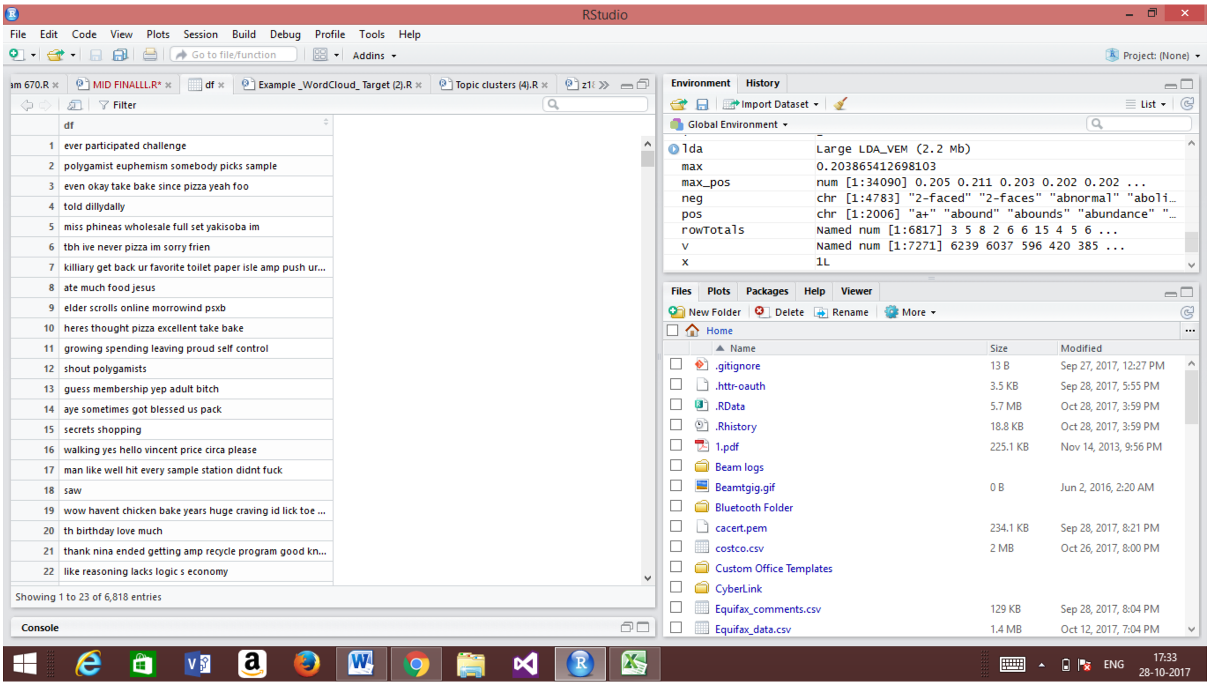
Data description

Being an avid shopper at Costco, I personally like the range of varieties it offers in all kinds of shopping. I usually suggest all my friends and family to shop at Costco. With the help of this data anlaysis, I can show them real statistics based on the reviews I searched. I conducted data analysis on costco to check how often people shop at costco and what they feel about the range of products at costco offers.

Structured data after text processing



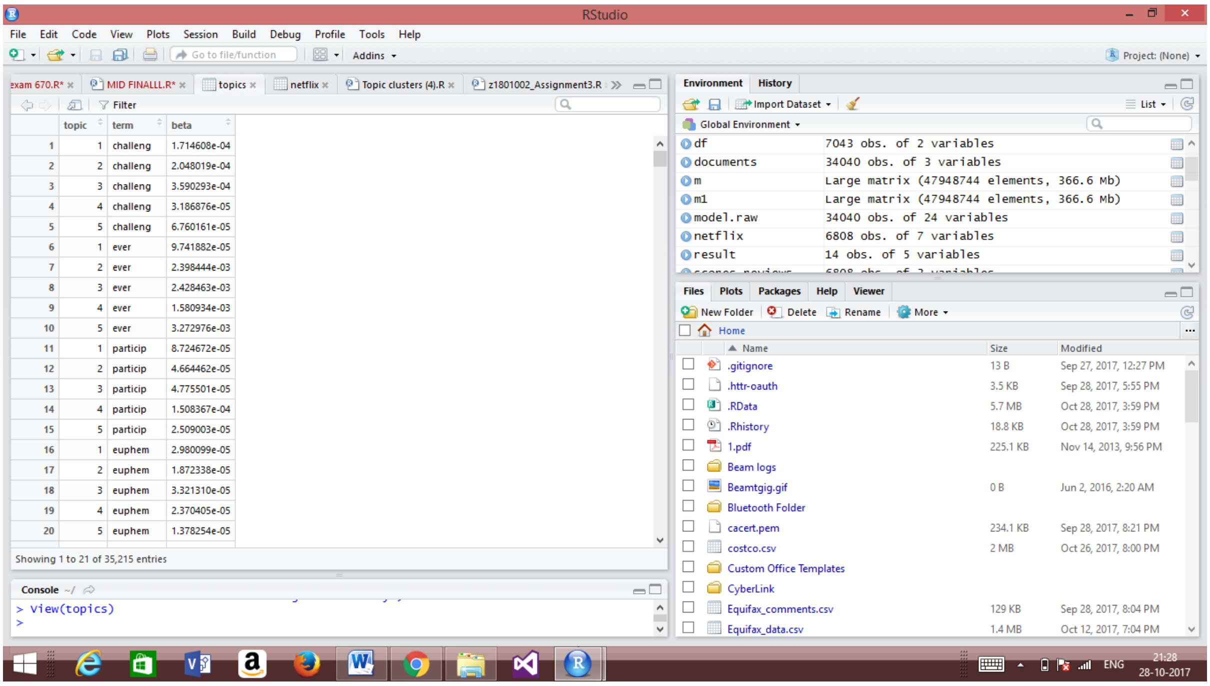
	df
1	ever participated challenge
2	polygamist euphemism somebody picks sample
3	even okay take bake since pizza yeah foo
4	told dillydally
5	miss phineas wholesale full set yakisoba im
6	tbh ive never pizza im sorry frien
7	killiary get back ur favorite toilet paper isle amp push ur...
8	ate much food jesus
9	elder scrolls online morrowind psxb
10	heres thought pizza excellent take bake
11	growing spending leaving proud self control
12	shout polygamists
13	guess membership yep adult bitch
14	aye sometimes got blessed us pack
15	secrets shopping
16	walking yes hello vincent price circa please
17	man like well hit every sample station didnt fuck
18	saw
19	wow havent chicken bake years huge craving id lick toe ...
20	th birthday love much
21	thank nina ended getting amp recycle program good kn...
22	like reasoning lacks logic s economy

Showing 1 to 23 of 6,818 entries

```
lda          Large LDA_VEM (2.2 Mb)
max          0.203865412698103
max_pos      num [1:34090] 0.205 0.211 0.203 0.202 0.202 ...
neg          chr [1:4783] "2-faced" "2-faces" "abnormal" "aboli…
pos          chr [1:2006] "a+" "abound" "abounds" "abundance" "…
rowTotals    Named num [1:6817] 3 5 8 2 6 6 15 4 5 6 ...
v            Named num [1:7271] 6239 6037 596 420 385 ...
x            1L
```

Name	Size	Modified
.gitignore	13 B	Sep 27, 2017, 12:27 PM
.httr-oauth	3.5 KB	Sep 28, 2017, 5:55 PM
.RData	5.7 MB	Oct 28, 2017, 3:59 PM
.Rhistory	18.8 KB	Oct 28, 2017, 3:59 PM
1.pdf	225.1 KB	Nov 14, 2013, 9:56 PM
Beam logs		
Beamtgig.gif	0 B	Jun 2, 2016, 2:20 AM
Bluetooth Folder		
cacert.pem	234.1 KB	Sep 28, 2017, 8:21 PM
costco.csv	2 MB	Oct 26, 2017, 8:00 PM
Custom Office Templates		
CyberLink		
Equifax_comments.csv	129 KB	Sep 28, 2017, 8:04 PM
Equifax_data.csv	1.4 MB	Oct 12, 2017, 7:04 PM

Topic numbers



	topic	term	beta
1	1	challeng	1.714608e-04
2	2	challeng	2.048019e-04
3	3	challeng	3.590293e-04
4	4	challeng	3.186876e-05
5	5	challeng	6.760161e-05
6	1	ever	9.741882e-05
7	2	ever	2.398444e-03
8	3	ever	2.428463e-03
9	4	ever	1.580934e-03
10	5	ever	3.272976e-03
11	1	particip	8.724672e-05
12	2	particip	4.664462e-05
13	3	particip	4.775501e-05
14	4	particip	1.508367e-04
15	5	particip	2.509003e-05
16	1	euphem	2.980099e-05
17	2	euphem	1.872338e-05
18	3	euphem	3.321310e-05
19	4	euphem	2.370405e-05
20	5	euphem	1.378254e-05

Showing 1 to 21 of 35,215 entries

```
> View(topics)
>
```

```
df           7043 obs. of 2 variables
documents    34040 obs. of 3 variables
m            Large matrix (47948744 elements, 366.6 Mb)
m1           Large matrix (47948744 elements, 366.6 Mb)
model.raw    34040 obs. of 24 variables
netflix      6808 obs. of 7 variables
result       14 obs. of 5 variables
```

Name	Size	Modified
.gitignore	13 B	Sep 27, 2017, 12:27 PM
.httr-oauth	3.5 KB	Sep 28, 2017, 5:55 PM
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.Rhistory	18.8 KB	Oct 28, 2017, 3:59 PM
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Beam logs		
Beamtgig.gif	0 B	Jun 2, 2016, 2:20 AM
Bluetooth Folder		
cacert.pem	234.1 KB	Sep 28, 2017, 8:21 PM
costco.csv	2 MB	Oct 26, 2017, 8:00 PM
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CyberLink		
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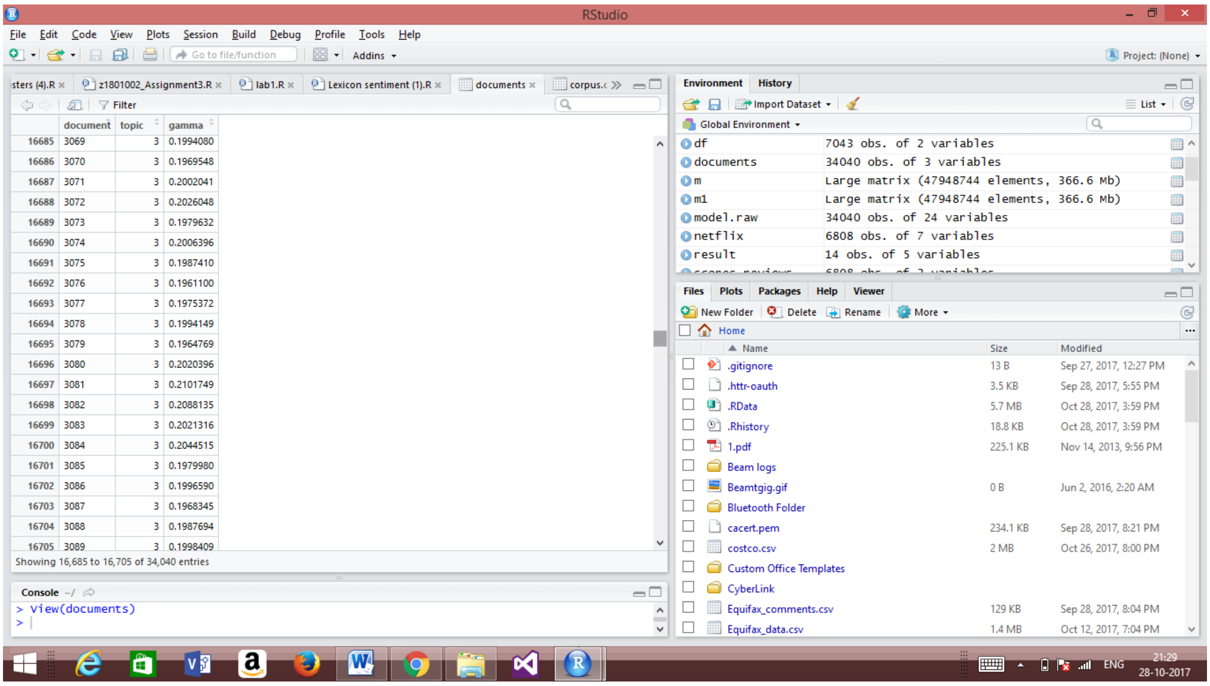

	document	topic	gamma
16685	3069	3	0.1994080
16686	3070	3	0.1969548
16687	3071	3	0.2002041
16688	3072	3	0.2026048
16689	3073	3	0.1979632
16690	3074	3	0.2006396
16691	3075	3	0.1987410
16692	3076	3	0.1961100
16693	3077	3	0.1975372
16694	3078	3	0.1994149
16695	3079	3	0.1964769
16696	3080	3	0.2020396
16697	3081	3	0.2101749
16698	3082	3	0.2088135
16699	3083	3	0.2021316
16700	3084	3	0.2044515
16701	3085	3	0.1979980
16702	3086	3	0.1996590
16703	3087	3	0.1968345
16704	3088	3	0.1987694
16705	3089	3	0.1998409

Showing 16,685 to 16,705 of 34,040 entries

Console ~/

```
> View(documents)
> 
```

```
df             7043 obs. of 2 variables
documents      34040 obs. of 3 variables
m              Large matrix (47948744 elements, 366.6 Mb)
m1             Large matrix (47948744 elements, 366.6 Mb)
model.raw      34040 obs. of 24 variables
netflix        6808 obs. of 7 variables
result         14 obs. of 5 variables
```

Name	Size	Modified
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Beam logs		
Beamtgig.gif	0 B	Jun 2, 2016, 2:20 AM
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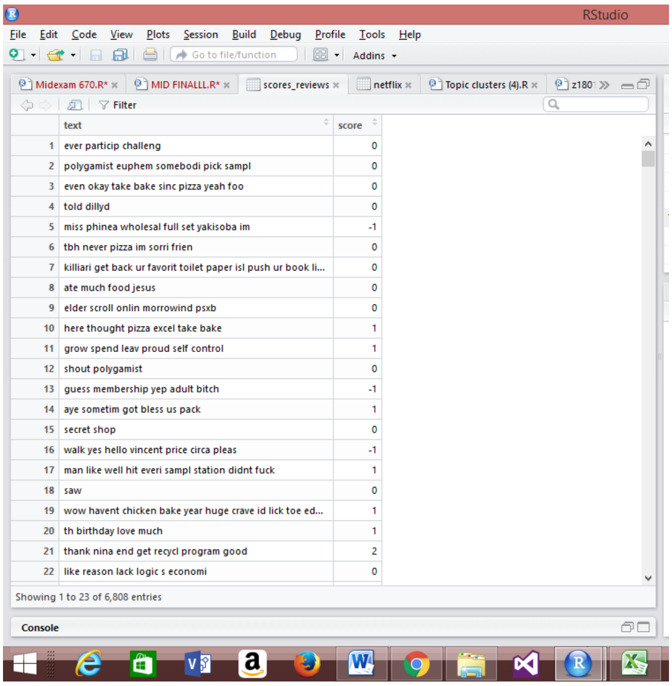
Custom Office Templates		
CyberLink		
Equifax_comments.csv	129 KB	Sep 28, 2017, 8:04 PM
Equifax_data.csv	1.4 MB	Oct 12, 2017, 7:04 PM

```
   document topic     gamma
      <chr> <int>     <dbl>
 1        1     1 0.1988803
 2        2     1 0.1990961
 3        3     1 0.2030079
 4        4     1 0.2017868
 5        5     1 0.2024302
 6        6     1 0.1963707
 7        7     1 0.1928946
 8        8     1 0.1985521
 9        9     1 0.1956651
10       10     1 0.1983563
# ... with 34,030 more rows
```

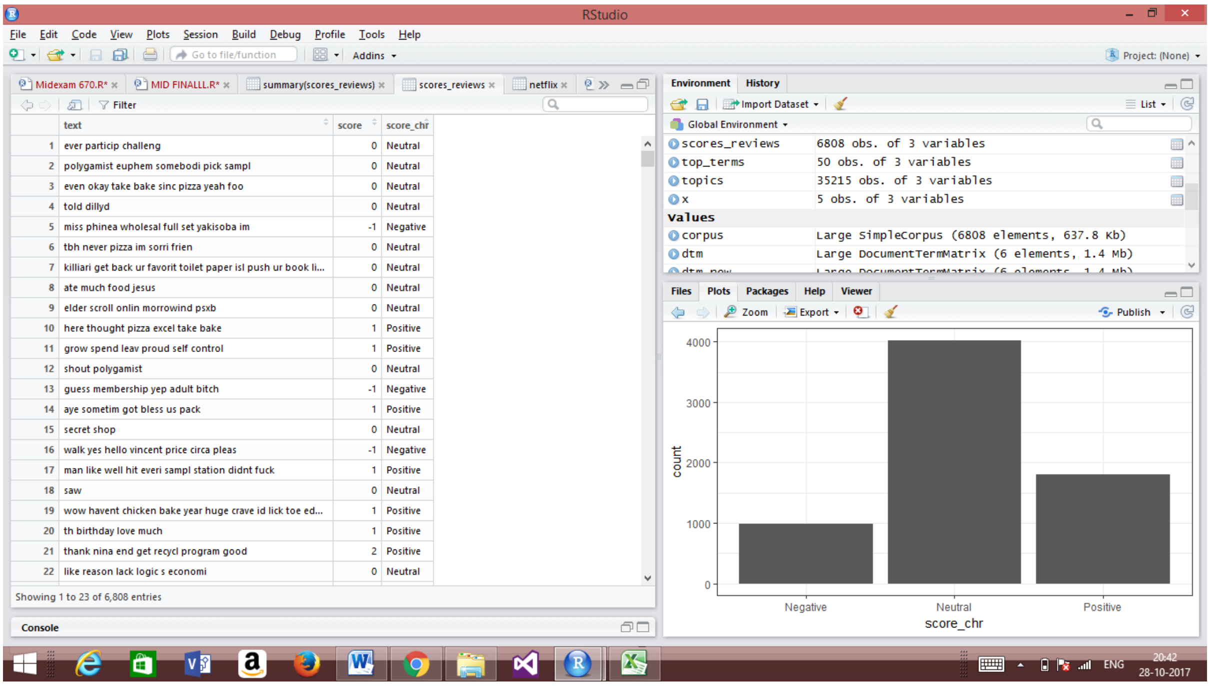
Sentiment Label



	text	score
1	ever particip challeng	0
2	polygamist euphem somebodi pick sampl	0
3	even okay take bake sinc pizza yeah foo	0
4	told dillyd	0
5	miss phinea wholesal full set yakisoba im	-1
6	tbh never pizza im sorri frien	0
7	killiari get back ur favorit toilet paper isl push ur book li...	0
8	ate much food jesus	0
9	elder scroll onlin morrowind psxb	0
10	here thought pizza excel take bake	1
11	grow spend leav proud self control	1
12	shout polygamist	0
13	guess membership yep adult bitch	-1
14	aye sometim got bless us pack	1
15	secret shop	0
16	walk yes hello vincent price circa pleas	-1
17	man like well hit everi sampl station didnt fuck	1
18	saw	0
19	wow havent chicken bake year huge crave id lick toe ed...	1
20	th birthday love much	1
21	thank nina end get recycl program good	2
22	like reason lack logic s economi	0

Showing 1 to 23 of 6,808 entries

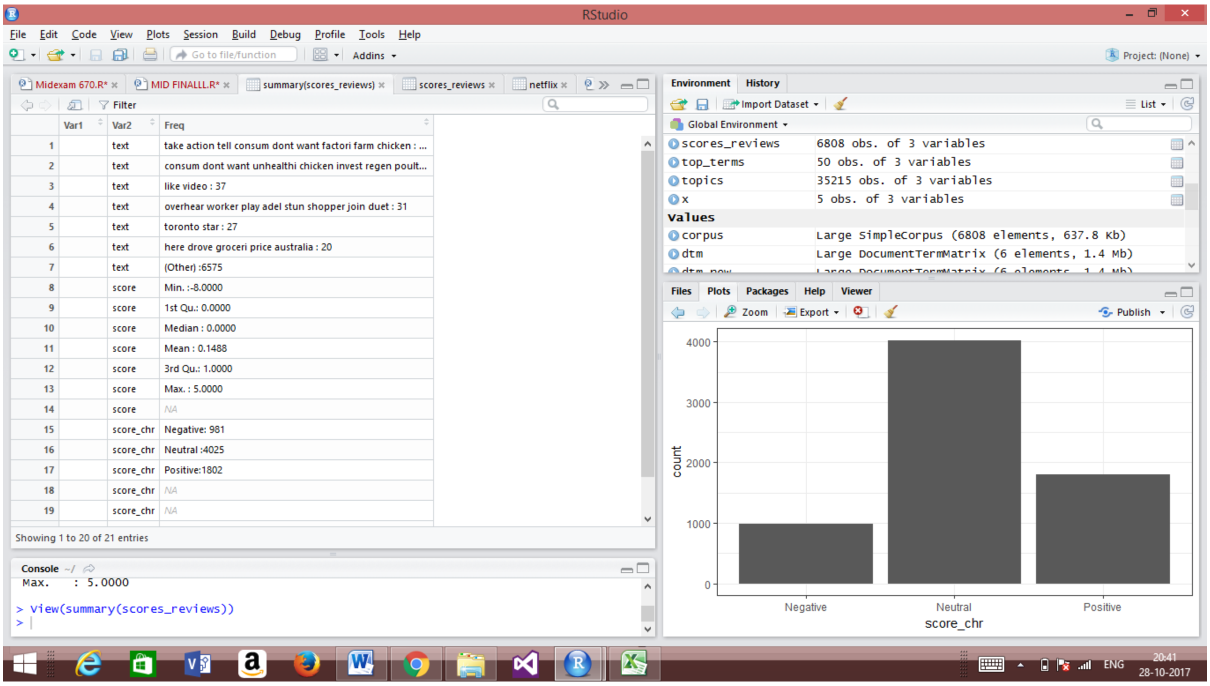
Sentiment Score



	text	score	score_chr
1	ever particip challeng	0	Neutral
2	polygamist euphem somebodi pick sampl	0	Neutral
3	even okay take bake sinc pizza yeah foo	0	Neutral
4	told dillyd	0	Neutral
5	miss phinea wholesal full set yakisoba im	-1	Negative
6	tbh never pizza im sorri frien	0	Neutral
7	killiari get back ur favorit toilet paper isl push ur book li...	0	Neutral
8	ate much food jesus	0	Neutral
9	elder scroll onlin morrowind psxb	0	Neutral
10	here thought pizza excel take bake	1	Positive
11	grow spend leav proud self control	1	Positive
12	shout polygamist	0	Neutral
13	guess membership yep adult bitch	-1	Negative
14	aye sometim got bless us pack	1	Positive
15	secret shop	0	Neutral
16	walk yes hello vincent price circa pleas	-1	Negative
17	man like well hit everi sampl station didnt fuck	1	Positive
18	saw	0	Neutral
19	wow havent chicken bake year huge crave id lick toe ed...	1	Positive
20	th birthday love much	1	Positive
21	thank nina end get recycl program good	2	Positive
22	like reason lack logic s economi	0	Neutral

Showing 1 to 23 of 6,808 entries

```
scores_reviews    6808 obs. of 3 variables
top_terms         50 obs. of 3 variables
topics            35215 obs. of 3 variables
x                 5 obs. of 3 variables
Values
corpus            Large SimpleCorpus (6808 elements, 637.8 Kb)
dtm               Large DocumentTermMatrix (6 elements, 1.4 Mb)
dtm_new           Large DocumentTermMatrix (6 elements, 1.4 Mb)
```



	Var1	Var2	Freq
1		text	take action tell consum dont want factori farm chicken : ...
2		text	consum dont want unhealthi chicken invest regen poult...
3		text	like video : 37
4		text	overhear worker play adel stun shopper join duet : 31
5		text	toronto star : 27
6		text	here drove groceri price australia : 20
7		text	(Other) :6575
8		score	Min. :-8.0000
9		score	1st Qu.: 0.0000
10		score	Median : 0.0000
11		score	Mean : 0.1488
12		score	3rd Qu.: 1.0000
13		score	Max. : 5.0000
14		score	NA
15		score_chr	Negative: 981
16		score_chr	Neutral :4025
17		score_chr	Positive:1802
18		score_chr	NA
19		score_chr	NA

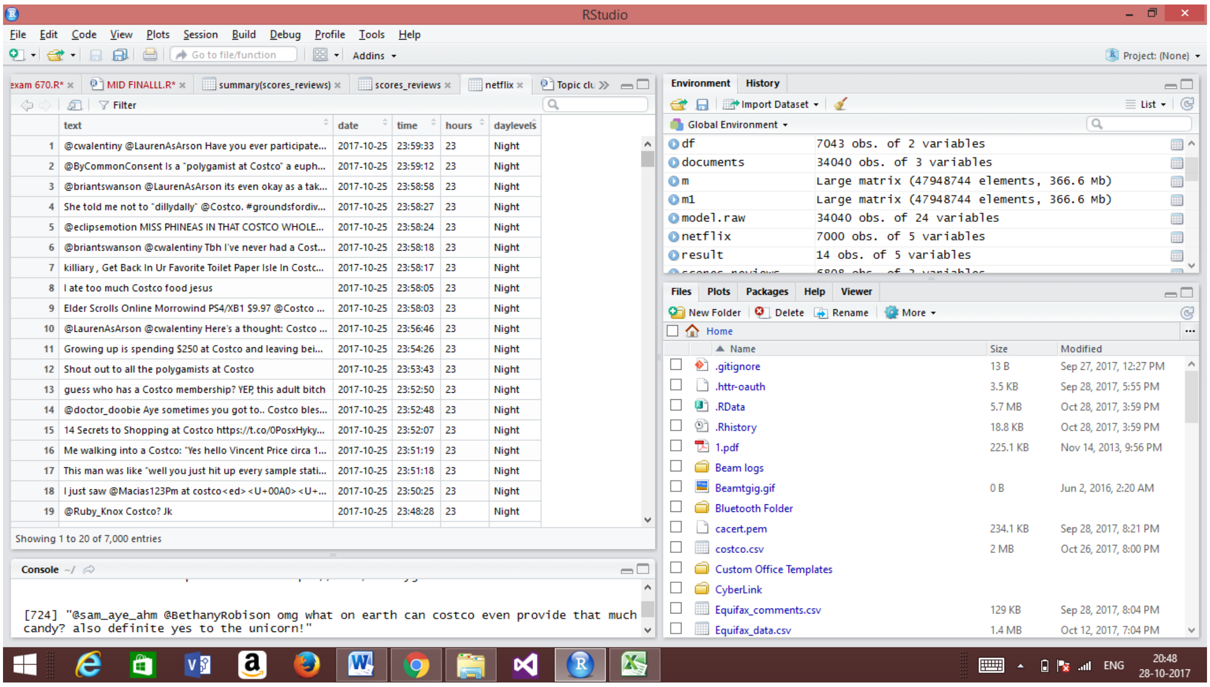
Showing 1 to 20 of 21 entries

Console ~/

```
 Max.   : 5.0000

> View(summary(scores_reviews))
> 
```

scores_reviews	6808 obs. of 3 variables
top_terms	50 obs. of 3 variables
topics	35215 obs. of 3 variables
x	5 obs. of 3 variables
Values	
corpus	Large SimpleCorpus (6808 elements, 637.8 Kb)
dtm	Large DocumentTermMatrix (6 elements, 1.4 Mb)

Hour of the day



	text	date	time	hours	daylevels
1	@cwalentiny @LaurenAsArson Have you ever participate...	2017-10-25	23:59:33	23	Night
2	@ByCommonConsent Is a "polygamist at Costco" a euph...	2017-10-25	23:59:12	23	Night
3	@briantswanson @LaurenAsArson its even okay as a tak...	2017-10-25	23:58:58	23	Night
4	She told me not to "dillydally" @Costco. #groundsfordiv...	2017-10-25	23:58:27	23	Night
5	@eclipsemotion MISS PHINEAS IN THAT COSTCO WHOLE...	2017-10-25	23:58:24	23	Night
6	@briantswanson @cwalentiny Tbh I've never had a Cost...	2017-10-25	23:58:18	23	Night
7	killiary , Get Back In Ur Favorite Toilet Paper Isle In Costc...	2017-10-25	23:58:17	23	Night
8	I ate too much Costco food jesus	2017-10-25	23:58:05	23	Night
9	Elder Scrolls Online Morrowind PS4/XB1 $9.97 @Costco ...	2017-10-25	23:58:03	23	Night
10	@LaurenAsArson @cwalentiny Here's a thought: Costco ...	2017-10-25	23:56:46	23	Night
11	Growing up is spending $250 at Costco and leaving bei...	2017-10-25	23:54:26	23	Night
12	Shout out to all the polygamists at Costco	2017-10-25	23:53:43	23	Night
13	guess who has a Costco membership? YEP, this adult bitch	2017-10-25	23:52:50	23	Night
14	@doctor_doobie Aye sometimes you got to.. Costco bles...	2017-10-25	23:52:48	23	Night
15	14 Secrets to Shopping at Costco https://t.co/0PosxHyky...	2017-10-25	23:52:07	23	Night
16	Me walking into a Costco: "Yes hello Vincent Price circa 1...	2017-10-25	23:51:19	23	Night
17	This man was like "well you just hit up every sample stati...	2017-10-25	23:51:18	23	Night
18	I just saw @Macias123Pm at costco<ed><U+00A0><U+...	2017-10-25	23:50:25	23	Night
19	@Ruby_Knox Costco? Jk	2017-10-25	23:48:28	23	Night

Showing 1 to 20 of 7,000 entries

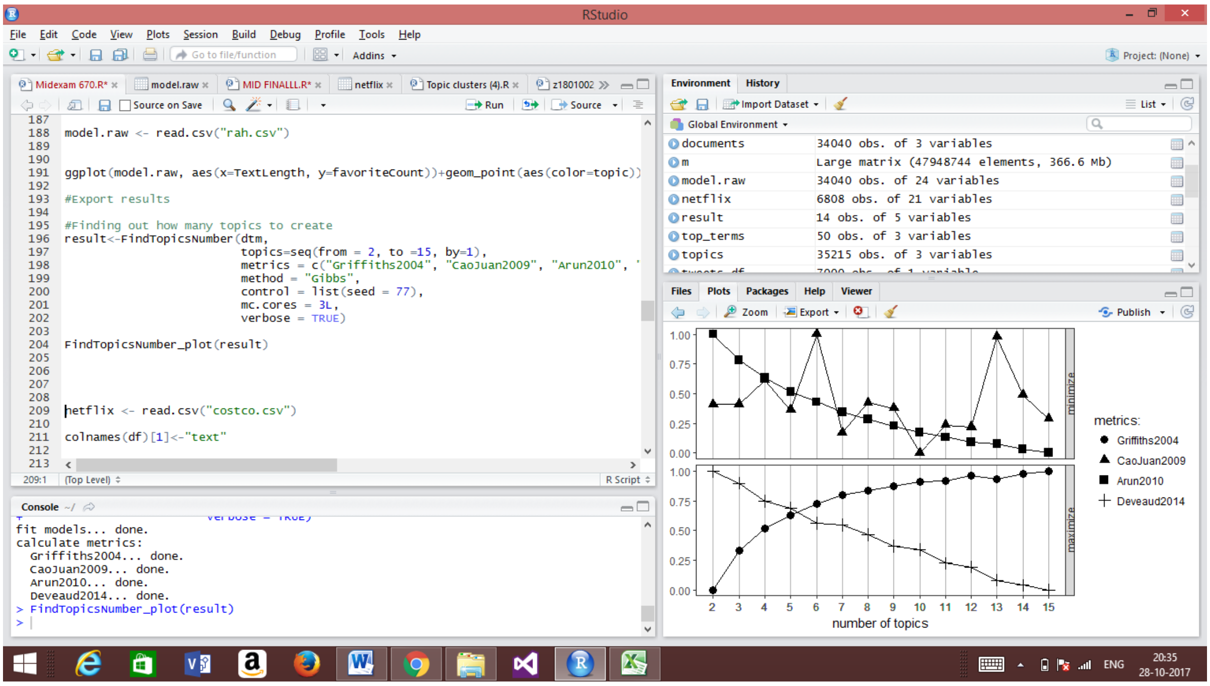
Console ~/

```
[724] "@sam_aye_ahm @BethanyRobison omg what on earth can costco even provide that much
candy? also definite yes to the unicorn!"
```

df	7043 obs. of 2 variables
documents	34040 obs. of 3 variables
m	Large matrix (47948744 elements, 366.6 Mb)
m1	Large matrix (47948744 elements, 366.6 Mb)
model.raw	34040 obs. of 24 variables
netflix	7000 obs. of 5 variables
result	14 obs. of 5 variables

Name	Size	Modified
.gitignore	13 B	Sep 27, 2017, 12:27 PM
.httr-oauth	3.5 KB	Sep 28, 2017, 5:55 PM
.RData	5.7 MB	Oct 28, 2017, 3:59 PM
.Rhistory	18.8 KB	Oct 28, 2017, 3:59 PM
1.pdf	225.1 KB	Nov 14, 2013, 9:56 PM
Beam logs		
Beamtgig.gif	0 B	Jun 2, 2016, 2:20 AM
Bluetooth Folder		
cacert.pem	234.1 KB	Sep 28, 2017, 8:21 PM
costco.csv	2 MB	Oct 26, 2017, 8:00 PM
Custom Office Templates		
CyberLink		
Equifax_comments.csv	129 KB	Sep 28, 2017, 8:04 PM
Equifax_data.csv	1.4 MB	Oct 12, 2017, 7:04 PM

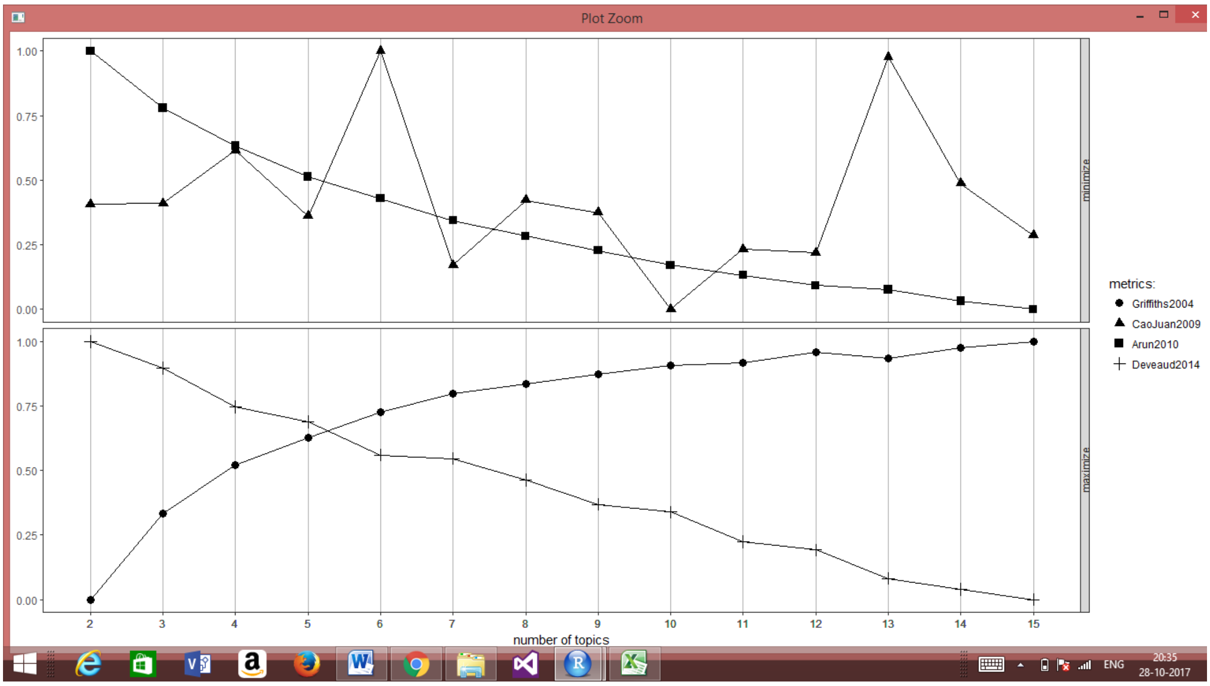
Test deciding on the number of topics generated



```
model.raw <- read.csv("rah.csv")


ggplot(model.raw, aes(x=TextLength, y=favoriteCount))+geom_point(aes(color=topic))

#Export results

#Finding out how many topics to create
result<-FindTopicsNumber(dtm,
                         topics=seq(from = 2, to =15, by=1),
                         metrics = c("Griffiths2004", "CaoJuan2009", "Arun2010", '
                         method = "Gibbs",
                         control = list(seed = 77),
                         mc.cores = 3L,
                         verbose = TRUE)

FindTopicsNumber_plot(result)




netflix <- read.csv("costco.csv")

colnames(df)[1]<-"text"
```

```
fit models... done.
calculate metrics:
  Griffiths2004... done.
  CaoJuan2009... done.
  Arun2010... done.
  Deveaud2014... done.
> FindTopicsNumber_plot(result)
>
```

```
documents     34040 obs. of 3 variables
m             Large matrix (47948744 elements, 366.6 Mb)
model.raw     34040 obs. of 24 variables
netflix       6808 obs. of 21 variables
result        14 obs. of 5 variables
top_terms     50 obs. of 3 variables
topics        35215 obs. of 3 variables
```



Simple approach is to analyze the metrics to find extremum.

minimization:

Arun2010

CaoJuan2009

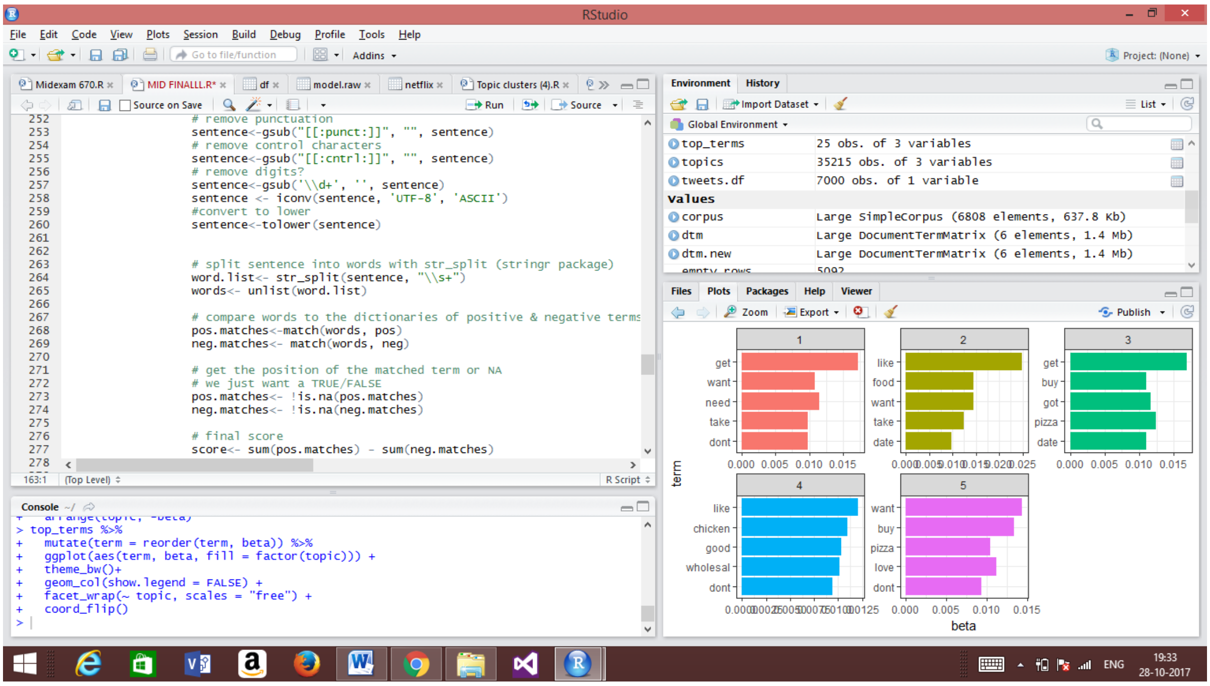
maximization:

Deveaud2014

Griffiths2004

From this plot we made conclusion that optimal number of topics is in range 7-10.

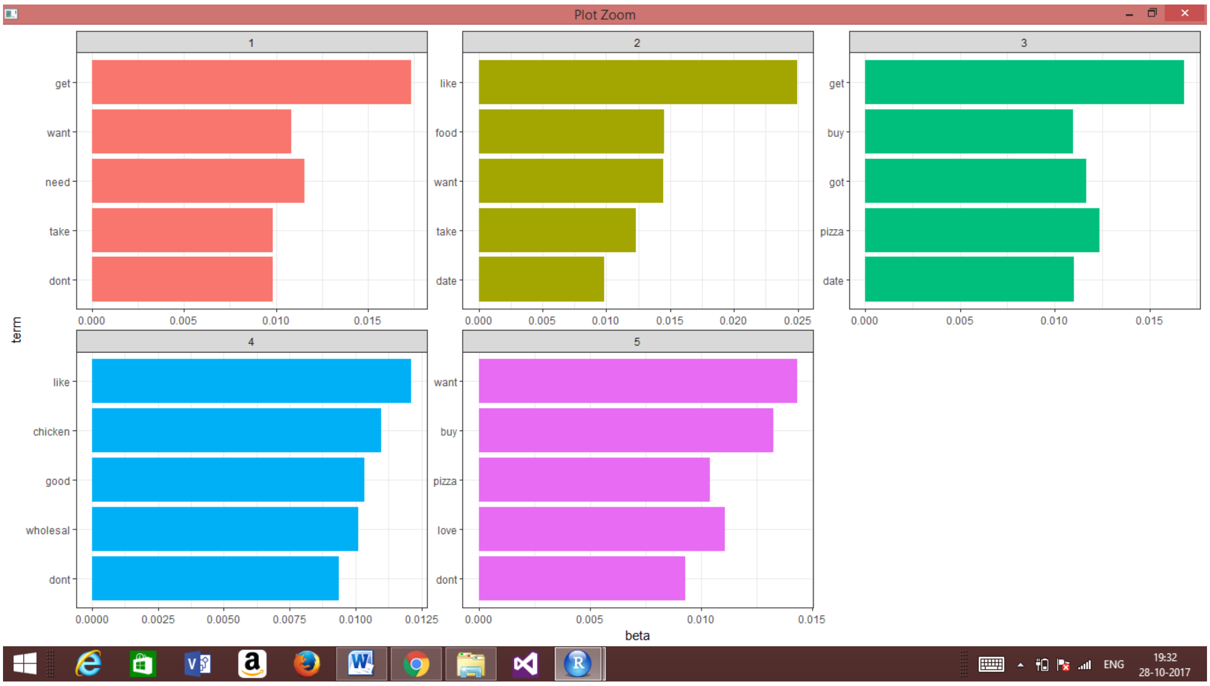
Top 5 words for each topic generated



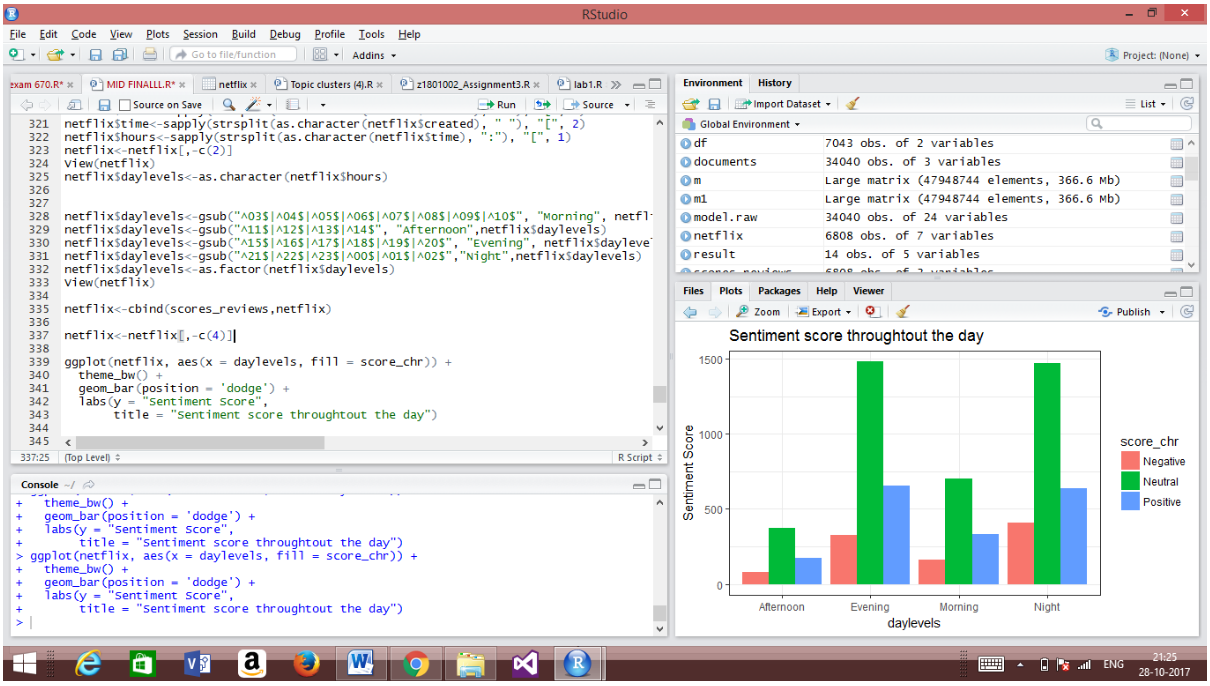
```
              # remove punctuation
              sentence<-gsub("[[:punct:]]", "", sentence)
              # remove control characters
              sentence<-gsub("[[:cntrl:]]", "", sentence)
              # remove digits?
              sentence<-gsub('\\d+', '', sentence)
              sentence <- iconv(sentence, 'UTF-8', 'ASCII')
              #convert to lower
              sentence<-tolower(sentence)


              # split sentence into words with str_split (stringr package)
              word.list<- str_split(sentence, "\\s+")
              words<- unlist(word.list)

              # compare words to the dictionaries of positive & negative terms
              pos.matches<-match(words, pos)
              neg.matches<- match(words, neg)

              # get the position of the matched term or NA
              # we just want a TRUE/FALSE
              pos.matches<- !is.na(pos.matches)
              neg.matches<- !is.na(neg.matches)

              # final score
              score<- sum(pos.matches) - sum(neg.matches)
```

```
> top_terms %>%
+   mutate(term = reorder(term, beta)) %>%
+   ggplot(aes(term, beta, fill = factor(topic))) +
+   theme_bw()+
+   geom_col(show.legend = FALSE) +
+   facet_wrap(~ topic, scales = "free") +
+   coord_flip()
>
```

```
top_terms     25 obs. of 3 variables
topics        35215 obs. of 3 variables
tweets.df     7000 obs. of 1 variable
Values
corpus        Large SimpleCorpus (6808 elements, 637.8 Kb)
dtm           Large DocumentTermMatrix (6 elements, 1.4 Mb)
dtm.new       Large DocumentTermMatrix (6 elements, 1.4 Mb)
```



Sentiment scores are varying over the time range



```r
netflix$time<-sapply(strsplit(as.character(netflix$created), " "), "[", 2)
netflix$hours<-sapply(strsplit(as.character(netflix$time), ":"), "[", 1)
netflix<-netflix[,-c(2)]
View(netflix)
netflix$daylevels<-as.character(netflix$hours)


netflix$daylevels<-gsub("^03$|^04$|^05$|^06$|^07$|^08$|^09$|^10$", "Morning", netfl
netflix$daylevels<-gsub("^11$|^12$|^13$|^14$", "Afternoon",netflix$daylevels)
netflix$daylevels<-gsub("^15$|^16$|^17$|^18$|^19$|^20$", "Evening", netflix$dayleve
netflix$daylevels<-gsub("^21$|^22$|^23$|^00$|^01$|^02$","Night",netflix$daylevels)
netflix$daylevels<-as.factor(netflix$daylevels)
View(netflix)

netflix<-cbind(scores_reviews,netflix)

netflix<-netflix[,-c(4)]

ggplot(netflix, aes(x = daylevels, fill = score_chr)) +
  theme_bw() +
  geom_bar(position = 'dodge') +
  labs(y = "Sentiment Score",
       title = "Sentiment score throughtout the day")
```

```
+   theme_bw() +
+   geom_bar(position = 'dodge') +
+   labs(y = "Sentiment Score",
+        title = "Sentiment score throughtout the day")
> ggplot(netflix, aes(x = daylevels, fill = score_chr)) +
+   theme_bw() +
+   geom_bar(position = 'dodge') +
+   labs(y = "Sentiment Score",
+        title = "Sentiment score throughtout the day")
> 
```

```
df            7043 obs. of 2 variables
documents     34040 obs. of 3 variables
m             Large matrix (47948744 elements, 366.6 Mb)
m1            Large matrix (47948744 elements, 366.6 Mb)
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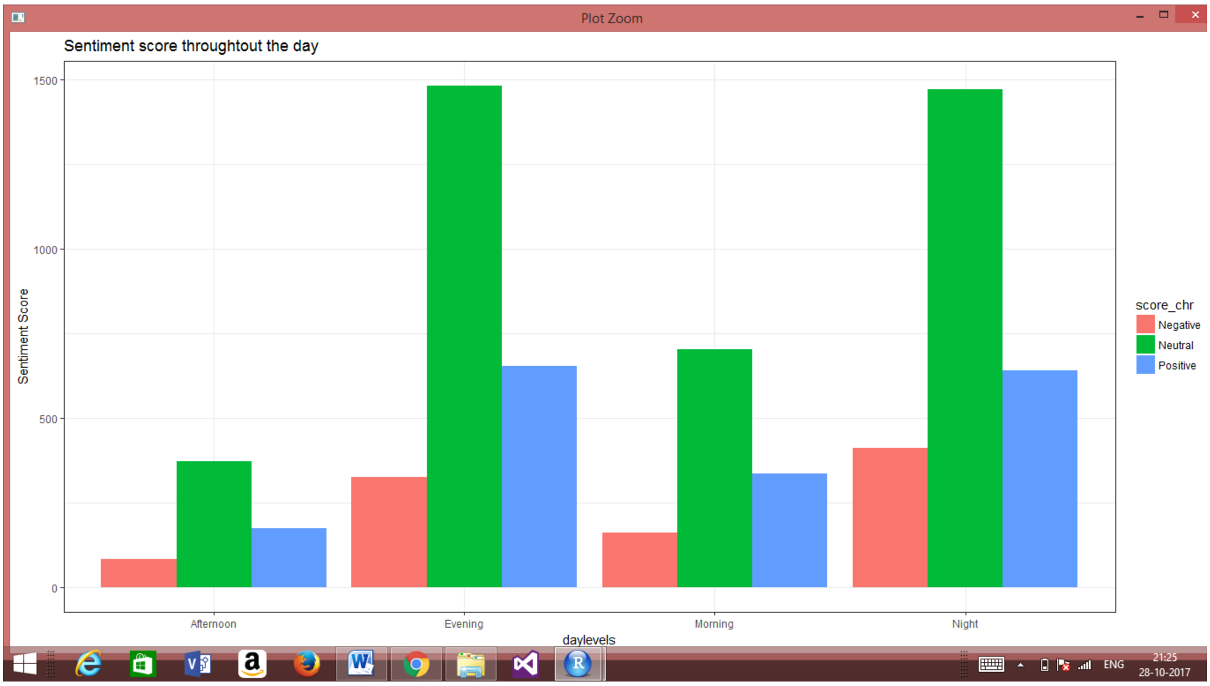
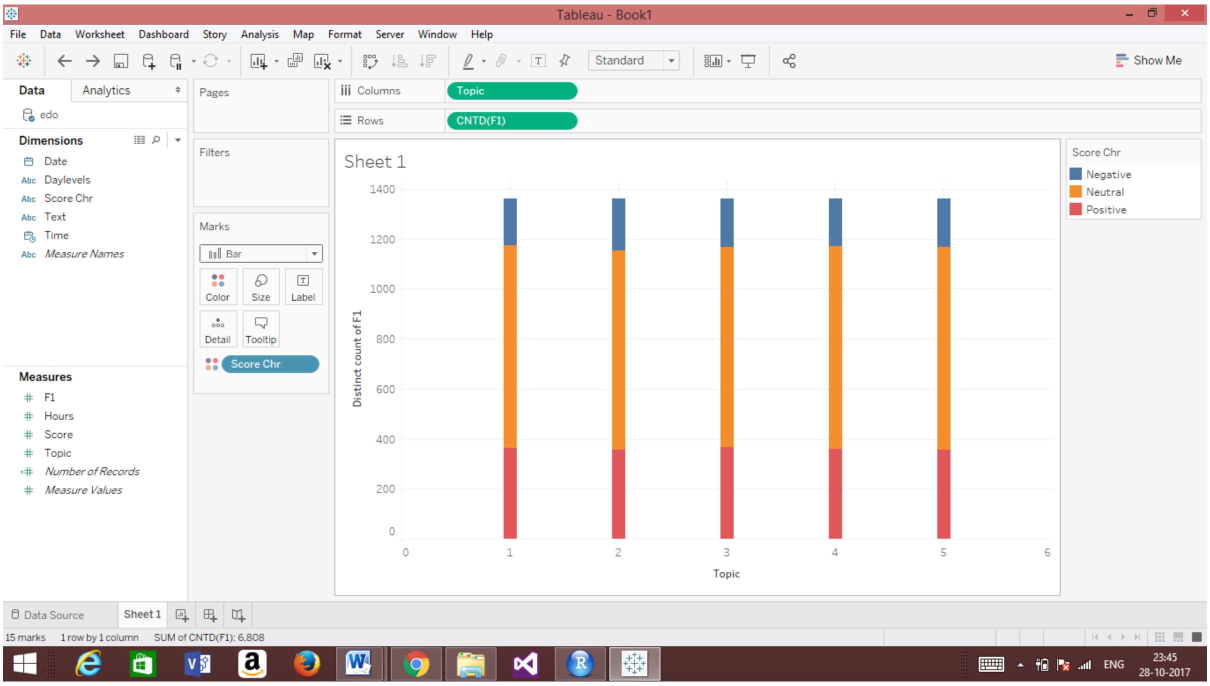
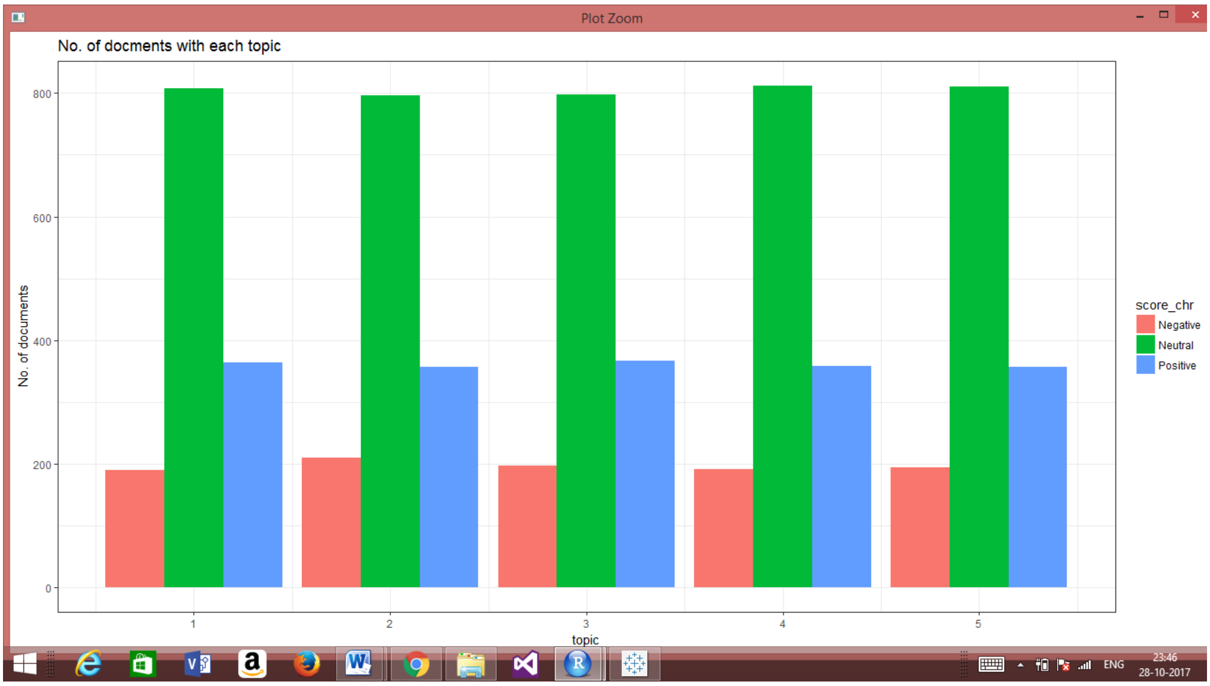
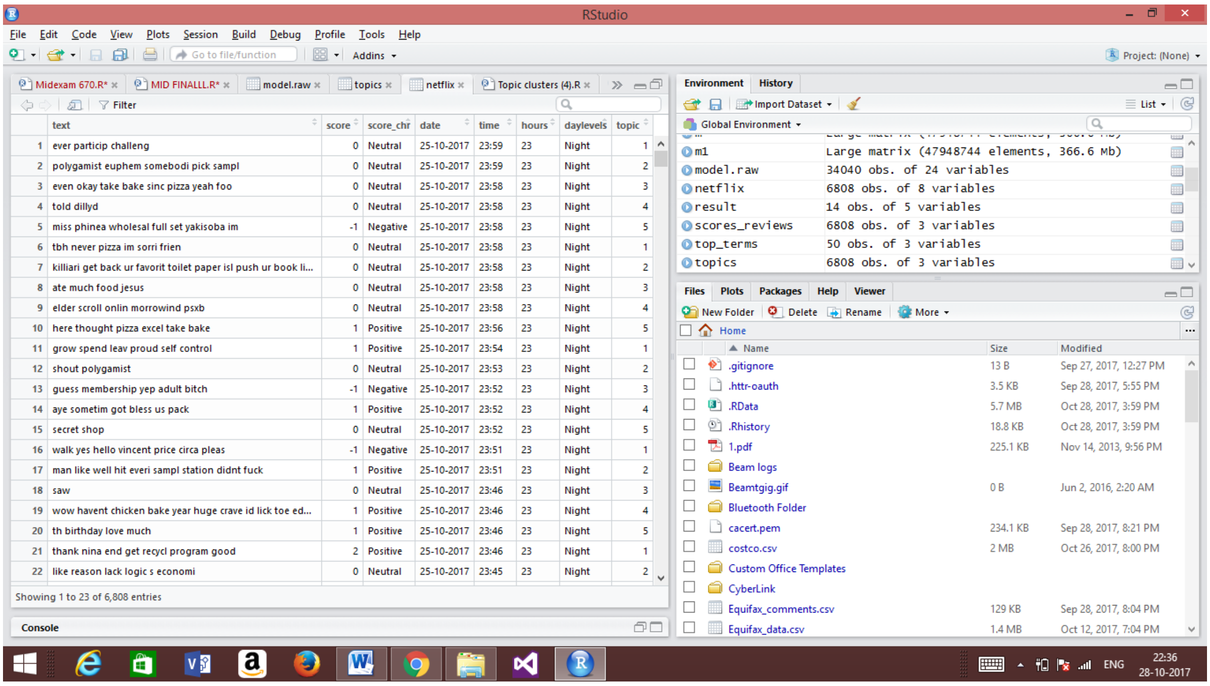


Distribution of topic numbers segmented by sentiment labels





New features added with master file



	text	score	score_chr	date	time	hours	daylevels	topic
1	ever particip challeng	0	Neutral	25-10-2017	23:59	23	Night	1
2	polygamist euphem somebodi pick sampl	0	Neutral	25-10-2017	23:59	23	Night	2
3	even okay take bake sinc pizza yeah foo	0	Neutral	25-10-2017	23:58	23	Night	3
4	told dillyd	0	Neutral	25-10-2017	23:58	23	Night	4
5	miss phinea wholesal full set yakisoba im	-1	Negative	25-10-2017	23:58	23	Night	5
6	tbh never pizza im sorri frien	0	Neutral	25-10-2017	23:58	23	Night	1
7	killiari get back ur favorit toilet paper isl push ur book li...	0	Neutral	25-10-2017	23:58	23	Night	2
8	ate much food jesus	0	Neutral	25-10-2017	23:58	23	Night	3
9	elder scroll onlin morrowind psxb	0	Neutral	25-10-2017	23:58	23	Night	4
10	here thought pizza excel take bake	1	Positive	25-10-2017	23:56	23	Night	5
11	grow spend leav proud self control	1	Positive	25-10-2017	23:54	23	Night	1
12	shout polygamist	0	Neutral	25-10-2017	23:53	23	Night	2
13	guess membership yep adult bitch	-1	Negative	25-10-2017	23:52	23	Night	3
14	aye sometim got bless us pack	1	Positive	25-10-2017	23:52	23	Night	4
15	secret shop	0	Neutral	25-10-2017	23:52	23	Night	5
16	walk yes hello vincent price circa pleas	-1	Negative	25-10-2017	23:51	23	Night	1
17	man like well hit everi sampl station didnt fuck	1	Positive	25-10-2017	23:51	23	Night	2
18	saw	0	Neutral	25-10-2017	23:46	23	Night	3
19	wow havent chicken bake year huge crave id lick toe ed...	1	Positive	25-10-2017	23:46	23	Night	4
20	th birthday love much	1	Positive	25-10-2017	23:46	23	Night	5
21	thank nina end get recycl program good	2	Positive	25-10-2017	23:46	23	Night	1
22	like reason lack logic s economi	0	Neutral	25-10-2017	23:45	23	Night	2

Showing 1 to 23 of 6,808 entries

```
m1              Large matrix (47948744 elements, 366.6 Mb)
model.raw       34040 obs. of 24 variables
netflix         6808 obs. of 8 variables
result          14 obs. of 5 variables
scores_reviews  6808 obs. of 3 variables
top_terms       50 obs. of 3 variables
topics          6808 obs. of 3 variables
```

Name	Size	Modified
.gitignore	13 B	Sep 27, 2017, 12:27 PM
.httr-oauth	3.5 KB	Sep 28, 2017, 5:55 PM
.RData	5.7 MB	Oct 28, 2017, 3:59 PM
.Rhistory	18.8 KB	Oct 28, 2017, 3:59 PM
1.pdf	225.1 KB	Nov 14, 2013, 9:56 PM
Beam logs		
Beamtgig.gif	0 B	Jun 2, 2016, 2:20 AM
Bluetooth Folder		
cacert.pem	234.1 KB	Sep 28, 2017, 8:21 PM
costco.csv	2 MB	Oct 26, 2017, 8:00 PM
Custom Office Templates		
CyberLink		
Equifax_comments.csv	129 KB	Sep 28, 2017, 8:04 PM
Equifax_data.csv	1.4 MB	Oct 12, 2017, 7:04 PM

Insights on second visualization of section 4

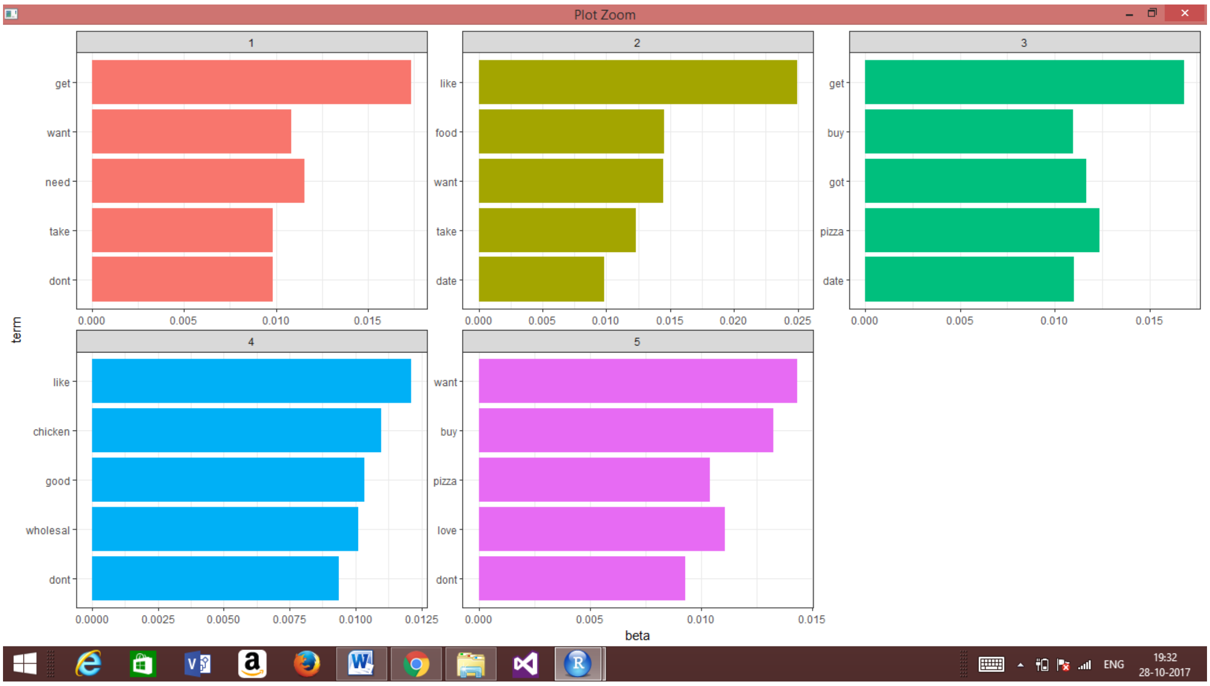
In the first topic, we observe more positive words such as get, want, need, and take. And we just have one negative word don’t. We can infer that most product are suitable for purchase through this topics.

In the second topic, we observe very positive words such as like, food,want, and date. This implies that costco has wide range of foods and people prefer buying groceries at costco.

In the third topic, we can infer that amongst the food varieties pizza is most purchased one at costco.

In the fourth topic, we can observe that cosco is a wholesale chain with chicken and pizza foods most purchased and liked.

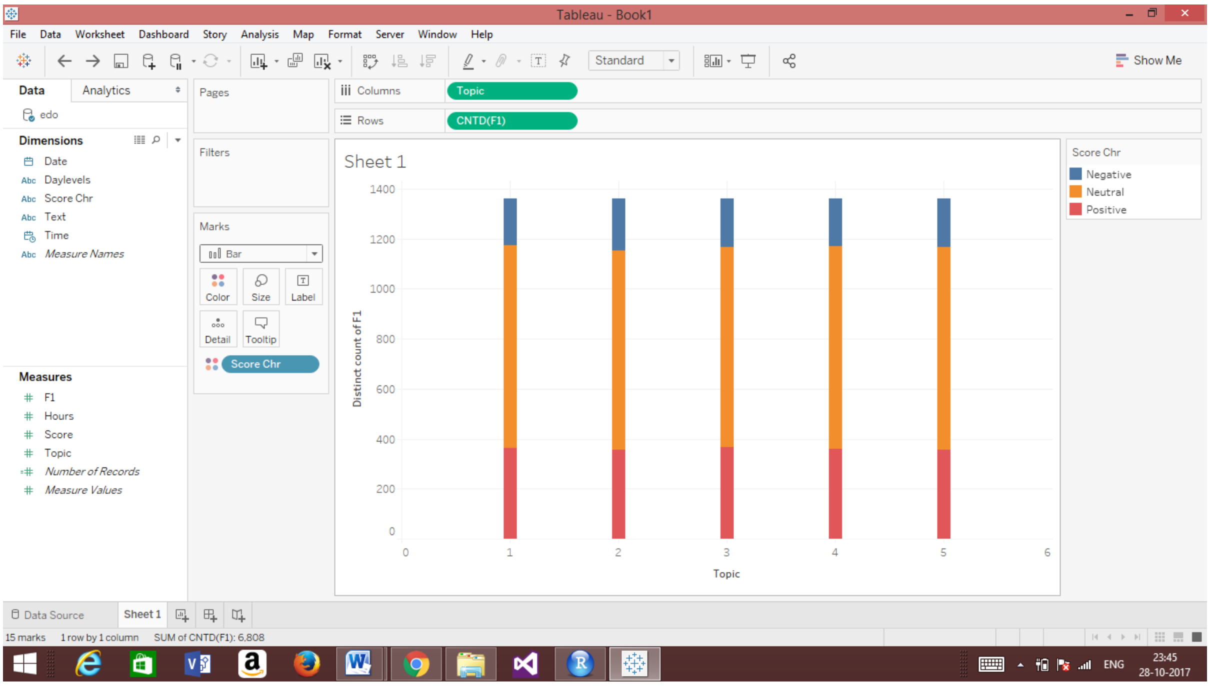
In the fifth topic, we can see that pizza word is repeated in this topic. So we can infer that people prefer buying pizza at costco amongst the wide food varieties.



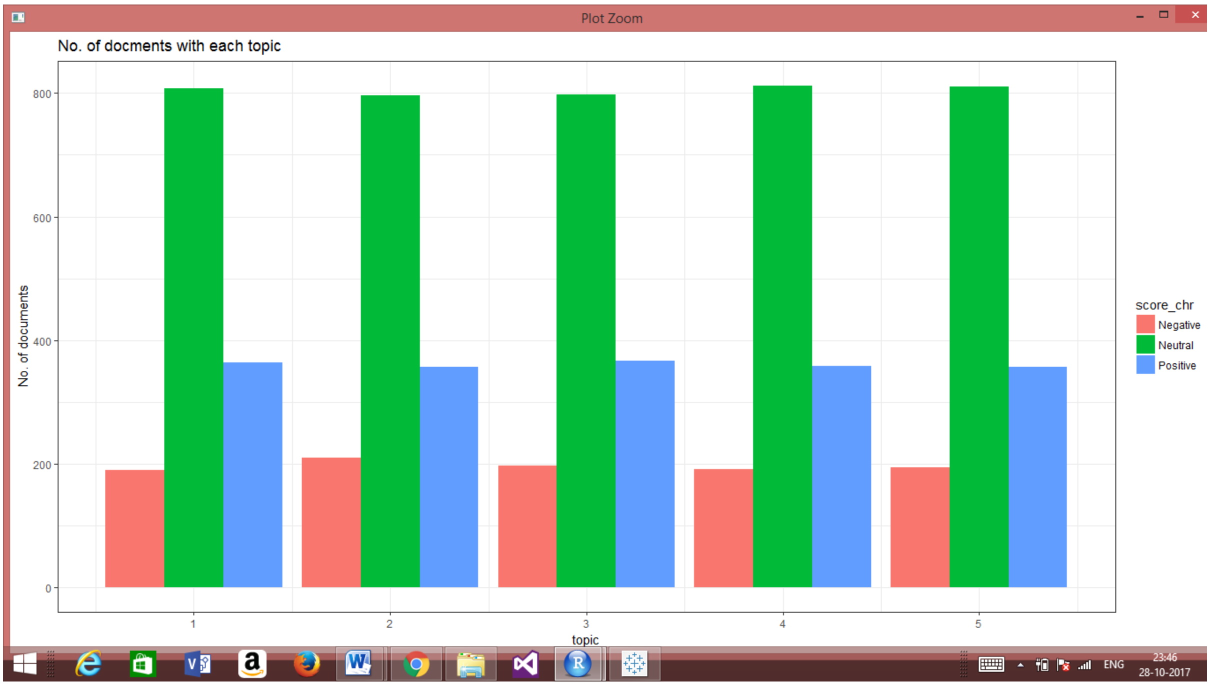
Insights on third and fourth visualization of section 4

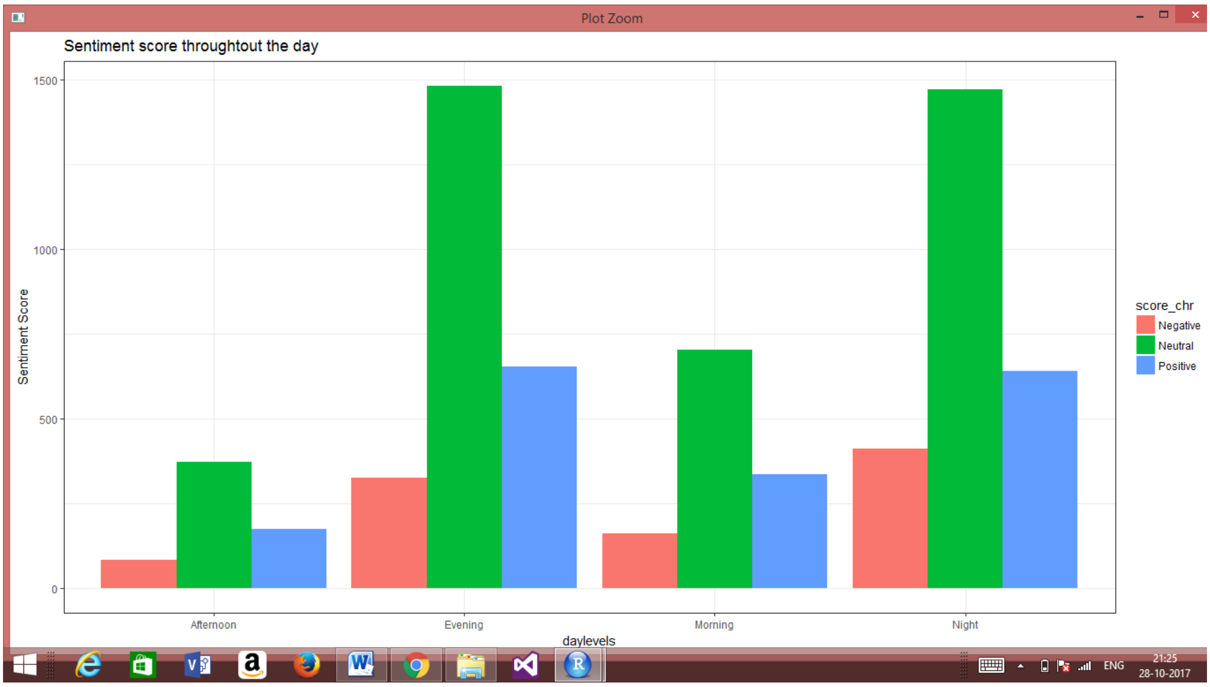
In the third visualization, the most neutral scores were during the evenings and nights. The most positive scores were observed during evenings and nights too. The most negative scores were observed during evenings and nights. Also we can infer that most of the comments were generated during evenings and nights. However, most comments on costco are more neutral than positive in the graph.

From the fourth visualization, we calculate the number of comments per topic and also seggregate them based on sentiment label. We can observe that in topic 1, 4, and 5 the neutral comments are slightly more than the rest. In topics, 1 and 3 the positive comments are slighly higher. Whereas, the negative comments in the 2nd topic is more than the rest.



15 marks 1 row by 1 column SUM of CNTD(F1): 6,808




Plot Zoom
Sentiment score throughtout the day
1500
1000
500
0
Sentiment Score
Afternoon
Evening
Morning
Night
daylevels
score_chr
Negative
Neutral
Positive
ENG
21:25
28-10-2017