Neuromas PubMed

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This script takes ten articles from the abstracts on earache articles from NCBI's PubMed

This creates a directory to stem the abstracts and preprocess from the csv file into a corpus of 20 files in a folder called Earache.

```
Auto <- read.csv('neuroma_PubMed_abstracts.csv', sep=',',
                 header=TRUE, na.strings=c('',' '))

auto <- Auto[complete.cases(Auto$abstract),]


dir.create('./neuromas')

ea <- as.character(auto$abstract)
setwd('./neuromas')

for (j in 1:length(ea)){
  write(ea[j], paste(paste('EA',j, sep='.'), '.txt', sep=''))
}
setwd('../')
```

This code preprocesses and stems the corpus

```
library(tm)
library(SnowballC)
library(wordcloud)
library(ggplot2)

neuromas <- Corpus(DirSource("neuromas"))


neuromas
```

```
## <<SimpleCorpus>>
## Metadata:  corpus specific: 1, document level (indexed): 0
## Content:  documents: 20
```

```
#neuromas <- tm_map(neuromas, removePunctuation)
#neuromas <- tm_map(neuromas, removeNumbers)
neuromas <- tm_map(neuromas, tolower)
neuromas <- tm_map(neuromas, removeWords, stopwords("english"))
neuromas <- tm_map(neuromas, stripWhitespace)
neuromas <- tm_map(neuromas, stemDocument)

dtmneuromas <- DocumentTermMatrix(neuromas)
```

```
freq <- colSums(as.matrix(dtmneuromas))
```

This code orders words stemmed by frequency and finds input correlations

```
FREQ <- data.frame(freq)
ord <- order(freq, decreasing=TRUE)

freq[head(ord, 25)]
```

```
##        morton       neuroma       patient          nerv          pain
##            39            37            35            33            31
##        clinic     forefoot        inject     keywords:     neuroma;
##            29            25            25            19            18
##         month          foot     treatment intermetatars         studi
##            18            17            17            17            14
##           use      neuroma.       plantar      signific        assess
##            14            14            13            13            12
##          ankl      diagnosi        differ         level      results:
##            12            12            11            11            11
```

```
findAssocs(dtmneuromas, "plantar", corlimit=0.5)
```

```
## $plantar
##              may            allow           anatom            foot;
##             0.84             0.80             0.80             0.80
##            digit           condit              (34          (mppdn)
##             0.78             0.75             0.72             0.72
##         (mppdn).       0.4-1.4).              0.8             1-8)
##             0.72             0.72             0.72             0.72
##           19-27)           2-9).           adjac           adult
##             0.72             0.72             0.72             0.72
##        analysed.         anatomy;    applications.            boni
##             0.72             0.72             0.72             0.72
##           border           branch            clear       consensus.
##             0.72             0.72             0.72             0.72
##          consist           cours          course.       cross-sect
##             0.72             0.72             0.72             0.72
##       cuneiform.         defined.           depict           detect
##             0.72             0.72             0.72             0.72
##           direct       distally,           entir            first
##             0.72             0.72             0.72             0.72
##          hallux.         hallux;          healthi     high-resolut
##             0.72             0.72             0.72             0.72
##           joint,           joplin           known         landmark
##             0.72             0.72             0.72             0.72
##             long              map          materi           medial
##             0.72             0.72             0.72             0.72
## metatarsophalang              mm2           mppdn    musculoskelet
##             0.72             0.72             0.72             0.72
##          nerves)       position,           precis           proper
##             0.72             0.72             0.72             0.72
```

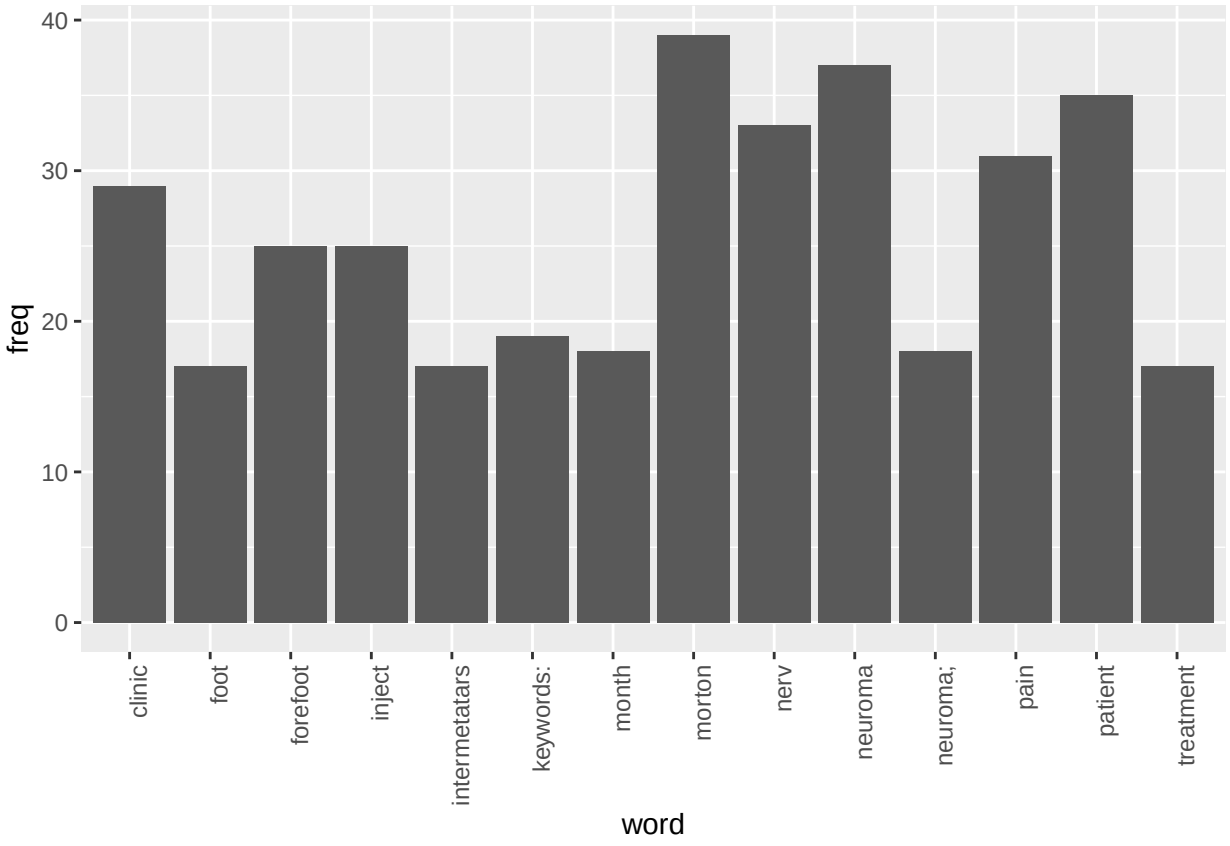
```
##      radiologist          respect             rise         sesamoid
##             0.72             0.72             0.72             0.72
##         specimen          trauma,       undertaken           volunt
##             0.72             0.72             0.72             0.72
##            along            (rang            locat             head
##             0.70             0.68             0.60             0.58
##            divid             area              key       ultrasound
##             0.53             0.53             0.53             0.51
```

```
findAssocs(dtmneuromas, "pain", corlimit=0.5)
```

```
## $pain
##        sever         left      (3/10).    (nsaids).       1/10).
##         0.82         0.80         0.79         0.79         0.79
##          10.  50-year-old   abduction,    allodynia         anti
##         0.79         0.79         0.79         0.79         0.79
##  antidepress       aspect         away         back        block
##         0.79         0.79         0.79         0.79         0.79
##       block;    buttocks.      central          cm.     contract
##         0.79         0.79         0.79         0.79         0.79
##         cyst    detected.   dorsolater         drug electric-lik
##         0.79         0.79         0.79         0.79         0.79
##    eversion,         exam    experienc   extension.     flexion,
##         0.79         0.79         0.79         0.79         0.79
##        foot,      gluteal          goe          hip        incis
##         0.79         0.79         0.79         0.79         0.79
##    incision. inflammatori    injected. intercourse.         leg.
##         0.79         0.79         0.79         0.79         0.79
##       length         limp       manner       midlin         mild
##         0.79         0.79         0.79         0.79         0.79
##       mixtur        motor    movement.        muscl     neoplasm
##         0.79         0.79         0.79         0.79         0.79
##      nervous    neuropath   nonsteroid      nsaids,    observed.
##         0.79         0.79         0.79         0.79         0.79
##      ovarian       palpat     parallel  pharmacolog       physic
##         0.79         0.79         0.79         0.79         0.79
##     pinprick       plexus        point  pregabalin.     prescrib
##         0.79         0.79         0.79         0.79         0.79
##        rare.     reappear        refer     removed.      repetit
##         0.79         0.79         0.79         0.79         0.79
##         rest       reveal         root        root.          s2.
##         0.79         0.79         0.79         0.79         0.79
##       sacral  schwannoma.   schwanomma      sciatic       sensat
##         0.79         0.79         0.79         0.79         0.79
##        shown          sit        start       stimul     surgery,
##         0.79         0.79         0.79         0.79         0.79
##     systems.         take        thigh       touch,      trigger
##         0.79         0.79         0.79         0.79         0.79
##         upon        woman      persist        lower      surgeri
##         0.79         0.79         0.78         0.77         0.77
##          leg       reduct   temperatur          toe        excis
##         0.75         0.69         0.69         0.69         0.69
##         (vas          day      patient       analog       despit
##         0.69         0.69         0.66         0.66         0.65
```

```
##        later       visual     peripher      histori          old
##         0.65         0.64         0.63         0.61         0.61
##     previous      sensori         year        (vas)         free
##         0.61         0.61         0.61         0.61         0.61
##         nerv        pain.
##         0.57         0.53
```

```
wf <- data.frame(word=names(freq), freq=freq)
p <- ggplot(subset(wf, freq>16), aes(word, freq))
p <- p + geom_bar(stat= 'identity')
p <- p + theme(axis.text.x=element_text(angle=90, hjust=1))
p
```




```
wordcloud(names(freq), freq, min.freq=15,colors=brewer.pal(3,'Dark2'))
```


```
wordcloud(names(freq), freq, max.words=30,colors=brewer.pal(6,'Dark2'))
```

The above stemmed the corpus, this will lemmatize the original csv file

and add the field to the table and write out to csv, followed by plot the word count frequencies that were lemmatized and the word clouds

```
library(textstem)

lemma <- lemmatize_strings(auto$abstract, dictionary=lexicon::hash_lemmas)

Lemma <- as.data.frame(lemma)
Lemma <- cbind(Lemma, auto)

colnames(Lemma) <- c('lemmatizedAbstract','abstract', 'source')

write.csv(Lemma, 'Lemmatizedneuromas.csv', row.names=FALSE)
```

```
dir.create('./neuromas-Lemma')

ea <- as.character(Lemma$lemmatizedAbstract)
setwd('./neuromas-Lemma')

for (j in 1:length(ea)){
  write(ea[j], paste(paste('EAL',j, sep='.'), '.txt', sep=''))
}
setwd('../')
```

```r
library(tm)
library(SnowballC)
library(wordcloud)
library(ggplot2)
```

```r
neuromas <- Corpus(DirSource("neuromas-Lemma"))

neuromas
```

```
## <<SimpleCorpus>>
## Metadata:  corpus specific: 1, document level (indexed): 0
## Content:  documents: 20
```

```r
#neuromas <- tm_map(neuromas, removePunctuation)
#neuromas <- tm_map(neuromas, removeNumbers)
neuromas <- tm_map(neuromas, tolower)
neuromas <- tm_map(neuromas, removeWords, stopwords("english"))
neuromas <- tm_map(neuromas, stripWhitespace)

dtmneuromas <- DocumentTermMatrix(neuromas)
dtmneuromas
```

```
## <<DocumentTermMatrix (documents: 20, terms: 1087)>>
## Non-/sparse entries: 1883/19857
## Sparsity           : 91%
## Maximal term length: 19
## Weighting          : term frequency (tf)
```

```r
freq <- colSums(as.matrix(dtmneuromas))

FREQ <- data.frame(freq)
ord <- order(freq, decreasing=TRUE)

freq[head(ord, 25)]
```

```
##         neuroma           nerve         patient        morton's
##              38              35              33              29
##            pain       forefoot       injection        clinical
##              27              25              25              24
##           month      ultrasound        keyword:        neuroma;
##              20              20              19              18
##            foot       treatment intermetatarsal          follow
##              17              17              17              16
##           study         plantar     significant             use
##              14              13              13              13
##        neuroma.           guide            case         control
##              13              13              12              12
##           group
##              12
```

```
pain <- as.data.frame(findAssocs(dtmneuromas, "pain", corlimit=0.70))

ultrasounds <- as.data.frame(findAssocs(dtmneuromas, "ultrasound", corlimit=0.75))


treatment <- as.data.frame(findAssocs(dtmneuromas, "treatment", corlimit=0.55))

pain
```

```
##                 pain
## leave           0.86
## severe          0.85
## 10.             0.85
## abduction,      0.85
## allodynia       0.85
## anti            0.85
## antidepressant  0.85
## aspect          0.85
## away            0.85
## back            0.85
## block           0.85
## block;          0.85
## buttock.        0.85
## central         0.85
## cm.             0.85
## contraction     0.85
## detect.         0.85
## dorsolateral    0.85
## drug            0.85
## electric        0.85
## eversion,       0.85
## exam            0.85
## extension.      0.85
## flexion,        0.85
## foot,           0.85
## gluteal         0.85
## hip             0.85
## incision        0.85
## incision.       0.85
## inflammatory    0.85
## inject.         0.85
## intercourse.    0.85
## late            0.85
## leg.            0.85
## length          0.85
## limp            0.85
## manage          0.85
## manner          0.85
## midline         0.85
## mild            0.85
## mixture         0.85
## motor           0.85
## movement.       0.85
```

```
## muscle          0.85
## neoplasm        0.85
## nervous         0.85
## neurologic      0.85
## neuropathic     0.85
## nonsteroidal    0.85
## nsaids          0.85
## nsaids,         0.85
## observe.        0.85
## ovarian         0.85
## palpation       0.85
## parallel        0.85
## patient's       0.85
## persistent      0.85
## pharmacological 0.85
## physical        0.85
## pinprick        0.85
## plexus          0.85
## point           0.85
## pregabalin.     0.85
## prescribe       0.85
## rare.           0.85
## reappear        0.85
## refer           0.85
## remove.         0.85
## repetitive      0.85
## rest            0.85
## reveal          0.85
## root            0.85
## root.           0.85
## s2.             0.85
## sacral          0.85
## schwannoma.     0.85
## schwanommas     0.85
## sciatic         0.85
## sensation       0.85
## severity        0.85
## sit             0.85
## start           0.85
## stimulation     0.85
## stimulator      0.85
## surgery,        0.85
## system.         0.85
## take            0.85
## thigh           0.85
## touch,          0.85
## trigger         0.85
## upon            0.85
## woman           0.85
## leg             0.81
## old             0.81
## low             0.80
## excision        0.75
## day             0.75
```

```
## several         0.75
## despite         0.71
```

```
ultrasounds
```

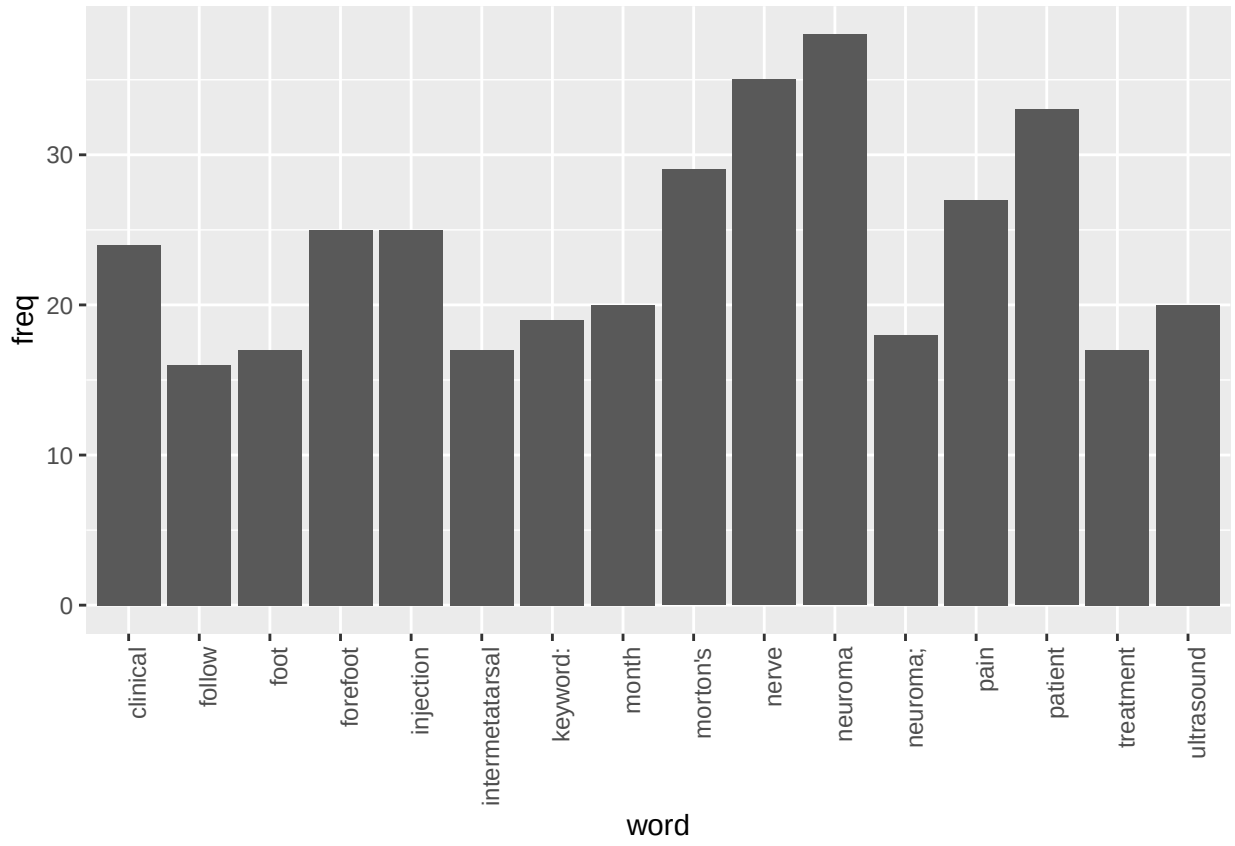
```
##                 ultrasound
## point:?               0.87
## work                  0.87
## include               0.83
## guide                 0.79
## ultrasonography       0.79
## 0.5                   0.79
## 0.5,                  0.79
## 001;                  0.79
## 002;                  0.79
## 010;                  0.79
## 018                   0.79
## 020                   0.79
## 047                   0.79
## 1.8                   0.79
## 1.9                   0.79
## 2.0,                  0.79
## 3.0                   0.79
## 3.1                   0.79
## 31.2                  0.79
## 31.5                  0.79
## 37.7                  0.79
## 38.5                  0.79
## 38.8                  0.79
## 5.2                   0.79
## 5.5                   0.79
## 5.6                   0.79
## age                   0.79
## appropriate           0.79
## day,                  0.79
## disability            0.79
## evaluator             0.79
## initial               0.79
## injection.?           0.79
## interventional        0.79
## manchester            0.79
## mepivacaine           0.79
## mfpds                 0.79
## mfpds:                0.79
## patient,              0.79
## patient.?             0.79
## randomise             0.79
## stage                 0.79
## triamcinolone         0.79
## va:                   0.79
## versus                0.79
## web                   0.79
## blind                 0.77
```

```
treatment
```

```
##                 treatment
## randomize            0.80
## last                 0.73
## case                 0.65
## anesthetic           0.59
## 2015.                0.58
## 283                  0.58
## august               0.58
## benefit              0.58
## bibliographic        0.58
## cochrane             0.58
## collect.             0.58
## conservative,        0.58
## conservative;        0.58
## criterion.           0.58
## dare.                0.58
## different            0.58
## english              0.58
## evaluation           0.58
## find,                0.58
## include.             0.58
## inclusion            0.58
## independently.       0.58
## infiltrative         0.58
## infiltrative.        0.58
## infiltrative;        0.58
## library,             0.58
## medline,             0.58
## meet                 0.58
## operative            0.58
## operative,           0.58
## outcome              0.58
## patients'            0.58
## primary              0.58
## quality,             0.58
## ratio                0.58
## rcts                 0.58
## result.              0.58
## retrieve             0.58
## reviewer             0.58
## risk                 0.58
## satisfaction         0.58
## series               0.58
## surgery;             0.58
## title                0.58
## trial                0.58
## type                 0.58
## 48.                  0.58
## alone                0.58
## alone.               0.58
## baseline             0.58
## baseline,            0.58
```

```
## collect              0.58
## comparison           0.58
## corticosteroid;      0.58
## experimental         0.58
## forty                0.58
## injection,           0.58
## interphalangeal      0.58
## local                0.58
## neuroma:             0.58
## obtain               0.58
## orthopaedic          0.58
## placebo              0.58
## plus                 0.58
## receive              0.58
## request              0.58
## researcher           0.58
## superior             0.58
## unclear.             0.58
## value.               0.58
```

```
wf <- data.frame(word=names(freq), freq=freq)
p <- ggplot(subset(wf, freq>15), aes(word, freq))
p <- p + geom_bar(stat= 'identity')
p <- p + theme(axis.text.x=element_text(angle=90, hjust=1))
p
```



```
wordcloud(names(freq), freq, min.freq=14,colors=brewer.pal(3,'Dark2'))
```

```
## Warning in wordcloud(names(freq), freq, min.freq = 14, colors =
## brewer.pal(3, : patient could not be fit on page. It will not be plotted.
```


```
wordcloud(names(freq), freq, max.words=40,colors=brewer.pal(6,'Dark2'))
```

```
## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : intermetatarsal could not be fit on page. It will not be
## plotted.

## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : injection could not be fit on page. It will not be plotted.

## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : morton's could not be fit on page. It will not be plotted.

## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : recommendation could not be fit on page. It will not be
## plotted.

## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : pain could not be fit on page. It will not be plotted.
```

```
## Warning in wordcloud(names(freq), freq, max.words = 40, colors =
## brewer.pal(6, : patient could not be fit on page. It will not be plotted.
```