1] 24
## [1] "1kgs"
## [1] 22
## [1] "2kgs"
## [1] 25
## [1] "1chro"
## [1] 29
## [1] "2chro"
## [1] 36
## [1] "ezra"
## [1] 10
## [1] "neh"
## [1] 13
## [1] "esth"
## [1] 10
## [1] "job"
## [1] 42
## [1] "psa"
## [1] 150
## [1] "prov"
## [1] 31
## [1] "ecc"
## [1] 12
## [1] "song"
## [1] 8
## [1] "isa"
## [1] 66
## [1] "jer"
## [1] 52
## [1] "lam"
## [1] 5
## [1] "ezek"
## [1] 48
## [1] "dan"
## [1] 12
## [1] "hosea"
## [1] 14
## [1] "joel"
```

```
## [1] 3
## [1] "amos"
## [1] 9
## [1] "obad"
## [1] 1
## [1] "jonah"
## [1] 4
## [1] "micah"
## [1] 7
## [1] "nahum"
## [1] 3
## [1] "hab"
## [1] 3
## [1] "zeph"
## [1] 3
## [1] "hag"
## [1] 2
## [1] "zech"
## [1] 14
## [1] "mal"
## [1] 4
## [1] "matt"
## [1] 28
## [1] "mark"
## [1] 16
## [1] "luke"
## [1] 24
## [1] "john"
## [1] 21
## [1] "acts"
## [1] 28
## [1] "rom"
## [1] 16
## [1] "1cor"
## [1] 16
## [1] "2cor"
## [1] 13
## [1] "gal"
## [1] 6
## [1] "eph"
## [1] 6
## [1] "phil"
## [1] 4
## [1] "col"
## [1] 4
## [1] "1thes"
```

```
## [1] 5
## [1] "2thes"
## [1] 3
## [1] "1tim"
## [1] 6
## [1] "2tim"
## [1] 4
## [1] "tit"
## [1] 3
## [1] "phile"
## [1] 1
## [1] "heb"
## [1] 13
## [1] "jas"
## [1] 5
## [1] "1pet"
## [1] 5
## [1] "2pet"
## [1] 3
## [1] "1john"
## [1] 5
## [1] "2john"
## [1] 1
## [1] "3john"
## [1] 1
## [1] "jude"
## [1] 1
## [1] "rev"
## [1] 22
```

```r
ASV_Books = data.frame(Testaments = c(rep('OT', 39), rep('NT', 27)),
                       Sections = c(rep('Law', 5), rep('History', 12), rep('Wisdom', 5), rep
                       Books = unique(Books), text = txt.b,
                       wordcount = txt.b.wc)
Testaments = c(rep('OT', 39), rep('NT', 27))
Sections = c(rep('Law', 5), rep('History', 12), rep('Wisdom', 5), rep('Prophets', 17), rep('

docs <- Corpus(VectorSource(ASV_Books$text))
summary(docs)
```

```
##    Length Class             Mode
## 1  2      PlainTextDocument list
## 2  2      PlainTextDocument list
## 3  2      PlainTextDocument list
## 4  2      PlainTextDocument list
```

```
## 5  2        PlainTextDocument list
## 6  2        PlainTextDocument list
## 7  2        PlainTextDocument list
## 8  2        PlainTextDocument list
## 9  2        PlainTextDocument list
## 10 2        PlainTextDocument list
## 11 2        PlainTextDocument list
## 12 2        PlainTextDocument list
## 13 2        PlainTextDocument list
## 14 2        PlainTextDocument list
## 15 2        PlainTextDocument list
## 16 2        PlainTextDocument list
## 17 2        PlainTextDocument list
## 18 2        PlainTextDocument list
## 19 2        PlainTextDocument list
## 20 2        PlainTextDocument list
## 21 2        PlainTextDocument list
## 22 2        PlainTextDocument list
## 23 2        PlainTextDocument list
## 24 2        PlainTextDocument list
## 25 2        PlainTextDocument list
## 26 2        PlainTextDocument list
## 27 2        PlainTextDocument list
## 28 2        PlainTextDocument list
## 29 2        PlainTextDocument list
## 30 2        PlainTextDocument list
## 31 2        PlainTextDocument list
## 32 2        PlainTextDocument list
## 33 2        PlainTextDocument list
## 34 2        PlainTextDocument list
## 35 2        PlainTextDocument list
## 36 2        PlainTextDocument list
## 37 2        PlainTextDocument list
## 38 2        PlainTextDocument list
## 39 2        PlainTextDocument list
## 40 2        PlainTextDocument list
## 41 2        PlainTextDocument list
## 42 2        PlainTextDocument list
## 43 2        PlainTextDocument list
## 44 2        PlainTextDocument list
## 45 2        PlainTextDocument list
## 46 2        PlainTextDocument list
## 47 2        PlainTextDocument list
## 48 2        PlainTextDocument list
## 49 2        PlainTextDocument list
## 50 2        PlainTextDocument list
```

```
## 51 2        PlainTextDocument list
## 52 2        PlainTextDocument list
## 53 2        PlainTextDocument list
## 54 2        PlainTextDocument list
## 55 2        PlainTextDocument list
## 56 2        PlainTextDocument list
## 57 2        PlainTextDocument list
## 58 2        PlainTextDocument list
## 59 2        PlainTextDocument list
## 60 2        PlainTextDocument list
## 61 2        PlainTextDocument list
## 62 2        PlainTextDocument list
## 63 2        PlainTextDocument list
## 64 2        PlainTextDocument list
## 65 2        PlainTextDocument list
## 66 2        PlainTextDocument list
```

```
stopwords("english")
```

```
##    [1] "i"          "me"         "my"         "myself"     "we"
##    [6] "our"        "ours"       "ourselves"  "you"        "your"
##   [11] "yours"      "yourself"   "yourselves" "he"         "him"
##   [16] "his"        "himself"    "she"        "her"        "hers"
##   [21] "herself"    "it"         "its"        "itself"     "they"
##   [26] "them"       "their"      "theirs"     "themselves" "what"
##   [31] "which"      "who"        "whom"       "this"       "that"
##   [36] "these"      "those"      "am"         "is"         "are"
##   [41] "was"        "were"       "be"         "been"       "being"
##   [46] "have"       "has"        "had"        "having"     "do"
##   [51] "does"       "did"        "doing"      "would"      "should"
##   [56] "could"      "ought"      "i'm"        "you're"     "he's"
##   [61] "she's"      "it's"       "we're"      "they're"    "i've"
##   [66] "you've"     "we've"      "they've"    "i'd"        "you'd"
##   [71] "he'd"       "she'd"      "we'd"       "they'd"     "i'll"
##   [76] "you'll"     "he'll"      "she'll"     "we'll"      "they'll"
##   [81] "isn't"      "aren't"     "wasn't"     "weren't"    "hasn't"
##   [86] "haven't"    "hadn't"     "doesn't"    "don't"      "didn't"
##   [91] "won't"      "wouldn't"   "shan't"     "shouldn't"  "can't"
##   [96] "cannot"     "couldn't"   "mustn't"    "let's"      "that's"
##  [101] "who's"      "what's"     "here's"     "there's"    "when's"
##  [106] "where's"    "why's"      "how's"      "a"          "an"
##  [111] "the"        "and"        "but"        "if"         "or"
##  [116] "because"    "as"         "until"      "while"      "of"
##  [121] "at"         "by"         "for"        "with"       "about"
##  [126] "against"    "between"    "into"       "through"    "during"
```

```
## [131] "before"      "after"        "above"        "below"        "to"
## [136] "from"         "up"           "down"         "in"           "out"
## [141] "on"           "off"          "over"         "under"        "again"
## [146] "further"      "then"         "once"         "here"         "there"
## [151] "when"         "where"        "why"          "how"          "all"
## [156] "any"          "both"         "each"         "few"          "more"
## [161] "most"         "other"        "some"         "such"         "no"
## [166] "nor"          "not"          "only"         "own"          "same"
## [171] "so"           "than"         "too"          "very"
```

```
myCorpus <- Corpus(VectorSource(ASV_Books$text))
mystopwords <- c(stopwords('english'), "and", "unto", "shall")
myCorpus <- tm_map(myCorpus, removeWords, mystopwords)
```

```
## Warning in tm_map.SimpleCorpus(myCorpus, removeWords, mystopwords):
## transformation drops documents
```

```
tdm <- TermDocumentMatrix(myCorpus, control = list(wordLengths = c(1, Inf)))
freq.terms <- findFreqTerms(tdm, lowfreq = 15)
term.freq <- rowSums(as.matrix(tdm))
term.freq <- subset(term.freq, term.freq >= 15)
df <- data.frame(term = names(term.freq), freq = term.freq)
dim(df)
```

```
## [1] 2799      2
```

```
ggplot(df[1:10, 1:2], aes(x = term, y = freq)) + geom_bar(stat = "identity") + xlab("Terms")
```
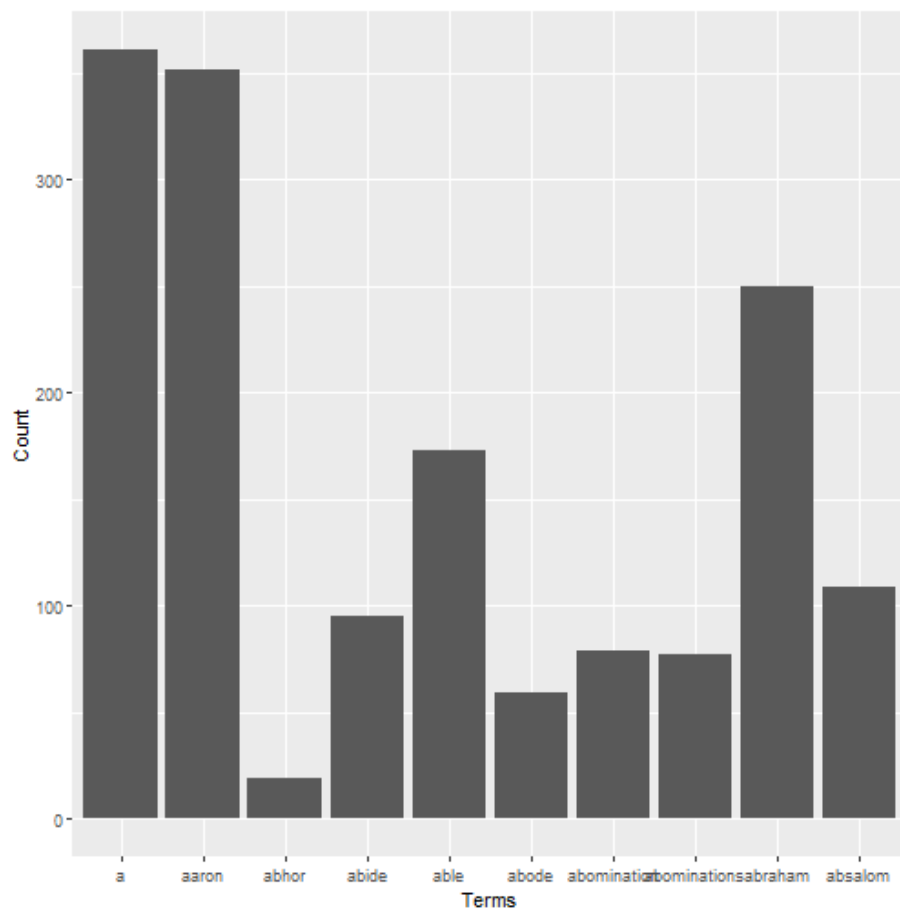
```
docs <- tm_map(docs, removeWords, mystopwords)
```

```
## Warning in tm_map.SimpleCorpus(docs, removeWords, mystopwords):
## transformation drops documents
```

```
dtm <- TermDocumentMatrix(docs)
m <- as.matrix(dtm)
v <- sort(rowSums(m),decreasing=TRUE)
d <- data.frame(word = names(v),frequency=v)
head(d, 15)
```

```
##              word frequency
## and           and     13707
## jehovah   jehovah      6888
## thou         thou      5513
```

```
## thy        thy     4956
## will       will    4117
## god        god     4112
## said       said    3910
## thee       thee    3844
## upon       upon    2777
## man        man     2670
## israel   israel    2582
## king       king    2551
## son        son     2382
## hath       hath    2322
## one        one     2147
```

```
wordcloud(words = d$word, freq = d$freq, min.freq = 1,
        max.words=200, random.order=FALSE, rot.per=0.35,
        colors=brewer.pal(8, "Dark2"))
```
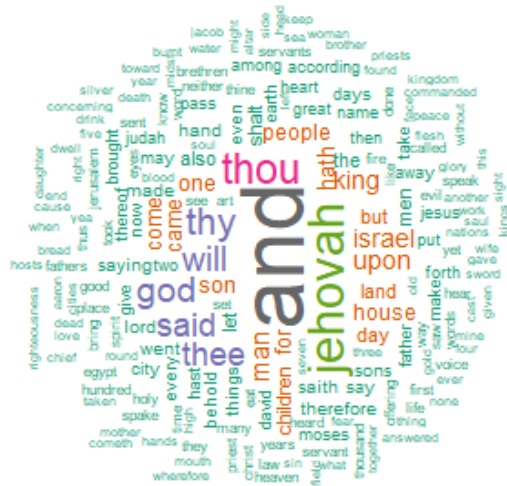
```
findFreqTerms(dtm, lowfreq = 4)
```

```
##     [1] "aaron"         "abarim"        "abhor"          "abhorred"
##     [5] "abidan"        "abide"         "abiding"        "abiezer"
##     [9] "ability"       "able"          "abode"          "abomination"
##    [13] "abominations"  "abraham"       "absalom"        "abstain"
##    [17] "abundance"     "abundant"      "acacia"         "accept"
##    [21] "acceptable"    "accomplish"    "accomplished"   "accord"
##    [25] "according"     "accursed"      "achan"          "achzib"
##    [29] "acquaintance"  "acts"          "adam"           "add"
##    [33] "addeth"        "admonition"    "adullam"        "adultery"
##    [37] "adversaries"   "afar"          "afflicted"      "affliction"
##    [41] "affrighted"    "afraid"        "after"          "afterward"
##    [45] "again"         "against"       "age"            "ages"
##    [49] "agree"         "agreed"        "ahab"           "ahaziah"
##    [53] "ahiezer"       "ahijah"        "ahohite"        "aileth"
##    [57] "air"           "alarm"         "alas"           "alive"
##    [61] "all"           "almighty"      "alone"          "aloud"
##    [65] "already"       "also"          "altar"          "altars"
##    [69] "alter"         "although"      "amasai"         "amazed"
##    [73] "ambassadors"   "ammihud"       "amminadab"      "ammishaddai"
##    [77] "ammonite"      "amnon"         "amon"           "among"
##    [81] "amorites"      "amoz"          "anathoth"       "anathothite"
##    [85] "ancient"       "and"           "angel"          "angels"
##    [89] "anger"         "anguish"       "anoint"         "anointed"
##    [93] "anointing"     "another"       "answer"         "answered"
##    [97] "antioch"       "apart"         "apostle"        "apostles"
##   [101] "apostleship"   "apparel"       "appear"         "appoint"
##   [105] "appointed"     "arad"          "ararat"         "are"
##   [109] "aright"        "arise"         "ark"            "arm"
##   [113] "armed"         "armor"         "armorbearer"    "arms"
##   [117] "army"          "arose"         "arpad"          "array"
##   [121] "arrayed"       "arrows"        "art"            "asa"
##   [125] "ascend"        "ascent"        "ascribe"        "ashamed"
##   [129] "asher"         "asherim"       "ashes"          "aside"
##   [133] "ask"           "asked"         "askest"         "asking"
##   [137] "ass"           "assemble"      "assembled"      "assembly"
##   [141] "assured"       "assuredly"     "assyria"        "assyrian"
##   [145] "astonished"    "astonishment"  "athirst"        "atonement"
##   [149] "attai"         "attain"        "aught"          "augury"
##   [153] "authority"     "aven"          "avenged"        "avenger"
##   [157] "away"          "awoke"         "axe"            "azarel"
##   [161] "azmaveth"      "azubah"        "baal"           "baalim"
##   [165] "baanah"        "babe"          "babylon"        "back"
##   [169] "backs"         "backsliding"   "backslidings"   "bad"
##   [173] "bade"          "baggage"       "bake"           "baked"
```

```
## [177] "baker"      "balance"    "bald"         "baldness"
## [181] "balm"       "band"       "banks"        "baptism"
## [185] "baptized"   "bar"        "bare"         "barley"
## [189] "barnabas"   "bars"       "base"         "basket"
## [193] "baskets"    "battle"     "bear"         "bearer"
## [197] "bearing"    "beast"      "beasts"       "beat"
## [201] "beating"    "beauty"     "became"       "because"
## [205] "become"     "becometh"   "bed"          "beds"
## [209] "before"     "began"      "beginning"    "begotten"
## [213] "beguiled"   "behave"     "beheld"       "behind"
## [217] "behold"     "being"      "believe"      "believed"
## [221] "belongeth"  "belonging"  "beloved"      "benaiah"
## [225] "bend"       "bene"       "benefit"      "benjamin"
## [229] "beseech"    "beside"     "besought"     "beth"
## [233] "bethlehem"  "betray"     "betrothed"    "betwixt"
## [237] "beyond"     "bezalel"    "bid"          "bind"
## [241] "bird"       "birds"      "bishop"       "bite"
## [245] "bitter"     "bitterly"   "bitterness"   "black"
## [249] "blameless"  "blaspheme"  "blasphemies"  "blast"
## [253] "blasted"    "blemish"    "bless"        "blessed"
## [257] "blessing"   "blessings"  "blew"         "blind"
## [261] "blood"      "blow"       "blowing"      "boast"
## [265] "boaz"       "bodily"     "body"         "boldness"
## [269] "bond"       "bondage"    "bonds"        "bone"
## [273] "bones"      "book"       "border"       "born"
## [277] "borne"      "bottom"     "boughs"       "bought"
## [281] "bound"      "bounds"     "bow"          "bowed"
## [285] "bowels"     "bowl"       "bowls"        "bows"
## [289] "boy"        "bozrah"     "brake"        "branch"
## [293] "branches"   "brass"      "bread"        "breadth"
## [297] "break"      "breaketh"   "breast"       "breasts"
## [301] "breath"     "breathed"   "brethren"     "bribes"
## [305] "bricks"     "briers"     "bright"       "brimstone"
## [309] "bring"      "bringeth"   "brink"        "broad"
## [313] "broken"     "brooks"     "brother"      "brought"
## [317] "brutish"    "buckler"    "buffet"       "build"
## [321] "builded"    "buildeth"   "built"        "burden"
## [325] "buried"     "burn"       "burned"       "burneth"
## [329] "burning"    "burnt"      "burst"        "burying"
## [333] "business"   "but"        "butler"       "buy"
## [337] "caesar"     "caesarea"   "cakes"        "caldron"
## [341] "calf"       "call"       "called"       "came"
## [345] "camel"      "camp"       "can"          "cana"
## [349] "canaan"     "canaanite"  "canaanites"   "candlestick"
## [353] "canker"     "canst"      "capernaum"    "captain"
## [357] "captains"   "captivity"  "care"         "careth"
```

```
##   [361] "carmelite"     "carmi"         "carnal"        "carried"
##   [365] "carry"         "case"          "cast"          "cattle"
##   [369] "cause"         "caused"        "causeth"       "cease"
##   [373] "ceased"        "cedars"        "cephas"        "certain"
##   [377] "chain"         "chains"        "chaldea"       "chaldeans"
##   [381] "chamber"       "chamberlain"   "change"        "changed"
##   [385] "changes"       "charge"        "charged"       "charges"
##   [389] "chariot"       "chariots"      "chased"        "cheek"
##   [393] "cherubim"      "chief"         "child"         "children"
##   [397] "choice"        "chose"         "chosen"        "christ"
##   [401] "chronicles"    "church"        "cinnamon"      "circumcise"
##   [405] "cities"        "city"          "clap"          "clave"
##   [409] "clay"          "clean"         "cleanse"       "cleaveth"
##   [413] "climb"         "close"         "clothed"       "clothes"
##   [417] "cloud"         "clouds"        "clusters"      "coal"
##   [421] "coat"          "colors"        "colt"          "come"
##   [425] "cometh"        "comfort"       "comforted"     "coming"
##   [429] "command"       "commanded"     "commanding"    "commandment"
##   [433] "commandments"  "commit"        "committed"     "communion"
##   [437] "companies"     "companions"    "company"       "compass"
##   [441] "compassed"     "compasseth"    "compassion"    "complaint"
##   [445] "conceived"     "concerning"    "condemn"       "condemnation"
##   [449] "condemned"     "confident"     "confidently"   "confounded"
##   [453] "confusion"     "congregation"  "conscience"    "consider"
##   [457] "considered"    "consolation"   "conspired"     "consume"
##   [461] "consumed"      "content"       "contentious"   "continual"
##   [465] "continually"   "continue"      "continued"     "continueth"
##   [469] "control"       "controversy"   "corner"        "cornet"
##   [473] "correction"    "corruptible"   "corruption"    "costly"
##   [477] "counsel"       "counsellor"    "count"         "country"
##   [481] "couple"        "courage"       "courageous"    "course"
##   [485] "courts"        "covenant"      "cover"         "covered"
##   [489] "covereth"      "covert"        "covet"         "covetousness"
##   [493] "created"       "creature"      "creatures"     "creep"
##   [497] "creepeth"      "creeping"      "cried"         "crown"
##   [501] "crucify"       "cruel"         "crushed"       "cry"
##   [505] "crying"        "cubit"         "cubits"        "cup"
##   [509] "cursed"        "curtains"      "cush"          "custom"
##   [513] "cut"           "cutting"       "cyprus"        "cyrene"
##   [517] "damascus"      "damsel"        "dan"           "dark"
##   [521] "darkness"      "daughter"      "daughters"     "david"
##   [525] "dawning"       "day"           "days"          "deacons"
##   [529] "dead"          "deaf"          "deal"          "dealings"
##   [533] "dealt"         "death"         "deceitful"     "deceive"
##   [537] "deceived"      "deceiveth"     "decide"        "declare"
##   [541] "declared"      "declareth"     "decree"        "dedan"
```

```
##   [545] "deeds"       "deep"        "deeper"       "defence"
##   [549] "defile"      "defiled"     "delight"      "deliver"
##   [553] "delivered"   "delivereth"  "demons"       "denied"
##   [557] "depart"      "departed"    "depths"       "deputies"
##   [561] "descent"     "desert"      "deserts"      "desire"
##   [565] "desireth"    "desolate"    "desolation"   "despise"
##   [569] "destroy"     "destroyed"   "destroyer"    "destroyers"
##   [573] "destroyest"  "destroyeth"  "destroying"   "destruction"
##   [577] "determined"  "detestable"  "device"       "devil"
##   [581] "devise"      "devised"     "deviseth"     "devoted"
##   [585] "devour"      "devoured"    "devoureth"    "devout"
##   [589] "dew"         "dibon"       "didst"        "die"
##   [593] "died"        "dieth"       "diligent"     "diligently"
##   [597] "dip"         "direct"      "discernment"  "disciples"
##   [601] "displeased"  "disquieted"  "distress"     "distresses"
##   [605] "divers"      "divide"      "divided"      "divine"
##   [609] "diviners"    "doctrine"    "doctrines"    "doer"
##   [613] "doers"       "doeth"       "dogs"         "doings"
##   [617] "dominion"    "done"        "door"         "dost"
##   [621] "doth"        "double"      "dough"        "dragon"
##   [625] "drank"       "draw"        "drawn"        "dream"
##   [629] "dreamed"     "dreams"      "dress"        "drew"
##   [633] "dried"       "drink"       "drinketh"     "drinking"
##   [637] "driven"      "drunk"       "drunken"      "dry"
##   [641] "due"         "dungeon"     "dust"         "dwell"
##   [645] "dwellest"    "dwelleth"    "dwelling"     "dwelt"
##   [649] "eagle"       "eagles"      "ear"          "early"
##   [653] "ears"        "earth"       "earthquake"   "easier"
##   [657] "east"        "eastward"    "eat"          "eaten"
##   [661] "eateth"      "eating"      "eden"         "edge"
##   [665] "edom"        "eggs"        "egypt"        "egyptians"
##   [669] "eight"       "eighth"      "ekron"        "elder"
##   [673] "elders"      "eleventh"    "eliab"        "eliel"
##   [677] "elihu"       "elijah"      "elim"         "elimelech"
##   [681] "elisha"      "elishama"    "elizur"       "elkanah"
##   [685] "empty"       "encamp"      "encamped"     "enchantments"
##   [689] "end"         "ended"       "ends"         "endure"
##   [693] "enemies"     "enemy"       "enjoy"        "enlarge"
##   [697] "enlarged"    "enrolled"    "ensample"     "enter"
##   [701] "entered"     "entrance"    "entreat"      "entreated"
##   [705] "ephah"       "ephraim"     "ephrathah"    "equal"
##   [709] "equity"      "ere"         "err"          "erreth"
##   [713] "escape"      "escaped"     "establish"    "established"
##   [717] "estimation"  "eternal"     "etham"        "euphrates"
##   [721] "eve"         "even"        "evening"      "ever"
##   [725] "everlasting" "evermore"    "every"        "everything"
```

```
##   [729] "evil"          "exalt"         "exalted"       "examine"
##   [733] "examined"      "example"       "exceeding"     "exceedingly"
##   [737] "except"        "execute"       "executed"      "exercise"
##   [741] "exhort"        "exhortation"   "expectation"   "exult"
##   [745] "eye"           "eyes"          "ezer"          "ezion"
##   [749] "fables"        "face"          "faces"         "fail"
##   [753] "failed"        "faint"         "fainted"       "fainteth"
##   [757] "fair"          "faith"         "faithful"      "faithfulness"
##   [761] "fall"          "fallen"        "falling"       "false"
##   [765] "falsehood"     "falsely"       "fame"          "familiar"
##   [769] "families"      "family"        "famine"        "famous"
##   [773] "far"           "fashioned"     "fast"          "fasted"
##   [777] "fastened"      "fastings"      "fat"           "father"
##   [781] "fatherless"    "fathers"       "fatness"       "favor"
##   [785] "favored"       "fear"          "feared"        "feast"
##   [789] "fed"           "feed"          "feedeth"       "feet"
##   [793] "feigned"       "fell"          "female"        "fetch"
##   [797] "fetched"       "fetters"       "field"         "fields"
##   [801] "fierce"        "fifteen"       "fifteenth"     "fifth"
##   [805] "fifties"       "fifty"         "fig"           "fight"
##   [809] "fill"          "filled"        "filthy"        "find"
##   [813] "fine"          "finished"      "fire"          "firm"
##   [817] "firmament"     "first"         "firstborn"     "firstfruits"
##   [821] "firstling"     "fish"          "fishes"        "five"
##   [825] "flame"         "flames"        "flat"          "fled"
##   [829] "flee"          "fleeth"        "flesh"         "fleshed"
##   [833] "flight"        "flock"         "flocks"        "floods"
##   [837] "floor"         "flow"          "flowing"       "fly"
##   [841] "flying"        "foes"          "folds"         "follow"
##   [845] "followed"      "followeth"     "following"     "folly"
##   [849] "food"          "fool"          "foolish"       "fools"
##   [853] "foot"          "footstool"     "for"           "forasmuch"
##   [857] "forbear"       "forbidding"    "force"         "forced"
##   [861] "forehead"      "foreheads"     "foreign"       "foreigner"
##   [865] "foreskins"     "forest"        "forgat"        "forget"
##   [869] "forgive"       "forgotten"     "formed"        "former"
##   [873] "fornication"   "forsake"       "forsaken"      "forsaketh"
##   [877] "forth"         "fortieth"      "fortified"     "forty"
##   [881] "found"         "foundation"    "foundations"   "fountain"
##   [885] "fountains"     "four"          "fourscore"     "foursquare"
##   [889] "fourth"        "framed"        "frankincense"  "free"
##   [893] "freely"        "friend"        "fro"           "front"
##   [897] "fruit"         "fruitful"      "fuel"          "fugitive"
##   [901] "fulfilled"     "full"          "fully"         "fulness"
##   [905] "furlongs"      "furniture"     "gaash"         "gad"
##   [909] "gadites"       "gain"          "galilaeans"    "galilee"
```

```
##    [913] "gamaliel"      "garden"        "garment"       "garments"
##    [917] "gat"           "gate"          "gates"         "gath"
##    [921] "gather"        "gathered"      "gathereth"     "gathering"
##    [925] "gave"          "geba"          "geber"         "gedor"
##    [929] "generation"    "generations"   "gentiles"      "gentle"
##    [933] "gerahs"        "geshur"        "get"           "ghost"
##    [937] "gibeah"        "gideoni"       "gift"          "gifts"
##    [941] "gihon"         "gilead"        "gilgal"        "gird"
##    [945] "girdle"        "girdles"       "girt"          "give"
##    [949] "given"         "giveth"        "giving"        "glad"
##    [953] "gladness"      "glass"         "glean"         "gleaned"
##    [957] "glorify"       "glorifying"    "glory"         "goats"
##    [961] "god"           "godliness"     "gods"          "goest"
##    [965] "goeth"         "gog"           "going"         "goings"
##    [969] "gold"          "golden"        "goldsmith"     "gomer"
##    [973] "gone"          "good"          "goodly"        "goodness"
##    [977] "goods"         "gospel"        "gotten"        "governor"
##    [981] "governors"     "grace"         "grain"         "grant"
##    [985] "granted"       "grapes"        "grass"         "grave"
##    [989] "graven"        "graves"        "great"         "greater"
##    [993] "greatest"      "greatly"       "greedy"        "green"
##    [997] "grew"          "grieved"       "grievous"      "ground"
##    [ reached getOption("max.print") -- omitted 4941 entries ]

findAssocs(dtm, terms = "freedom", corlimit = 0.3)

## $freedom
##         gavest          bases      decapolis        keepest          roast
##           0.89           0.87           0.87           0.87           0.85
##         rebekah    circumcision    provocations        capital        ascents
##           0.85           0.84           0.84           0.83           0.83
##            fins          lavers         lintel           brim       manifold
##           0.83           0.83           0.83           0.81           0.79
##          attent            bat      compassing     conditions      cormorant
##           0.79           0.79           0.79           0.79           0.79
##         envying        excusing         fatted           gier           goad
##           0.79           0.79           0.79           0.79           0.79
##          graved        gravings        hearers          heron         hoopoe
##           0.79           0.79           0.79           0.79           0.79
##          horned            kite         madman           mede       networks
##           0.79           0.79           0.79           0.79           0.79
##          ospray     overwhelming     persuasion        topmost          twigs
##           0.79           0.79           0.79           0.79           0.79
##        visiteth         vulture         wraths        kolaiah     revellings
##           0.79           0.79           0.79           0.79           0.79
```

```
##      shamgar          wick           yon       network       damsels
##         0.79          0.79          0.79          0.77          0.76
##         folk    whatsoever      capitals           122           123
##         0.76          0.75          0.75          0.75          0.75
##          124           125           126          ants     approvest
##         0.75          0.75          0.75          0.75          0.75
##      askance         axles     axletrees       baptizer         bunch
##         0.75          0.75          0.75          0.75          0.75
##    chameleon      churning       clappeth       compact     consulter
##         0.75          0.75          0.75          0.75          0.75
##      convert     converteth      corrector       cricket         cries
##         0.75          0.75          0.75          0.75          0.75
##    crocodile        cruelly    deliverances     desiredst      detained
##         0.75          0.75          0.75          0.75          0.75
##         dimly        dipping    discontented    dishonorest      distaff
##         0.75          0.75          0.75          0.75          0.75
##        duties         edges       effected      effectest      enmities
##         0.75          0.75          0.75          0.75          0.75
##      envyings      equitable      evildoer        exactor       felloes
##         0.75          0.75          0.75          0.75          0.75
##     fetcheth        forcing       forewarn     forsookest      foundest
##         0.75          0.75          0.75          0.75          0.75
##        fraud         gecko      greyhound          haft        harhas
##         0.75          0.75          0.75          0.75          0.75
##        helve        hereth         husks     idolatrous     jealousies
##         0.75          0.75          0.75          0.75          0.75
##       jedidah      lanterns      lappidoth        ledges       leftest
##         0.75          0.75          0.75          0.75          0.75
##      leisure        lemuel        lizard         locked       lusteth
##         0.75          0.75          0.75          0.75          0.75
##      malchus      mightiest         mowed    multipliedst         naves
##         0.75          0.75          0.75          0.75          0.75
##   necromancer    nehelamite      paleness      patrimony          paws
##         0.75          0.75          0.75          0.75          0.75
##   peacemakers       pedestal       planets     practiseth      preachest
##         0.75          0.75          0.75          0.75          0.75
##      quarries       reasons       refusest      resolved        restest
##         0.75          0.75          0.75          0.75          0.75
##       richer       riotous     rishathaim        rusted         scalp
##         0.75          0.75          0.75          0.75          0.75
##     scrabbled        seamew         seirah       severed      shackles
##         0.75          0.75          0.75          0.75          0.75
##      shedder    slanderously      slewest       snoweth       spindle
##         0.75          0.75          0.75          0.75          0.75
##        spokes     subduedst     succeedest       swelled        tadmor
##         0.75          0.75          0.75          0.75          0.75
```

```
##   testifiedst   undersetters      unsettle     unweighed  vainglorious
##          0.75           0.75          0.75          0.75          0.75
##     vauntings        waitest       wasting        weasel    whereabout
##          0.75           0.75          0.75          0.75          0.75
##   withheldest        wreaths       wringing        pillar    broughtest
##          0.75           0.75          0.75          0.74          0.74
##       withdrew      rebellion      resorted          rows        panels
##          0.74           0.74          0.74          0.74          0.74
##     carpenter           hawk    perpetually presumptuously       resist
##          0.74           0.74          0.74          0.74          0.74
##          ehud            owl        cushan uncircumcision          lost
##          0.74           0.73          0.73          0.73          0.72
##        winged        shovels    stewardship         fours        augury
##          0.72           0.72          0.71          0.71          0.70
##       passions    transgressor      leavened       proverb      suffering
##          0.70           0.70          0.70          0.70          0.70
##        greece          anath         blade      goodness          flax
##          0.70           0.70          0.70          0.69          0.69
##        dathan          realm        censer           mad        abiram
##          0.69           0.69          0.69          0.68          0.68
##       carcass        unclean           lad      possessed          lily
##          0.68           0.67          0.67          0.67          0.67
##    abomination          isles           she         march       calleth
##          0.66           0.66          0.66          0.66          0.66
##        scales          basin   clovenfooted       availeth     contained
##          0.66           0.66          0.66          0.66          0.66
##        stately       withdrawn      security     delicately        useth
##          0.66           0.65          0.65          0.65          0.65
##      incurable      sheepfolds      scoffing          levy        retain
##          0.65           0.65          0.65          0.65          0.65
##        murmur        caiaphas    communicate      factions       mercies
##          0.64           0.64          0.64          0.64          0.64
##       officers        roasted       shaphan     dispersion       wronged
##          0.64           0.64          0.64          0.64          0.64
##        errand           sela        falcon    unspeakable        bushel
##          0.64           0.64          0.64          0.64          0.64
##        bewail         govern       ostrich        pitcher        salted
##          0.64           0.64          0.64          0.64          0.64
##      whereinto       zarethan      citizens       exceeded         stays
##          0.64           0.64          0.64          0.64          0.64
##         haste           open         upper        nature       leaving
##          0.63           0.63          0.63          0.63          0.63
##       dominion           room      standing        desired       hilkiah
##          0.62           0.62          0.62          0.62          0.62
##      teachest        spakest        thirst         hiram   strengthened
##          0.62           0.62          0.61          0.61          0.61
```

```
##       patient    commandedst     warming         base        didst
##          0.61          0.61        0.61         0.60         0.60
##       diviners         eaten      fields       molten       rising
##          0.60          0.60        0.60         0.60         0.60
##       waiteth         annas      hivites    receiving  mesopotamia
##          0.60          0.60        0.60         0.60         0.60
##         owest     inscribed      beget       leaven         legs
##          0.60          0.60        0.60         0.60         0.60
##   chastisement      gloriest       sour     committed       damsel
##          0.60          0.60        0.60         0.59         0.59
##       escaped       merciful    toucheth    unleavened        doors
##          0.59          0.59        0.59         0.59         0.59
##      herodias       pillars        pots      timbrels          ask
##          0.59          0.59        0.59         0.59         0.58
##         herod      justified     looking       master    ordinances
##          0.58          0.58        0.58         0.58         0.58
##         steal     persecuted     disciple       arrow       jewels
##          0.58          0.58        0.58         0.58         0.58
##          safe     perizzites      guarded       elihu    prophetess
##          0.58          0.58        0.58         0.57         0.57
##         stand       statutes       there       younger      confirm
##          0.57          0.57        0.57         0.57         0.57
##     ordinance        debtor       jachin        korah      bethuel
##          0.57          0.57        0.57         0.57         0.57
##       clothes         doeth         end         kind        laver
##          0.56          0.56        0.56         0.56         0.56
##          mean          neck       night        plant       served
##          0.56          0.56        0.56         0.56         0.56
##     thousands          top       walked       basins         hurt
##          0.56          0.56        0.56         0.56         0.56
##       workmen           fir      hardened      sinneth     hindered
##          0.56          0.56        0.56         0.56         0.56
##      mightest       robbery      merchant    deceiveth     gentiles
##          0.56          0.56        0.56         0.55         0.55
##        giveth         merry      neighbor      nothing         oath
##          0.55          0.55        0.55         0.55         0.55
##        praise          rain       reject         song          use
##          0.55          0.55        0.55         0.55         0.55
##        vessel        pelican    persecute        seem     behavior
##          0.55          0.55        0.55         0.55         0.55
##     birthright       promised      struck     inwardly        baths
##          0.55          0.55        0.55         0.55         0.55
##      carcasses        dropped   contemptible    yellow        aught
##          0.55          0.55        0.55         0.55         0.54
##    congregation     declareth      doer       example       healed
##          0.54          0.54        0.54         0.54         0.54
```

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```
## incorruptible          live          lofty       neither    thenceforth
##          0.54          0.54          0.54          0.54           0.54
##        travail        effect       yieldeth          shot          eglon
##          0.54          0.54          0.54          0.54           0.54
##        melteth   unprofitable       forsook      wickedly         madest
##          0.54          0.54          0.54          0.54           0.54
##         sheath       othniel      advantage      chooseth       abounded
##          0.54          0.54          0.54          0.54           0.54
##       killedst     sprinkling    oppressions        achbor lasciviousness
##          0.54          0.54          0.54          0.54           0.54
##           shod        criest          arose        chosen           done
##          0.54          0.54          0.53          0.53           0.53
##       hallowed      jonathan          needy        profit           sins
##          0.53          0.53          0.53          0.53           0.53
##        solomon         south         strong        camels       heardest
##          0.53          0.53          0.53          0.53           0.53
##       meekness        proudly         locust      vineyards        earthen
##          0.53          0.53          0.53          0.53           0.53
##          among         built  congregations          doth          elder
##          0.52          0.52          0.52          0.52           0.52
##       exceeding      fountain        history           jew            maw
##          0.52          0.52          0.52          0.52           0.52
##           much       practise         regard    revelation       servants
##          0.52          0.52          0.52          0.52           0.52
##        wherein        wrought            yea       azaliah        falleth
##          0.52          0.52          0.52          0.52           0.52
##         fowlers        huldah       suffered      wardrobe        ensnare
##          0.52          0.52          0.52          0.52           0.52
##       minstrels       miseries      bithynia        conies      perceiveth
##          0.52          0.52          0.52          0.52           0.52
##       appertain         allot      showedst        anxious      overtaken
##          0.52          0.52          0.52          0.52           0.52
##        bozkath      posterity    prosperously     arrogance        asherah
##          0.52          0.52          0.52          0.52           0.52
##         buying          crop        smitest         tikvah      convenient
##          0.52          0.52          0.52          0.52           0.52
##         mending          task          abda         anaiah         banner
##          0.52          0.52          0.52          0.52           0.52
##        bethink      christian         color    comprehended        easily
##          0.52          0.52          0.52          0.52           0.52
##         fringes      justifying    lighteneth       market         public
##          0.52          0.52          0.52          0.52           0.52
##          resort           sew         sorts      sprinkleth    temptations
##          0.52          0.52          0.52          0.52           0.52
##      travailest      abhorrest       accusing           box      cappadocia
##          0.52          0.52          0.52          0.52           0.52
```

```
##        charmer    epileptic      fattest     fervently foreknowledge
##           0.52         0.52         0.52          0.52          0.52
##       leaveneth        lusty       madmen         mouse        offend
##           0.52         0.52         0.52          0.52          0.52
##         parties       peleth    plentiful         range       sabaoth
##           0.52         0.52         0.52          0.52          0.52
##        saviours      torments       wizard   ministereth   skilfulness
##           0.52         0.52         0.52          0.52          0.52
##           camel        dealt        dwelt          even       forsake
##           0.51         0.51         0.51          0.51          0.51
##           forth        given       height          kept           law
##           0.51         0.51         0.51          0.51          0.51
##            seek    synagogues       toward          turn         wound
##           0.51         0.51         0.51          0.51          0.51
##          brazen     builders        cedar   pomegranates         swine
##           0.51         0.51         0.51          0.51          0.51
##            your    zephaniah       fadeth         burst      creeping
##           0.51         0.51         0.51          0.50          0.50
##      determined    egyptians        fruit         hairy          high
##           0.50         0.50         0.50          0.50          0.50
##    nevertheless         none       prayer       rejoice           rob
##           0.50         0.50         0.50          0.50          0.50
##             sea         seed   straightway         tents          tree
##           0.50         0.50         0.50          0.50          0.50
##         whether      worketh      zebedee       beareth         isaac
##           0.50         0.50         0.50          0.50          0.50
##           shoot         debt     beheaded     repenteth    oliveyards
##           0.50         0.50         0.50          0.50          0.50
##          byword        raven         fain       goliath     undefiled
##           0.50         0.50         0.50          0.50          0.50
##      praetorium     bracelets      blessed         bread         bring
##           0.50         0.50         0.49          0.49          0.49
##        business      covered         dead           eat         exult
##           0.49         0.49         0.49          0.49          0.49
##          father      forgive         hath         judge          just
##           0.49         0.49         0.49          0.49          0.49
##            lack       lawful         maid          milk          name
##           0.49         0.49         0.49          0.49          0.49
##            past    pestilence     shoulder          shut          sick
##           0.49         0.49         0.49          0.49          0.49
##          sinned       spring  supplication       borders       captive
##           0.49         0.49         0.49          0.49          0.49
##          obtain        porch       person           raw     ahimelech
##           0.49         0.49         0.49          0.49          0.49
##       stretcheth         ammi        huram        ithiel       marketh
##           0.49         0.49         0.49          0.49          0.49
```

```
##      phicol          stilled       whereto           amon       answer
##        0.49             0.49          0.49           0.48         0.48
##        book            cause        changed          david        evil
##        0.48             0.48          0.48           0.48         0.48
##      hamath           hearts        heaven        horsemen        idols
##        0.48             0.48          0.48           0.48         0.48
##     kingdom            lions        longer           might     moreover
##        0.48             0.48          0.48           0.48         0.48
##     nazareth            one         reason        revealed        saith
##        0.48             0.48          0.48           0.48         0.48
##       sake             smite         soul            that          thy
##        0.48             0.48          0.48           0.48         0.48
##     touched           whereas     whereunto         choose     oversight
##        0.48             0.48          0.48           0.48         0.48
##      sinner         proceedeth      forbid          powers        heave
##        0.48             0.48          0.48           0.48         0.48
##      smiths           creator     multiplieth       addeth         also
##        0.48             0.48          0.48           0.47         0.47
##        axe             behold        bowls         bringeth        clean
##        0.47             0.47          0.47           0.47         0.47
##      entered          fathers      forasmuch       fortified       found
##        0.47             0.47          0.47           0.47         0.47
##      greatly         husbandman     increase       intrusted       kings
##        0.47             0.47          0.47           0.47         0.47
##      lattice            let          love           meat         offered
##        0.47             0.47          0.47           0.47         0.47
##       peace          presence       priest         prophet       raiment
##        0.47             0.47          0.47           0.47         0.47
##       right        righteousness    surely          sworn         teeth
##        0.47             0.47          0.47           0.47         0.47
##      thither           time          wind           wiser       despised
##        0.47             0.47          0.47           0.47         0.47
##    faithfully         girded        islands          judas        kidron
##        0.47             0.47          0.47           0.47         0.47
##      mound             music         obey           renown        scribe
##        0.47             0.47          0.47           0.47         0.47
##     shemaiah           thigh        bruised          beard         cold
##        0.47             0.47          0.47           0.47         0.47
##      fearful          oracles       playing       sojourneth       would
##        0.47             0.47          0.47           0.47         0.47
##      common            mizpeh       hittites       burnished      debtors
##        0.47             0.47          0.47           0.47         0.47
##      yielded           vapor        provide         cheweth       pinions
##        0.47             0.47          0.47           0.47         0.47
##      babylon           behind      canaanites         cry       delivered
##        0.46             0.46          0.46           0.46         0.46
```

25

```
##           dost           err         faith          fear        follow
##           0.46          0.46          0.46          0.46          0.46
##         forgat          glad         hands        hideth     household
##           0.46          0.46          0.46          0.46          0.46
##         israel       jehovah          keep         least     neighbors
##           0.46          0.46          0.46          0.46          0.46
##            put          read        remain      reproach          save
##           0.46          0.46          0.46          0.46          0.46
##         secret         serve         ships     therefore         thine
##           0.46          0.46          0.46          0.46          0.46
##           thou         touch          what     wherewith          wife
##           0.46          0.46          0.46          0.46          0.46
##         boiled      eighteen          held        prosper      quenched
##           0.46          0.46          0.46          0.46          0.46
##          speed      captives      breaking       slumber      reckoned
##           0.46          0.46          0.46          0.46          0.46
##        parteth        hyssop     appeareth        hammer       stubborn
##           0.46          0.46          0.46          0.46          0.46
##          tooth        forces  abominations      assembled         bear
##           0.46          0.46          0.45          0.45          0.45
##        because          born         bowed  commandments      covenant
##           0.45          0.45          0.45          0.45          0.45
##          creep        desert           die     disciples          dry
##           0.45          0.45          0.45          0.45          0.45
##       entreated         eyes        falsely          fat         first
##           0.45          0.45          0.45          0.45          0.45
##       firstling         hand         hated         heard          land
##           0.45          0.45          0.45          0.45          0.45
##           levi          lust           may        mother        plague
##           0.45          0.45          0.45          0.45          0.45
##         spoken        spread         taken       thoughts         tithe
##           0.45          0.45          0.45          0.45          0.45
##      understand         upon     whosoever        wonders         words
##           0.45          0.45          0.45          0.45          0.45
##           work    disobedient      hearkened        holdeth        repent
##           0.45          0.45          0.45          0.45          0.45
##          roots          wool      answering       backward          moth
##           0.45          0.45          0.45          0.45          0.45
##        prayeth         moons      jebusites          nose        rained
##           0.45          0.45          0.45          0.45          0.45
##        adullam         asked      betrothed          calf     canaanite
##           0.44          0.44          0.44          0.44          0.44
##         cometh      daughter         death       declare         egypt
##           0.44          0.44          0.44          0.44          0.44
##       evermore         every       feedeth     fourscore     fulfilled
##           0.44          0.44          0.44          0.44          0.44
```

```
##      iniquity     kindled     kindred    kingdoms         new
##          0.44        0.44        0.44        0.44        0.44
##           our     produce        saul         say      sayest
##          0.44        0.44        0.44        0.44        0.44
##       servant     serveth    strength        take         ten
##          0.44        0.44        0.44        0.44        0.44
##          thee        will         yet   expedient        figs
##          0.44        0.44        0.44        0.44        0.44
##        humble    maaseiah    pertained   required    scripture
##          0.44        0.44        0.44        0.44        0.44
##         taught        want      armies   comforter     outward
##          0.44        0.44        0.44        0.44        0.44
##        tribute     locusts      damage   broidered   performeth
##          0.44        0.44        0.44        0.44        0.44
##    commendeth         cud    profaning        ice    according
##          0.44        0.44        0.44        0.44        0.43
##           arm       ashes    assembly       bless        bond
##          0.43        0.43        0.43        0.43        0.43
##         break      coming  concerning        deal    departed
##          0.43        0.43        0.43        0.43        0.43
##        depths         dip       eagle        feet       flesh
##          0.43        0.43        0.43        0.43        0.43
##           for      forest     garment         gat        give
##          0.43        0.43        0.43        0.43        0.43
##           god        gods        hast        head        help
##          0.43        0.43        0.43        0.43        0.43
##         house      houses    judgment        left      little
##          0.43        0.43        0.43        0.43        0.43
##         loins        mine    mountain     observe        poor
##          0.43        0.43        0.43        0.43        0.43
##          pray       prove     rebelled       ruled       shalt
##          0.43        0.43        0.43        0.43        0.43
##         sight        sing    springing      thence      things
##          0.43        0.43        0.43        0.43        0.43
##          thus       times       trees       truth    virginity
##          0.43        0.43        0.43        0.43        0.43
##         water       whose      within     written    betrayed
##          0.43        0.43        0.43        0.43        0.43
##        digged      givest    greatness      thomas       gerar
##          0.43        0.43        0.43        0.43        0.43
##     something      tokens     abraham     anathoth        army
##          0.43        0.43        0.42        0.42        0.42
##          away        bald       beasts       began         but
##          0.42        0.42        0.42        0.42        0.42
##           can        cast      caused    chariots      commit
##          0.42        0.42        0.42        0.42        0.42
```

```
##         divide          doers          dwell        enemies          feast
##           0.42           0.42           0.42           0.42           0.42
##         former            get          grace          guard         guided
##           0.42           0.42           0.42           0.42           0.42
##          hence           hewn          jesus        justice           king
##           0.42           0.42           0.42           0.42           0.42
##           look            man         mayest      mountains            now
##           0.42           0.42           0.42           0.42           0.42
##          peter      prisoners      prospered            ran           ring
##           0.42           0.42           0.42           0.42           0.42
##          round        sisters          skies          stars           stay
##           0.42           0.42           0.42           0.42           0.42
##          stood    strongholds          swear          truly           ward
##           0.42           0.42           0.42           0.42           0.42
##  [ reached getOption("max.print") -- omitted 1991 entries ]
```

```
barplot(d[1:15,]$freq, las = 2, names.arg = d[1:15,]$word,
        col ="green", main ="Most frequent words",
        ylab = "Word Frequencies")
```

Most frequent words
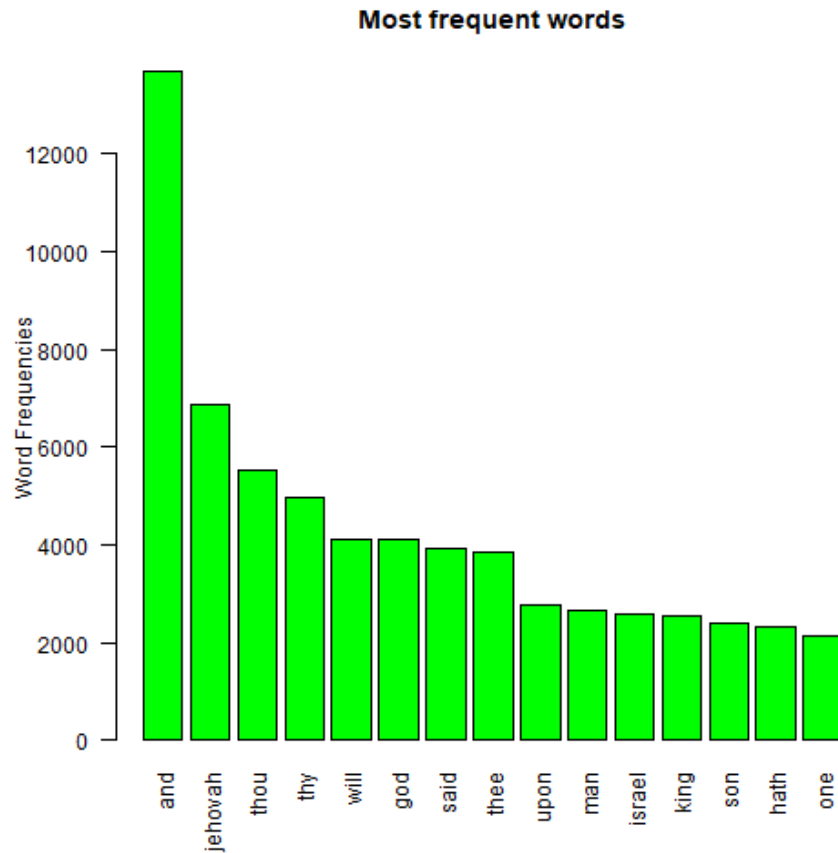

```
tdm2 <- removeSparseTerms(tdm, sparse = 0.85)
m2 <- as.matrix(tdm2)
distMatrix <- dist(scale(m2))
fit <- hclust(distMatrix, method = "ward")

## The "ward" method has been renamed to "ward.D"; note new "ward.D2"

plot(fit)
rect.hclust(fit, k = 5)
```

Cluster Dendrogram

distMatrix
hclust (*, "ward.D")
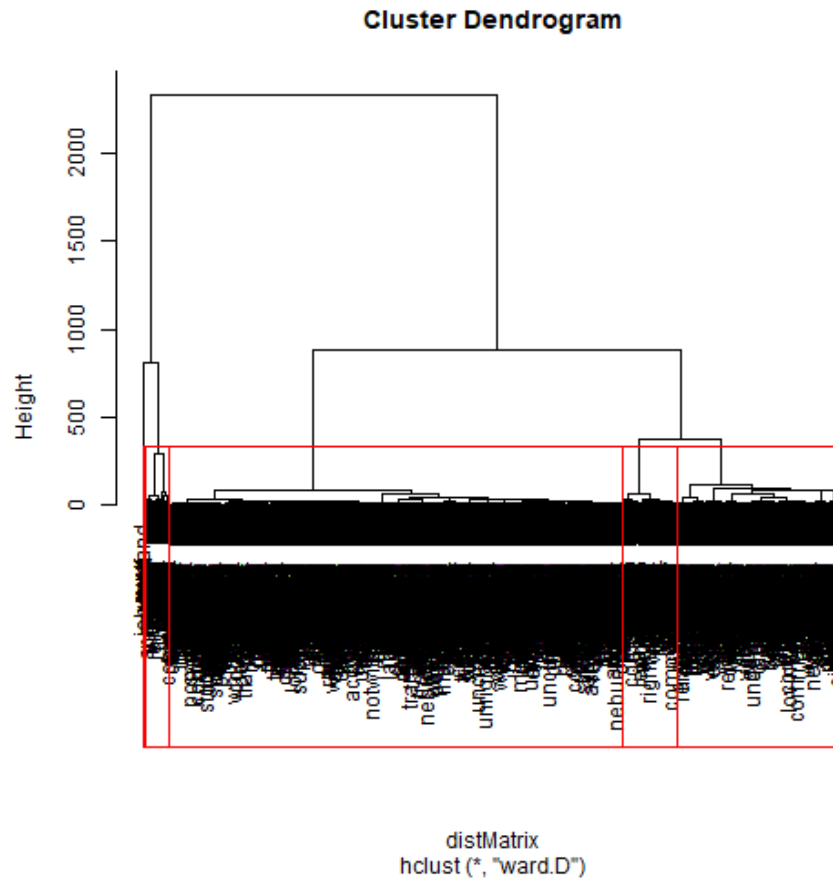
```
m3 <- t(m2)
k <- 5
kmeansResult <- kmeans(m3, k)
round(kmeansResult$centers, digits = 2)
```

```
##          a aaron abhor abhorred abide abiding  able abode abomination
##    abominations abraham absalom abundance acacia accept acceptable
##    accomplish accomplished accord according acts adam  add adultery
##    adversaries afar afflicted affliction affrighted afraid after afterward
##    again against  age   ah ahab ahaziah ahijah   ai  air alas alive    all
##    almighty alone aloud already   also altar altars although amazed  among
##    amorites anathoth ancient     and angel angels anger anguish anoint
##    anointed anointing another answer answered apart apostle apostles
##    apparel appear appoint appointed  are arise   ark  arm armed armor arms
##    army arose array arrayed arrows   art     as  asa ascent ashamed asher
```

```
##    asherim ashes aside   ask asked  ass assemble assembled assembly assyria
##    astonished astonishment    at atonement aught authority avenged avenger
##      away baal baalim babylon  back  bad bade band baptism baptized  bare
##    barley bars base basket baskets battle   be  bear bearing beast beasts
##    beat beauty became because become becometh   bed before began beginning
##    begotten beheld behind behold believe believed belongeth beloved benaiah
##    benjamin beseech beside besought  beth betwixt beyond  bid bind bird
##    birds bitter bitterness black blemish bless blessed blessing blew blind
##    blood blow  body boldness bond bondage bonds bone bones  book border
##     born borne bottom boughs bought bound   bow bowed bowels bowls brake
##    branch branches brass bread breadth break breaketh breast breasts breath
##    brethren bright brimstone bring bringeth broad broken brooks brother
##    brought build builded built burden buried  burn burned burneth burning
##    burnt burst business    but  buy    by caesar caesarea cakes calf  call
##    called   came  camp   can canaan canaanite canaanites candlestick canst
##    capernaum captain captains captivity care carried carry  cast cattle
##    cause caused causeth cease ceased cedars certain chains chaldeans
##    chamber change changed charge charged chariot chariots cherubim chief
##    child children choice chose chosen christ chronicles church cities  city
##    clave clay clean cleanse cleaveth close clothed clothes cloud clouds
##    coat   come cometh comfort comforted coming command commanded
##    commandment commandments commit committed companies companions company
##    compass compassed compassion complaint conceived concerning condemn
##    condemnation condemned confounded confusion congregation conscience
##    consider considered conspired consume consumed content continual
##    continually continue continued corner correction corruption counsel
##    count country courage course courts covenant cover covered covereth
##    covert created creature creatures creeping cried crown crucify cruel
##      cry crying cubit cubits  cup cursed custom   cut damascus  dan dark
##    darkness daughter daughters david   day   days dead deaf  deal dealt
##    death deceitful deceive deceived declare declared decree deeds deep
##    defence defile defiled delight deliver delivered demons denied depart
##    departed depths desert desire desireth desolate desolation despise
##    destroy destroyed destroyer destroying destruction determined devil
##    devise devised devour devoured devoureth  dew dibon didst   die  died
##    dieth diligently  dip disciples displeased distress divers divide
##    divided    do doctrine doers doeth dogs doings dominion  done  door dost
##     doth double drank  draw drawn dream dreams  drew dried drink drinking
##    driven drunk drunken dry  due  dust dwell dwellest dwelleth dwelling
##    dwelt eagle   ear early  ears  earth earthquake east eastward    eat
##    eaten eateth eating eden edge edom  egypt egyptians eight eighth    el
##    elder elders eleventh eliab elijah elisha elishama empty encamp encamped
##      end ends endure enemies enemy enter entered entrance entreat entreated
##    ephah ephraim equal  err escape escaped establish established eternal
##    euphrates    even evening  ever everlasting evermore  every everything
##      evil exalt exalted exceeding exceedingly except execute executed exhort
```

31

```
##    expectation  eye  eyes ezer  face faces fail failed faint fair faith
##    faithful faithfulness  fall fallen falling false falsehood falsely
##    familiar families family famine  far fast fasted fastened  fat father
##    fatherless fathers fatness favor  fear feared feast  fed feed  feet
##     fell female fetch fetched fetters field fields fierce fifteen fifteenth
##    fifth fifty  fig fight fill filled  find  fine finished  fire firm first
##    fish fishes  five flame  fled  flee fleeth flesh flock flocks floor flow
##    flowing  fly follow followed followeth following folly  food  fool
##    foolish fools  foot footstool    for forasmuch forbear force foreign
##    foreigner forest forget forgive forgotten formed former fornication
##    forsake forsaken  forth fortified forty found foundation foundations
##    fountain  four fourscore fourth frankincense free freely friend  fro
##    fruit fruitful fulfilled  full fully fulness   gad gadites gain galilee
##    garden garment garments  gat  gate gates gath gather gathered gathereth
##     gave geba generation generations gentiles   get ghost gibeah gift gifts
##    gilead gilgal gird girdle   give given giveth giving glad gladness
##    glorify glory     go goats    god  gods goest goeth going goings  gold
##    golden  gone  good goodly goodness goods gospel gotten governor
##    governors grace grain grant granted grapes grass grave graven  great
##    greater greatest greatly green  grew grieved grievous ground grow grown
##    guard guide guile guiltless guilty habitation hair  half hallowed hamath
##    hanan    hand handle handmaid hands hang hanged happened hard harlot harp
##    harps harvest   hast haste hate hated   hath have hazor      he  head
##    heads heal healed heap heaps  hear heard hearken  heart hearts heat
##    heaven heavenly heavens hebrew hebron  heed height heights heir  help
##    helped hence henceforth  her herbs  herd herds here herein heritage
##    herod hewed hewn hezekiah  hid  hide hideth  high  hill hills hinder
##    hire hired  his hither hittite  hold holding  holy home honor honorable
##    hooks  hope  horn horns horse horsemen horses  host hosts  hot  hour
##     house household houses   how howbeit humbled hundred hungry  hur
##    husband        i idols    if ignorant  ill image images immediately    in
##    incense increase increased indeed indignation inhabitant inhabitants
##    inhabited inherit inheritance iniquity innocent inquire instruction
##    integrity intent interpretation  iron    is isaiah isles israel issachar
##      it ivory jackals jacob james jealousy jehoiada jehoshaphat jehovah
##    jehu jeiel jeremiah jericho jeroboam jerusalem jesse jesus  jew  jews
##    joab joash joel johanan john join jonathan jordan joseph joshua josiah
##    journey journeyed   joy joyful judaea judah judge judges judgment
##    judgments just justice justified kadesh  keep keepers keeping  kept
##     kill killed kind kindled kindly kindness kindred   king kingdom
##    kingdoms kings kish kissed knees  knew   know knowest knoweth knowledge
##    known labor labored lachish lack  laid lamb lambs lame lament
##    lamentation lamps   land lands language large last latter   law lawful
##    laws   lay layeth laying lead leadeth learn least leave lebanon  led
##     left lehem length less  lest    let letters levi libnah   lie  lies
##    lieth  life  lift lifted light lightnings  like likeness likewise line
```

32

```
##    linen   lion lions   lips little   live lived liveth living     lo lodge
##    lodged lofty loins   long longer   look looked looking loose    lord lords
##    loss lost   lot loud   love loved lovers loveth lovingkindness   low lowly
##    lying maacah machir   mad    made magnify maid majesty    make maker
##    maketh male    man manasseh manifest manifested manner   many mark marry
##    marvelled marvellous mary master matter    may mayest   meal mean means
##    measure meat   meet meeting memorial    men mention merchants merciful
##    mercy merry messenger messengers   met michael middle midian midst might
##    mighty milk mind minded   mine mingled minister ministered mire mischief
##    moab mock molten moment money month months moreover morning morrow
##    morsel   moses   most mother mount mountain mountains mourn mourned
##    mourning mouth mouths moved   much multiplied multiply multitude murmured
##     must    my myrrh mystery   name named names naphtali nathan nation
##    nations   nay nazareth   near nebat nebo nebuchadrezzar   neck necks need
##    needs needy neighbor neighbors neither nest never nevertheless    new
##    nigh night ninth   no noise   none noonday   nor north nostrils   not
##    nothing notwithstanding nourished    now number numbered    nun     o
##    oath obadiah obed obeisance obeyed oblation observe    of offer offered
##    offering offerings office    oh   oil   old olive olives    on    one
##    ones   only   open opened openeth oppress    or order ordinances others
##     our   out outer overcome overthrown   ox   oxen pain palaces palm pangs
##    parable pardon parents   part parted parts    pass passed passeth passing
##    passover past pasture path paths patience   paul   pay peace people
##    peoples perceive perceived perez perfect perform performed perish
##    perished perpetual persia persons perverse pestilence peter pharaoh
##    philistines piece pieces pilate pillar    pit   place places plague
##    plagues plain plant planted play plead pleasant pleased pleasure pluck
##    pool   poor portion possess possession possessions possible pour poured
##    poverty power praise praised praises   pray prayed prayer prayers praying
##    preach preached precious prepare prepared presence present preserve
##    pressed prey pride priest priests prince princes prison prisoners
##    proclaim proclaimed profane profit profitable promise prophecy
##    prophesied prophesy prophet prophets prove proved provoke provoked psalm
##    publish punish punishment   pure purpose purposed    put putteth quarter
##    quench quickly rabbi raiment   rain raise raised    ram ramah rams    ran
##    ransom rather reached   read ready reap reason rebelled rebellious rebuke
##    rebuked receive received receiveth recompense recover   red redeem
##    redeemed redemption reed refuge refuse refused regard reign reigned
##    rejected rejoice rejoiced rejoiceth remain remained remember remembered
##    remission remnant remove removed render rent repentance repented
##    reported reproach reproof reprove request requite residue   rest rested
##    resting restored return returned reuben reubenites revealed revelation
##    reward   rich riches ride riding right righteous righteousness rimmon
##    rings   rise risen riseth rising river rivers roar   rob robbed robe robes
##    rock rocks    rod roll   room   rose round royal   rule ruled ruler rulers
##    ruleth   run      s sabbath sabbaths sackcloth sacrifice sacrificed
```

33

```
##    sacrifices safety   said saidst saints  saith  sake sakes salt salvation
##    samaria samuel sanctified sanctify sanctuary sand   sat satisfied  saul
##     save saved saviour   saw    say sayest saying sayings scarlet scourge
##    scribes   sea seal search seas season seasons seat second secret
##    secretly   see  seed seeing  seek seeketh seeking  seen seest seeth
##    seized self selfsame sell  send   sent separate separated sepulchres
##    serpents servant servants serve served service   set seven seventh
##    shadow shake shall  shalt shame sharp  she sheba sheep shekel shekels
##    sheol shephatiah shepherd shepherds shield shields shine ships shoes
##    shortly shoulder shouldest shout shouted  show showed showing  shut
##     sick sickness  side sides sidon siege sight  sign signet signs silver
##    simeon simple   sin sinai since  sing sinned sinners  sins sister
##    sisters   sit sitteth sitting   six sixth skies skilful skin slain
##    slaughter  slay sleep slept  slew sluggard small smell smite smitten
##    smoke smote snare snow    so sojourned sold soldiers solomon   son
##    song  sons soon sore sorrow sorrowful sorrows sought  soul souls sound
##    south  sow sown space  spake spare speak speakest speaketh speaking
##    spear spears spent spices spirit spirits spiritual spoil spoken spread
##    spring springs staff stand standeth standing stars stature statute
##    statutes staves stay stayed stead steal stedfast stedfastly still stir
##    stirred stirreth stock stone stones stood stopped store storm straight
##    straightway strange stranger strangers street streets strength stretch
##    stretched stricken strive stroke strong stronger stronghold strongholds
##    stumble stumblingblock substance suddenly suffer  sum summer   sun
##    supplication supplications sure surely swallowed sware swear sweet swift
##    sword swords sworn synagogue synagogues syria syrians tabernacle table
##    tail  take taken taketh taking talk tamar tarried tarry tarshish teach
##    teachers teacheth teaching teeth  tell temple temptation tempted   ten
##    tender  tent tenth tents terrible terror testified testimonies testimony
##    thanks thanksgiving  that    the    thee    then thence there thereby
##    therefore therein thereof thereon therewith these  they thine thing
##    things think thinketh third thirst thirty  this thither thorns    thou
##    though thoughts thousand thousands three threescore threshing throne
##    thrones throughout thrown thrust thunder   thus    thy thyself tidings
##     till  time times    to together toil  told tomb tongue  took  top torn
##    touch touched toucheth toward tower towns transgressed transgression
##    transgressions travail treacherous treacherously tread treasure
##    treasures treasuries  tree trees tremble trembled trespass trespassed
##    trial tribe tribes trodden trouble troubled true truly trumpet trumpets
##    trusted truth  try tumult  turn turned twelfth twelve twenty   two tyre
##    unclean uncleanness uncover uncovered understand understanding
##    unleavened unrighteous unrighteousness  unto   upon upper upright
##    uprightness upward uriah    us  use used utter uttereth utterly
##    uttermost  vain valiant valley valleys valor vanity veil vengeance
##    verily vessel vessels village villages  vine vineyard vintage violence
##    virgin virgins vision visit visitation visited voice voices void  vow
```

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```
##    wages wail wait  walk walked walketh walking  wall walls   war ward
##     wash washed  wast waste watch watchmen water watered waters waves  wax
##   waxed   way  ways    we  weak wealth weapons weary weight  well    went
##   wept west  what whatsoever wheat  when whence where whereas whereby
##   wherefore wherein whereof whereon whereunto wherewith whether which
##   whirlwind white whither whithersoever   who whole wholly whom whose
##   whoso whosoever   why wicked wickedness widow widows  wife wild
##   wilderness   will  wilt  wind winds  wine winepress wings wisdom  wise
##   wisely  with withered withhold within without witness witnesses wives
##     woe woman womb women wonderful wonders wondrous  wood   word  words
##    work workers worketh working works world worm worse worship worshipped
##   worthy wouldest wound wounded wrapped wrath write written wrong wrote
##   wroth wrought    ye   yea  year years   yet yoke young younger youngest
##   youth zadok zeal zebulun zerah zeruiah ziklag  zion abel abinadab
##   abominable abroad abundantly accuse added adversary along altogether
##   amen ammon angry anything appearance appeared approach arabah asleep
##   asses astray asunder babes balaam balak bashan basins beareth beaten
##   begat begin believeth belly belonged beneath besides besieged best
##   bethany betrayed better beware blasphemed boiled borders bosom brazen
##   breach bringing brook builders building bullocks burdens bury caleb
##   calves camels camest captive carmel casteth catch cedar chaff chiefs
##   choose churches cleave closed coats comely comest concubines confess
##   confidence confirm consecrated conspiracy contempt contend corners
##   corrupted counsellors counsels counted countenance countries courses
##   court covering crieth crooked curse cymbals darkened dash deceit
##   derision desired despised despiseth devices  did digged discern
##   discretion dishonor dismayed disobedient doest doors dove doves drive
##   drove dumb ease egyptian eighteen either elam eleazar elect eleven
##   eliezer else endureth envy ephod estate excellent faileth falleth feeble
##   fellow fellowship fierceness  figs findeth finger fingers flood flourish
##   forgiven form fortress forward fourteen fourteenth freewill  from fruits
##   gezer gibeon girded glorified glorious godless godly gracious greeks
##   grief groaning hadst  hail haply harm hashabiah hasted hateth heareth
##   hearing hearkened heavy  held hereby hezron highway hilkiah  him holden
##   humble hundreds hurt incline iniquities inquired instead instructed
##   instruments isaac jealous jearim jehiel jehoiakim jephunneh   job judas
##   judged keeper keepeth kinds kiriath knowing kohathites lamp leaf leah
##   levites looketh loosed lusts maaseiah making masters matters measured
##   measures meek meekness melt mentioned merari mercies meshullam micah
##   moabites mocked moon multitudes music musician naked nakedness namely
##    net next nine ninety nobles noon  obey occasion officer officers
##   offspring often oppression ordained ordinance oversight overtake
##   overthrew peradventure persecute persecuted persuaded philip phinehas
##   pillars pitched pity plains played please pleasing pledge pomegranates
##   porch porters portions posts preaching prevail prisoner profaned prosper
##   prosperity proud proudly prudent psalteries purple pursue pursued queen
```

```
##    question rachel reach reasoned regardeth region remembrance repent
##    rephaim report require required respect restore resurrection robbers
##    roof root roots satan scattered scribe scripture scriptures seem seemeth
##    sendeth sepulchre seraiah serpent setteth shaken shallum shaphan
##    shemaiah shiloh shoot shoulders shouting showeth singing sinner skins
##    soever solemn some songs sort southward speech sprinkled steps stoned
##    streams strife stripped stumbling subject suburbs suffered sunrising
##    surety tables talent talked taught teacher tears testify than thank
##    their thief thigh thought threshold timber timothy tongues tops touching
##    trust trusteth turning twentieth uncircumcised understood uttered  vex
##    victuals vines visions wander want wasted wave weep weeping wheresoever
##    while willing wool wounds writing your zechariah zedekiah zerubbabel
##    abiathar abideth abishai afflict  ago always amorite andrew answering
##    armies asaph ashtaroth asia awake backward barren beholdeth  ben blot
##     boat bondmen bride bridegroom bullock calling captives certainly
##    chambers circumcised clear delighteth deliverance deny diseases  dog
##    entry ephesus fasting feareth feasts finding  fir flour flower
##    foolishness friends fulfil gomorrah hardened heshbon hivite honey horeb
##    hunger inner inward jebusite joined killeth kindle kohath lives loaves
##    lower lowland magnified makest marriage members merchandise mightily
##    ministers nebuchadnezzar nineveh noah nought  oft   og oppressed
##    overflow palace perizzite person pharisees plucked prevailed provinces
##    quiet rage release runneth running scatter sceptre seer selah seventy
##    shed shelah shimei shot sihon silence simon singers slow snares sodom
##    sojourner sojourners star strengthened stubble suck sweep talents
##    trembling tribute turneth uzziel vows whereupon whomsoever wide windows
##    withdrew wolves yield account ahaz aijalon arnon aroer  ate bands beard
##    beer behalf bodies boil breaking calleth caught cave cherub cleansed
##    cold commandeth cords corrupt daily debir deed demon diligence disciple
##    dung earnestly   en enough epistle ethiopia fiery fought fresh gall
##    habitations  ham hangings happy haughty healing hebrews hidden higher
##    hoped inclined jazer jeshua laban learned leper letter lioness locust
##    longsuffering lose lots macedonia mahanaim males married ministry
##    mordecai move nadab nights overthrow polluted proceedeth promised
##    province remaining reveal salute sealed searched seir sending sinneth
##    sojourneth strengthen struck stubbornness swallow taste tear terrors
##    thick until victory vineyards waited wear wentest westward wheels
##    willingly window workman abound adversity alike arrow ashdod beautiful
##    beforetime bestowed blue breastplate brightness butter circumcision
##    clothing common conceive contrary couch earthen esau fashion fellows
##    forbid forsook gaza greatness jedaiah jewels message ministering mizpah
##    northward  oak overlaid partakers pastures possessed rabbah rend roaring
##    showbread smiteth sockets spared stripes tabernacles thirsty tribulation
##    tried triumph twice uncircumcision wars winter accounted aforetime
##    ahitub amalek amariah   an beforehand calamity communed daniel
##    foreigners furnace genealogy  goat laugh leap lightning obedient powers
```

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```
##    purify reckoned rejoicing remaineth reserved savor shemesh sprinkle
##    subdued tempest twined wickedly ahasuerus aram centurion duty error
##    issue joppa kedar peor presented ruin sidonians sixteen sojourn stream
##    thereto token alway heave obedience abijah adjure clothe coals
##    committeth holiness iddo insomuch jezreel kiss lacking price ramoth
##    redeemer rode towers azariah birth casting concubine council crucified
##    draweth glorying jabesh judgeth korah mightest nether outstretched
##    prolong delighted shechem  wit beholding malchijah oaks obtained
##    perplexed sarah sittest amalekites amaziah cross dedicated distressed
##    hananiah levite accepted cheer ishmael legs uzziah zichri abner jonah
##     ner rolled jotham teraphim state gardens hadad esther haman
##  [ reached getOption("max.print") -- omitted 5 rows ]


#Collapsing into Books and Chapters
attach(ASV)


## The following objects are masked _by_ .GlobalEnv:
##
##     Books, Sections, Testaments


## The following objects are masked from ASV (pos = 3):
##
##     Books, Chapters, field, Sections, Testaments, text, Verses, X


## The following objects are masked from ASV (pos = 4):
##
##     Books, Chapters, field, Sections, Testaments, text, Verses, X


txt.b=c()
txt.b.wc=c()
for (i in 1:66)
  {
  txt.b[i]=paste(text[Books==as.character(unique(Books)[i])],collapse = " ")
  }

text.Chapter=c()
text.Chapter.wc=c()
for (i in 1:1189)
  {
  text.Chapter[i]=paste(text[Chapters==as.character(unique(Chapters)[i])],collapse = " ")
  }

Books = c()
for (i in unique(ASV$Books))
```

```
    {
  kend = length(unique(ASV[ASV$Books==i,]$Chapters))
    Books = c(Books, rep(i, kend))
  }

ASV_Chapters=data.frame(Testaments=c(rep('OT',929),rep('NT',260)),
                        Sections=c(rep('Law',187),rep('History',249),rep('Wisdom',243),rep('
                                   rep('Gospels',117),rep('Paul',87),rep("Apostles",56)),
                        Books=Books,
                        Chapters=unique(Chapters),text=text.Chapter)

ASV_Books=data.frame(Testaments=c(rep('OT',39),rep('NT',27)),
                     Sections=c(rep('Law',5),rep('History',12),rep('Wisdom',5),rep('Proph
                                rep('Gospels',5),rep('Paul',13),rep("Apostles",9)),
                     Books=unique(Books),text=txt.b)


Testaments=c(rep('OT',39),rep('NT',27))
Sections=c(rep('Law',5),  rep('History',12),rep('Wisdom',5),rep('Prophets',17),
                          rep('Gospels',5),rep('Paul',13),rep("Apostles",9))

## Term Document Matrix ##
my_stopwords1 = c("a", "about", "above", "above", "across", "after", "afterwards", "again",

my_stopwords2 = c('thou','thee','thy','ye','shall','shalt','lo','unto',
                  'hath', 'thereof', 'hast', 'set', 'thine', 'art', 'yea', 'midst',
                  'wherefore', 'wilt', 'thyself')
# Turn those sentences into a DTM
dtm.ngrams = vector("list", 3*2*2)
j=1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    if (stemfn_name=="Porter"){ stemfn = function(x) SnowballC::wordStem(x, "porter")} else
    for (ngram_length in c(1,3,7)) {
      dtm <- CreateDtm(ASV_Books$text,
                       doc_names = ASV_Books$Books,
                       ngram_window = c(1, ngram_length),
                       stopword_vec = c(tm::stopwords("english"),
                                        tm::stopwords("SMART"),
                                        my_stopwords1, my_stopwords2),
                                        stem_lemma_function = stemfn,
                       lower = TRUE, remove_punctuation = TRUE, remove_numbers = FALSE, verb
                       )
      # explore basic frequencies & curate vocabulary
      tf <- TermDocFreq(dtm = dtm)
      # Keep only words appearing more than 2 times, AND in more than 1 document
```

```
      vocabulary <- tf$term[tf$term_freq>2 & tf$doc_freq>1]
      dtm <- dtm[ , vocabulary]
      # TF-IDF Frequency re-weighting
      if (idf_weight){
        idf <- log(nrow(dtm) / colSums(dtm > 0))
        tfidf <- t(dtm) * idf
        tfidf <- t(tfidf)
        dtm <-tfidf
      }
      dtm.ngrams[[j]] = dtm
      j = j+1
      # Calc Hellinger Dist (x = mymat)
      # dist.mtx=CalcHellingerDist(as.matrix(dtm))
    }
  }
}


for (i in 1:7){
dtm = dtm.ngrams[[i]]
csim <- dtm / sqrt(rowSums(dtm*dtm))
csim <- csim %*% t(csim)

dist.mtx <- 1-csim

fit.pca <- prcomp(as.dist(dist.mtx))
plot(fit.pca$x[,1:2], type='n',main="Seven Sections of the Bible based on Words Presence")
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
       line=2,
       outer=FALSE)
}
```

Seven Sections of the Bible based on Words Presence

Seven Sections o...
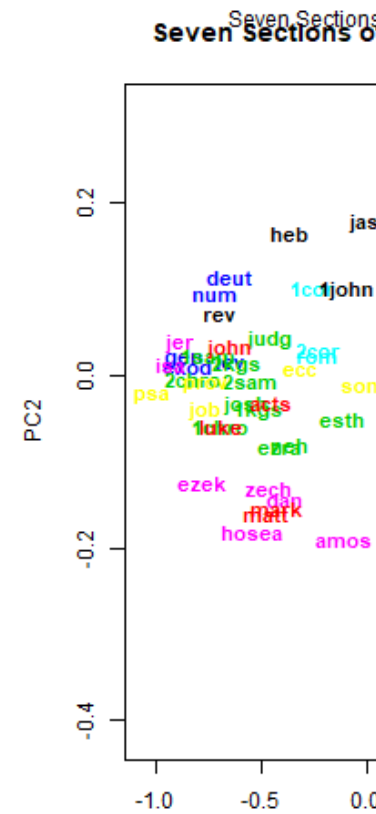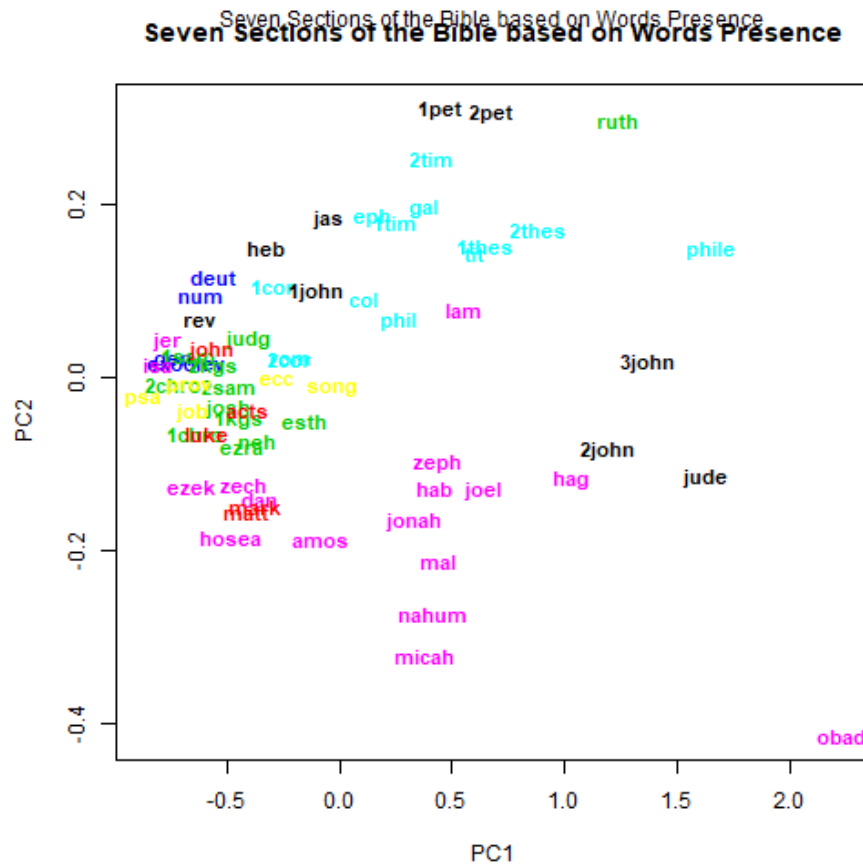

```
## N grams and stemming
j = 1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    for (ngram_length in c(1,3,7)) {

      dtm = dtm.ngrams[[j]]
      j = j+1

      csim <- dtm / sqrt(rowSums(dtm*dtm))
      csim <- csim %*% t(csim)
      dist.mtx <- 1-csim
      hc.avg=hclust(as.dist(dist.mtx),'average')
      avg.table = table(cutree(hc.avg, k=7), ... = as.numeric(ASV_Books$Sections[hc.avg$orde
      avg.match = solve_LSAP(x = avg.table, maximum = TRUE)
      avg.sxr = sum(avg.table[cbind(seq_along(avg.match),       avg.match)]) / sum(avg.table)
```

```
        avg.table = table(cutree(hc.avg, k=2), as.numeric(ASV_Books$Testaments[hc.avg$order]))
        avg.match = solve_LSAP(x = avg.table, maximum = TRUE)
        avg.sxrT = sum(avg.table[cbind(seq_along(avg.match), avg.match)]) / sum(avg.table)

        hc.wald=hclust(as.dist(dist.mtx),'ward.D2')

        wald.table = table(cutree(hc.wald, k=7), as.numeric(ASV_Books$Sections[hc.wald$order])
        wald.match = solve_LSAP(x = wald.table, maximum = TRUE)
        wald.sxr = sum(wald.table[cbind(seq_along(wald.match), wald.match)]) / sum(wald.table)

        wald.table = table(cutree(hc.wald, k=2), as.numeric(ASV_Books$Testaments[hc.wald$order
        wald.match = solve_LSAP(x = wald.table, maximum = TRUE)
        wald.sxrT = sum(wald.table[cbind(seq_along(wald.match), wald.match)]) / sum(wald.table

        cat(sprintf("n-grams: %d    tf-idf: %i     stemming: %s\n", ngram_length, idf_weight, s
        cat(sprintf("Sections:   AVG: %f\tWALD: %f\n", avg.sxr, wald.sxr))
        cat(sprintf("Testaments: AVG: %f\tWALD: %f\n", avg.sxrT, wald.sxrT))


    }
  }
}

## n-grams: 1    tf-idf: 0    stemming: None
## Sections:   AVG: 0.318182    WALD: 0.257576
## Testaments: AVG: 0.575758    WALD: 0.575758
## n-grams: 3    tf-idf: 0    stemming: None
## Sections:   AVG: 0.303030    WALD: 0.272727
## Testaments: AVG: 0.575758    WALD: 0.575758
## n-grams: 7    tf-idf: 0    stemming: None
## Sections:   AVG: 0.272727    WALD: 0.257576
## Testaments: AVG: 0.575758    WALD: 0.575758
## n-grams: 1    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.333333    WALD: 0.287879
## Testaments: AVG: 0.606061    WALD: 0.606061
## n-grams: 3    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.272727    WALD: 0.303030
## Testaments: AVG: 0.575758    WALD: 0.636364
## n-grams: 7    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.287879    WALD: 0.287879
## Testaments: AVG: 0.575758    WALD: 0.636364
## n-grams: 1    tf-idf: 1    stemming: None
## Sections:   AVG: 0.348485    WALD: 0.378788
## Testaments: AVG: 0.560606    WALD: 0.590909
## n-grams: 3    tf-idf: 1    stemming: None
```

```
## Sections:   AVG: 0.318182    WALD: 0.484848
## Testaments: AVG: 0.606061    WALD: 0.621212
## n-grams: 7    tf-idf: 1    stemming: None
## Sections:   AVG: 0.287879    WALD: 0.454545
## Testaments: AVG: 0.575758    WALD: 0.530303
## n-grams: 1    tf-idf: 1    stemming: Porter
## Sections:   AVG: 0.363636    WALD: 0.530303
## Testaments: AVG: 0.560606    WALD: 0.681818
## n-grams: 3    tf-idf: 1    stemming: Porter
## Sections:   AVG: 0.303030    WALD: 0.575758
## Testaments: AVG: 0.606061    WALD: 0.712121
## n-grams: 7    tf-idf: 1    stemming: Porter
## Sections:   AVG: 0.333333    WALD: 0.439394
## Testaments: AVG: 0.575758    WALD: 0.545455
```
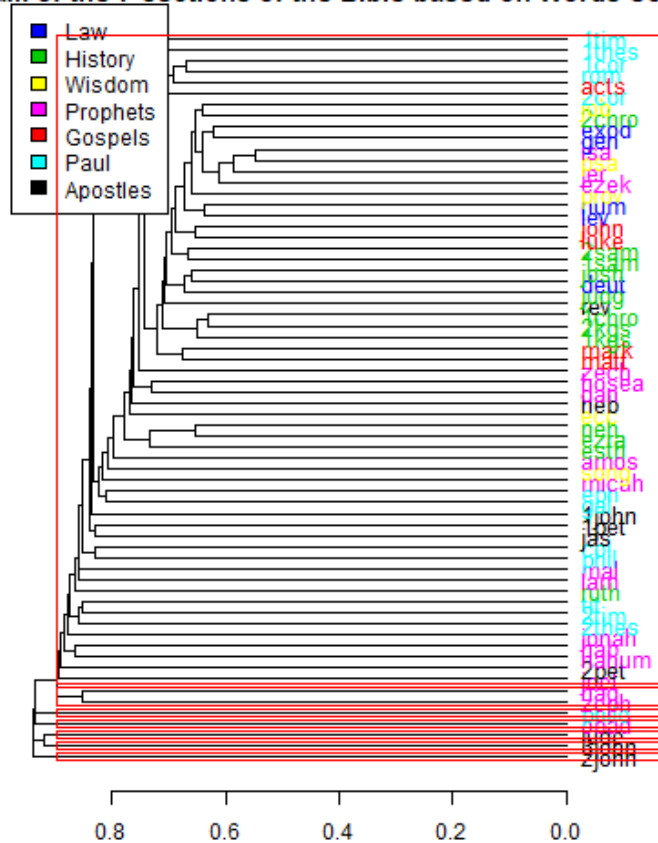
```r
dtm <- dtm.ngrams[[3]]
csim <- dtm / sqrt(rowSums(dtm*dtm))
csim <- csim %*% t(csim)

dist.mtx <- 1-csim
hc.avg=hclust(as.dist(dist.mtx),'average')
hc.wald=hclust(as.dist(dist.mtx),'ward.D2')


dend=as.dendrogram(hc.avg)

labels_colors(dend) <- as.numeric(as.factor(ASV_Books$Sections[hc.avg$order]))

dend <- set(dend, "labels_cex", 1.12)
par(mar = c(4,1,1,12))
plot(dend, horiz = TRUE, main='Dendrogram of the 7 Sections of the Bible based on Words Cou
legend("topleft", legend = unique(ASV_Books$Sections), fill = as.numeric(as.factor(unique(AS
rect.dendrogram(dend, k=7, border="red", horiz=T)
```

Dendrogram legend:
- Law (blue)
- History (green)
- Wisdom (yellow)
- Prophets (magenta)
- Gospels (red)
- Paul (cyan)
- Apostles (black)

```
fit <- cmdscale(as.dist(dist.mtx), k = 2)
plot(fit[,2]~fit[,1],type='n')
text(x = fit[,1], y = fit[,2], labels = row.names(fit), col=unclass(as.factor(ASV_Books$Sect
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Counts",
       line=2,
       outer=FALSE)
```

Seven Sections of the Bible based on Words Counts
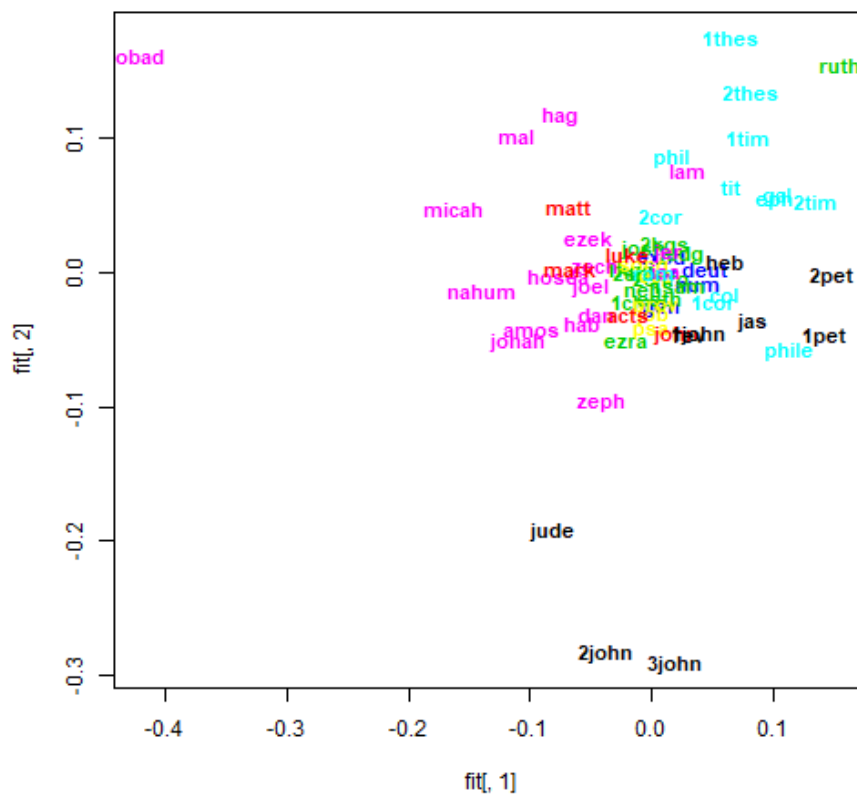

```
## Pca analysis of old and new testament ##
plot(fit.pca$x[,1:2], type='n', main="PCA of 2 Testaments of Bible based on word Counts")
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
       line=2,
       outer=FALSE)
```

PCA of 2 Testaments of Bible based on word Counts
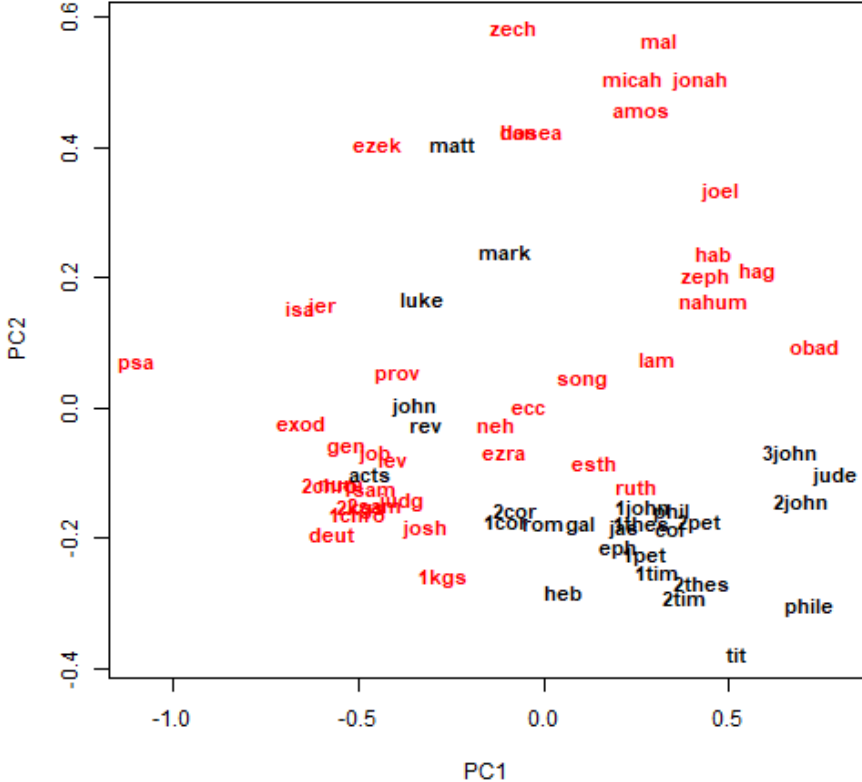
```
j = 1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    for (ngram_length in c(1,3,7)) {

      dtm = dtm.ngrams[[j]]
      j = j+1

      dtm1<-dtm
      dtm1[dtm1>1] <- 1
      csim <- dtm1 / sqrt(rowSums(dtm1*dtm1))
      csim <- csim %*% t(csim)

      dist.mtx1 <- 1-csim
```

```
      hc.avg1=hclust(as.dist(dist.mtx1),'average')


      avg.table = table(cutree(hc.avg1, k=7), as.numeric(ASV_Books$Sections[hc.avg1$order]))
      avg.match = solve_LSAP(x = avg.table, maximum = TRUE)
      avg.sxr = sum(avg.table[cbind(seq_along(avg.match), avg.match)]) / sum(avg.table)

      avg.table = table(cutree(hc.avg1, k=2), as.numeric(ASV_Books$Testaments[hc.avg1$order]
      avg.match = solve_LSAP(x = avg.table, maximum = TRUE)
      avg.sxrT = sum(avg.table[cbind(seq_along(avg.match), avg.match)]) / sum(avg.table)


      hc.wald1=hclust(as.dist(dist.mtx1),'ward.D2')

      wald.table = table(cutree(hc.wald1, k=7), as.numeric(ASV_Books$Sections[hc.wald1$order
      wald.match = solve_LSAP(x = wald.table, maximum = TRUE)
      wald.sxr = sum(wald.table[cbind(seq_along(wald.match), wald.match)]) / sum(wald.table)

      wald.table = table(cutree(hc.wald1, k=2), as.numeric(ASV_Books$Testaments[hc.wald1$or
      wald.match = solve_LSAP(x = wald.table, maximum = TRUE)
      wald.sxrT = sum(wald.table[cbind(seq_along(wald.match), wald.match)]) / sum(wald.table

      cat(sprintf("n-grams: %d    tf-idf: %i    stemming: %s\n", ngram_length, idf_weight, s
      cat(sprintf("Sections:   AVG: %f\tWALD: %f\n", avg.sxr, wald.sxr))
      cat(sprintf("Testaments: AVG: %f\tWALD: %f\n", avg.sxrT, wald.sxrT))
    }
  }
}

## n-grams: 1    tf-idf: 0    stemming: None
## Sections:   AVG: 0.303030    WALD: 0.409091
## Testaments: AVG: 0.575758    WALD: 0.696970
## n-grams: 3    tf-idf: 0    stemming: None
## Sections:   AVG: 0.318182    WALD: 0.439394
## Testaments: AVG: 0.545455    WALD: 0.712121
## n-grams: 7    tf-idf: 0    stemming: None
## Sections:   AVG: 0.318182    WALD: 0.454545
## Testaments: AVG: 0.606061    WALD: 0.803030
## n-grams: 1    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.287879    WALD: 0.318182
## Testaments: AVG: 0.575758    WALD: 0.666667
## n-grams: 3    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.242424    WALD: 0.409091
## Testaments: AVG: 0.545455    WALD: 0.696970
## n-grams: 7    tf-idf: 0    stemming: Porter
## Sections:   AVG: 0.272727    WALD: 0.363636
```

```
## Testaments: AVG: 0.606061    WALD: 0.742424
## n-grams: 1    tf-idf: 1    stemming: None
## Sections:    AVG: 0.303030    WALD: 0.333333
## Testaments: AVG: 0.590909    WALD: 0.651515
## n-grams: 3    tf-idf: 1    stemming: None
## Sections:    AVG: 0.272727    WALD: 0.409091
## Testaments: AVG: 0.575758    WALD: 0.530303
## n-grams: 7    tf-idf: 1    stemming: None
## Sections:    AVG: 0.257576    WALD: 0.393939
## Testaments: AVG: 0.575758    WALD: 0.742424
## n-grams: 1    tf-idf: 1    stemming: Porter
## Sections:    AVG: 0.257576    WALD: 0.318182
## Testaments: AVG: 0.590909    WALD: 0.560606
## n-grams: 3    tf-idf: 1    stemming: Porter
## Sections:    AVG: 0.257576    WALD: 0.348485
## Testaments: AVG: 0.575758    WALD: 0.666667
## n-grams: 7    tf-idf: 1    stemming: Porter
## Sections:    AVG: 0.303030    WALD: 0.439394
## Testaments: AVG: 0.606061    WALD: 0.575758


dend=as.dendrogram(hc.avg1)
labels_colors(dend) <- as.numeric(as.factor(ASV_Books$Sections[hc.avg1$order]))
dend <- set(dend, "labels_cex", 1.12)
par(mar = c(4,1,1,12))
plot(dend, horiz = TRUE, main='Dendrogram of the 7 Sections of the Bible based on Words Cour
legend("topleft", legend = unique(ASV_Books$Sections), fill = as.numeric(as.factor(unique(AS
rect.dendrogram(dend, k=7, border="red", horiz=T)
```

```
### K-Means ###
j = 1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    for (ngram_length in c(1,3,7)) {

      dtm = dtm.ngrams[[j]]
      j = j+1
      csim <- dtm / sqrt(rowSums(dtm*dtm))
      csim <- csim %*% t(csim)
      dist.mtx <- 1-csim

      set.seed(1234)
      km=kmeans(as.dist(dist.mtx), 7)
      kmT=kmeans(as.dist(dist.mtx), 2)
      km.table = table(km$cluster, as.numeric(ASV_Books$Sections))
```

```
        km.match = solve_LSAP(x = km.table, maximum = TRUE)
        km.sxr = sum(km.table[cbind(seq_along(km.match), km.match)]) / sum(km.table)

        kmT.table = table(kmT$cluster, as.numeric(ASV_Books$Testaments))
        kmT.match = solve_LSAP(x = kmT.table, maximum = TRUE)
        kmT.sxr = sum(kmT.table[cbind(seq_along(kmT.match), kmT.match)]) / sum(kmT.table)

        cat(sprintf("n-grams: %d    tf-idf: %i    stemming: %s\n", ngram_length, idf_weight, s
        cat(sprintf("Sections:   kmeans: %f\n", km.sxr))
        cat(sprintf("Testaments: kmeans: %f\n", kmT.sxr))
    }
  }
}

## n-grams: 1    tf-idf: 0    stemming: None
## Sections:   kmeans: 0.439394
## Testaments: kmeans: 0.621212
## n-grams: 3    tf-idf: 0    stemming: None
## Sections:   kmeans: 0.500000
## Testaments: kmeans: 0.651515
## n-grams: 7    tf-idf: 0    stemming: None
## Sections:   kmeans: 0.515152
## Testaments: kmeans: 0.651515
## n-grams: 1    tf-idf: 0    stemming: Porter
## Sections:   kmeans: 0.484848
## Testaments: kmeans: 0.590909
## n-grams: 3    tf-idf: 0    stemming: Porter
## Sections:   kmeans: 0.469697
## Testaments: kmeans: 0.651515
## n-grams: 7    tf-idf: 0    stemming: Porter
## Sections:   kmeans: 0.515152
## Testaments: kmeans: 0.651515
## n-grams: 1    tf-idf: 1    stemming: None
## Sections:   kmeans: 0.545455
## Testaments: kmeans: 0.651515
## n-grams: 3    tf-idf: 1    stemming: None
## Sections:   kmeans: 0.545455
## Testaments: kmeans: 0.636364
## n-grams: 7    tf-idf: 1    stemming: None
## Sections:   kmeans: 0.575758
## Testaments: kmeans: 0.666667
## n-grams: 1    tf-idf: 1    stemming: Porter
## Sections:   kmeans: 0.545455
## Testaments: kmeans: 0.666667
## n-grams: 3    tf-idf: 1    stemming: Porter
## Sections:   kmeans: 0.606061
```

```
## Testaments: kmeans: 0.606061
## n-grams: 7    tf-idf: 1    stemming: Porter
## Sections:   kmeans: 0.530303
## Testaments: kmeans: 0.606061


dtm = dtm.ngrams[[7]]
csim <- dtm / sqrt(rowSums(dtm*dtm))
csim <- csim %*% t(csim)
dist.mtx <- 1-csim
fit.pca <- prcomp(as.dist(dist.mtx))
plot(fit.pca$x[,1:2], type='n',main="Seven Sections of the Bible based on Words Presence - K
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
       line=2,
       outer=FALSE)
```


Seven Sections of the Bible based on Words Presence - KMEANS

```
fit.pca <- prcomp(as.dist(dist.mtx))
plot(fit.pca$x[,1:2], type='n',main="Two Testaments of the Bible based on Words Presence -
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
       line=2,
       outer=FALSE)
```
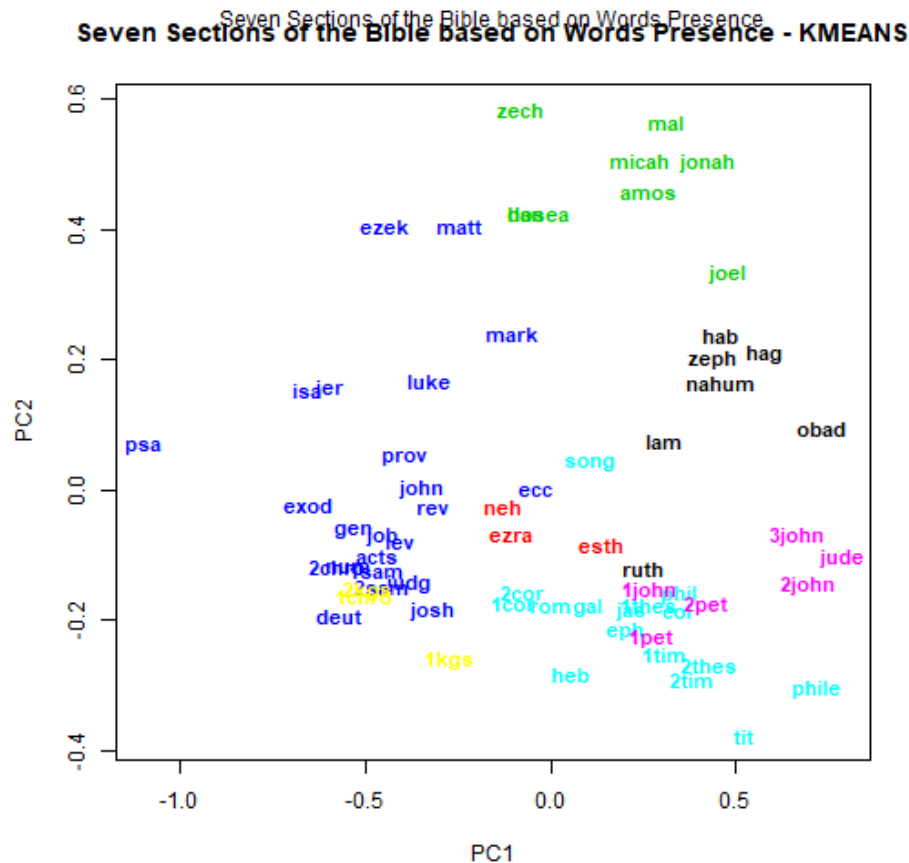
Two Testaments of the Bible based on Words Presence - KMEANS


```
## Fuzzy K-Means ##
km.sxr.best = 0
kmT.sxr.best = 0
j = 1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    for (ngram_length in c(1,3,7)) {
```

```
        dtm = dtm.ngrams[[j]]
        j = j+1

        csim <- dtm / sqrt(rowSums(dtm*dtm))
        csim <- csim %*% t(csim)
          dist.mtx <- 1-csim

        set.seed(1234)
        km=cmeans(as.dist(dist.mtx), 7, m=2, method="cmeans")
        kmT=cmeans(as.dist(dist.mtx), 2, m=2, method="cmeans")
        km.table = table(km$cluster, as.numeric(ASV_Books$Sections))
        km.match = solve_LSAP(x = km.table, maximum = TRUE)
        km.sxr = sum(km.table[cbind(seq_along(km.match), km.match)]) / sum(km.table)
        if (km.sxr > km.sxr.best) {
          km.sxr.best = km.sxr
          km.best = km
          km.j = j-1
        }

        kmT.table = table(kmT$cluster, as.numeric(ASV_Books$Testaments))
        kmT.match = solve_LSAP(x = kmT.table, maximum = TRUE)
        kmT.sxr = sum(kmT.table[cbind(seq_along(kmT.match), kmT.match)]) / sum(kmT.table)
        if (kmT.sxr > kmT.sxr.best) {
          kmT.sxr.best = kmT.sxr
          kmT.best = kmT
          kmT.j = j-1
        }

        cat(sprintf("n-grams: %d    tf-idf: %i    stemming: %s\n", ngram_length, idf_weight, s
        cat(sprintf("Sections:   cmeans: %f\n", km.sxr))
        cat(sprintf("Testaments: cmeans: %f\n", kmT.sxr))
    }
  }
}

## n-grams: 1    tf-idf: 0    stemming: None
## Sections:   cmeans: 0.409091
## Testaments: cmeans: 0.621212
## n-grams: 3    tf-idf: 0    stemming: None
## Sections:   cmeans: 0.393939
## Testaments: cmeans: 0.636364
## n-grams: 7    tf-idf: 0    stemming: None
## Sections:   cmeans: 0.409091
## Testaments: cmeans: 0.651515
## n-grams: 1    tf-idf: 0    stemming: Porter
## Sections:   cmeans: 0.378788
```

```
## Testaments: cmeans: 0.621212
## n-grams: 3    tf-idf: 0    stemming: Porter
## Sections:   cmeans: 0.378788
## Testaments: cmeans: 0.651515
## n-grams: 7    tf-idf: 0    stemming: Porter
## Sections:   cmeans: 0.393939
## Testaments: cmeans: 0.651515
## n-grams: 1    tf-idf: 1    stemming: None
## Sections:   cmeans: 0.318182
## Testaments: cmeans: 0.651515
## n-grams: 3    tf-idf: 1    stemming: None
## Sections:   cmeans: 0.318182
## Testaments: cmeans: 0.666667
## n-grams: 7    tf-idf: 1    stemming: None
## Sections:   cmeans: 0.333333
## Testaments: cmeans: 0.681818
## n-grams: 1    tf-idf: 1    stemming: Porter
## Sections:   cmeans: 0.318182
## Testaments: cmeans: 0.666667
## n-grams: 3    tf-idf: 1    stemming: Porter
## Sections:   cmeans: 0.333333
## Testaments: cmeans: 0.651515
## n-grams: 7    tf-idf: 1    stemming: Porter
## Sections:   cmeans: 0.318182
## Testaments: cmeans: 0.666667
```

```r
dtm = dtm.ngrams[[km.j]]
csim <- dtm / sqrt(rowSums(dtm*dtm))
csim <- csim %*% t(csim)
dist.mtx <- 1-csim
fit.pca <- prcomp(as.dist(dist.mtx))
plot(fit.pca$x[,1:2], type='n',main="Seven Sections of the Bible based on Words Presence - (
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
        line=2,
        outer=FALSE)
```

Seven Sections of the Bible based on Words Presence - CMEANS
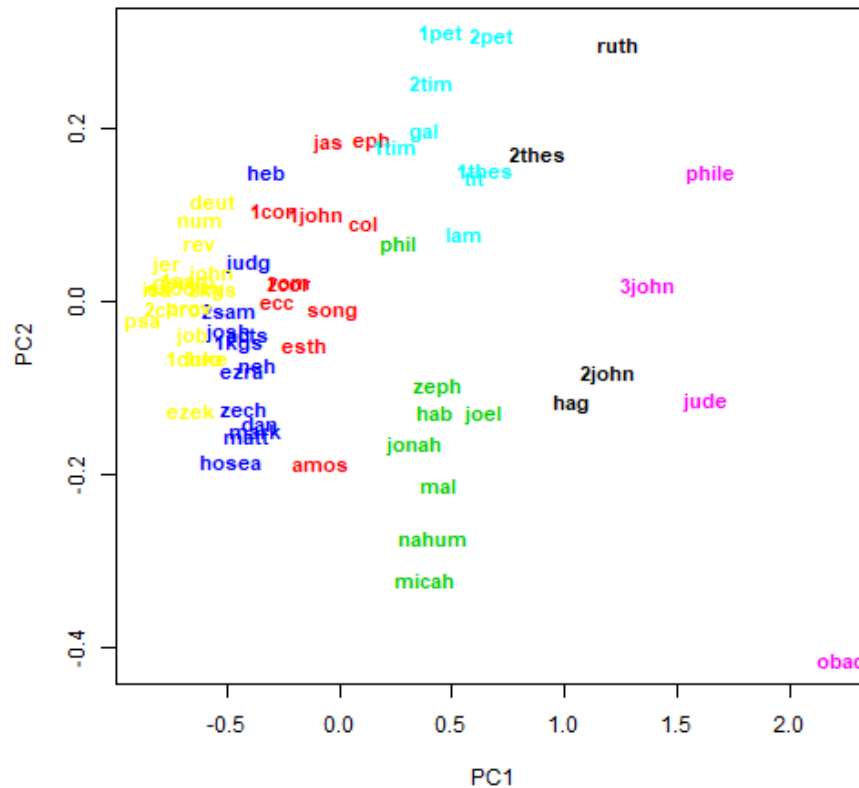

```
dtm = dtm.ngrams[[kmT.j]]
csim <- dtm / sqrt(rowSums(dtm*dtm))
csim <- csim %*% t(csim)
dist.mtx <- 1-csim
fit.pca <- prcomp(as.dist(dist.mtx))
plot(fit.pca$x[,1:2], type='n',main="Two Testaments of the Bible based on Words Presence - (
text(x = fit.pca$x[,1], y = fit.pca$x[,2], labels = row.names(fit.pca$x), col=unclass(as.fac
mtext( cex = 1, text = "Seven Sections of the Bible based on Words Presence",
      line=2,
      outer=FALSE)
```

Two Testaments of the Bible based on Words Presence - CMEANS
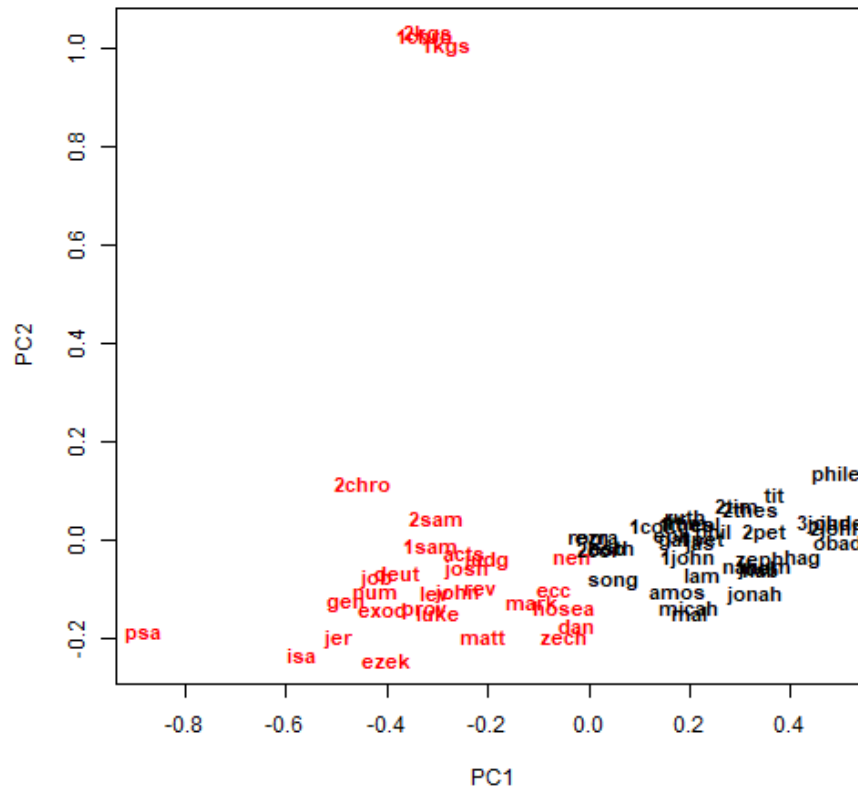

```
## Gaussian Mixture ##
mc.sxr.best = 0
mcT.sxr.best = 0
j = 1
for (idf_weight in c(FALSE, TRUE)) {
  for (stemfn_name in c("None", "Porter")){
    for (ngram_length in c(1,3,7)) {

      dtm = dtm.ngrams[[j]]
      j = j+1
      csim <- dtm / sqrt(rowSums(dtm*dtm))
      csim <- csim %*% t(csim)
      dist.mtx <- 1-csim

      set.seed(1234)
      mc=Mclust(as.dist(dist.mtx), 7, verbose=F)
```

```
      mcT=Mclust(as.dist(dist.mtx), 2, verbose=F)
      mc.table = table(mc$classification, as.numeric(ASV_Books$Sections))
      mc.match = solve_LSAP(x = mc.table, maximum = TRUE)
      mc.sxr = sum(mc.table[cbind(seq_along(mc.match), mc.match)]) / sum(mc.table)
      if (mc.sxr > mc.sxr.best) {
        mc.sxr.best = mc.sxr
        mc.best = mc
        mc.j = j-1
      }

      mcT.table = table(mcT$classification, as.numeric(ASV_Books$Testaments))
      mcT.match = solve_LSAP(x = mcT.table, maximum = TRUE)
      mcT.sxr = sum(mcT.table[cbind(seq_along(mcT.match), mcT.match)]) / sum(mcT.table)
      if (mcT.sxr > mcT.sxr.best) {
        mcT.sxr.best = mcT.sxr
        mcT.best = mcT
        mcT.j = j-1
      }

      cat(sprintf("n-grams: %d    tf-idf: %i    stemming: %s\n", ngram_length, idf_weight, s
      cat(sprintf("Sections:   mclust: %f\n", mc.sxr))
      cat(sprintf("Testaments: mclust: %f\n", mcT.sxr))
    }
  }
}

## n-grams: 1    tf-idf: 0    stemming: None
## Sections:   mclust: 0.424242
## Testaments: mclust: 0.651515
## n-grams: 3    tf-idf: 0    stemming: None
## Sections:   mclust: 0.454545
## Testaments: mclust: 0.651515
## n-grams: 7    tf-idf: 0    stemming: None
## Sections:   mclust: 0.439394
## Testaments: mclust: 0.651515
## n-grams: 1    tf-idf: 0    stemming: Porter
## Sections:   mclust: 0.378788
## Testaments: mclust: 0.651515
## n-grams: 3    tf-idf: 0    stemming: Porter
## Sections:   mclust: 0.363636
## Testaments: mclust: 0.636364
## n-grams: 7    tf-idf: 0    stemming: Porter
## Sections:   mclust: 0.393939
## Testaments: mclust: 0.666667
## n-grams: 1    tf-idf: 1    stemming: None
## Sections:   mclust: 0.560606
```

```
## Testaments: mclust: 0.606061
## n-grams: 3    tf-idf: 1    stemming: None
## Sections:   mclust: 0.469697
## Testaments: mclust: 0.606061
## n-grams: 7    tf-idf: 1    stemming: None
## Sections:   mclust: 0.469697
## Testaments: mclust: 0.696970
## n-grams: 1    tf-idf: 1    stemming: Porter
## Sections:   mclust: 0.530303
## Testaments: mclust: 0.681818
## n-grams: 3    tf-idf: 1    stemming: Porter
## Sections:   mclust: 0.530303
## Testaments: mclust: 0.606061
## n-grams: 7    tf-idf: 1    stemming: Porter
## Sections:   mclust: 0.469697
## Testaments: mclust: 0.727273
```
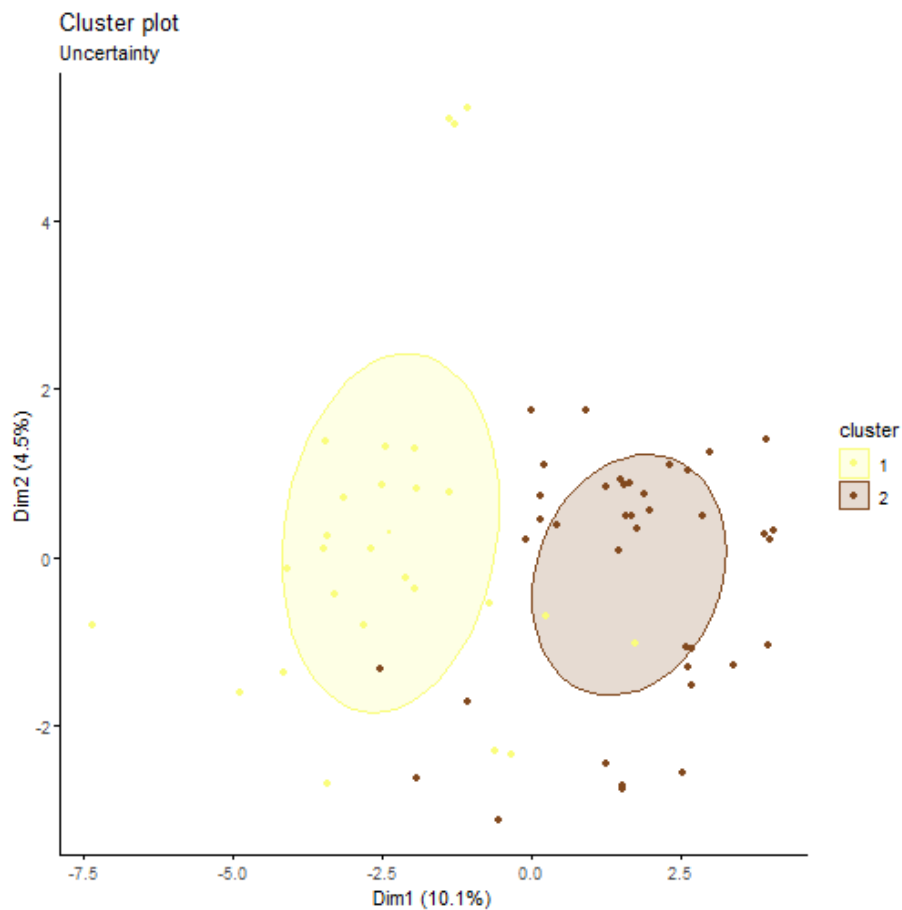
```
fviz_mclust(mc.best, "uncertainty", palette = "npg")
```

```
## Too few points to calculate an ellipse
```
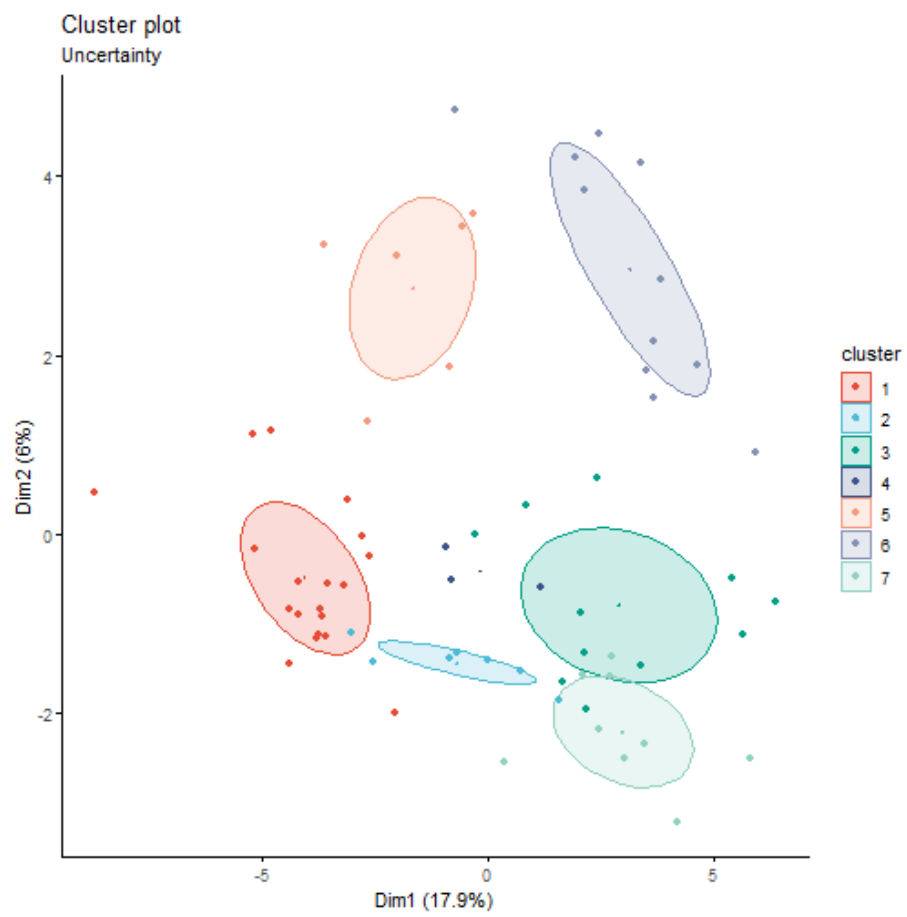
```
fviz_mclust(mcT.best, "uncertainty", palette = "rickandmorty")
```

Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing *Ctrl+Alt+I*.

When you save the notebook, an HTML file containing the code and output will be saved alongside it (click the *Preview* button or press *Ctrl+Shift+K* to preview the HTML file).

The preview shows you a rendered HTML copy of the contents of the editor. Consequently, unlike *Knit*, *Preview* does not run any R code chunks. Instead, the output of the chunk when it was last run in the editor is displayed.