



# Twitter data mining: social media as a rising customer service channel





# Statistics

500 million tweets per day

67% US customers use social media for customer service (J.D. Power and Associates, 2013)

33% prefer to contact brands using social media rather than the telephone (Nielsen, 2012)

# Social customer service



My mac book is slowly dying on me, its been an hour and its still like this!! @AppleSupport #helpme #macissues #ahhh

@alrollitt We'll be glad to look into this with you. DM us with any troubleshooting steps that have been taken, and we'll get started.



@AppleSupport, @SamsungSupport, @LGUSA-Mobile,  
@Moto\_Support, @HTCUSA

# Data collection

Twitter API + Python = Tweets

```
class SListener(StreamListener):

    def __init__(self, api = None, fprefix = 'streamer'):
        self.api = api
        self.counter = 0
        self.fprefix = fprefix
        self.output = open(fprefix + '.' + time.strftime('%Y%m%d-%H%M%S') + '.json', 'w')
        self.delout = open('delete.txt', 'a')

    def on_data(self, data):

        if 'in_reply_to_status' in data:
            self.on_status(data)
        elif 'delete' in data:
            delete = json.loads(data)['delete']['status']
            if self.on_delete(delete['id'], delete['user_id']) is False:
                return False
        elif 'limit' in data:
            if self.on_limit(json.loads(data)['limit']['track']) is False:
                return False
        elif 'warning' in data:
            warning = json.loads(data)['warnings']
            print warning['message']
            return False
```

32, 312 Tweets

20.4 - 4.5



# Data analysis

Clean it up!

```
:53775466,"id_str":"53775466","name":"Udbilao","screen_name":"ArreyYaaar","location":"JAI-MYS-MAA-PNQ-BOM-SNG","url":null,"description":null,"protected":false,"verified":f
upport","user":{"id":"14212815","id_str":"14212815","name":"Lacy Baugher","screen_name":"LacyMB","location":"Alexandria, VA","url":"http://Vinstagram.com/VlacymbV","description":
str":"2823451584","name":"itweetspoll","screen_name":"itweetspoll","location":null,"url":null,"description":null,"protected":false,"verified":false,"followers_count":14,"friends_count
11","in_reply_to_screen_name":"MelvinMaina22","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA
str":"2502077671","name":"Genna Martin","screen_name":"GENNASHEREE","location":"KCMO ","url":"http://Vwww.instagram.com/Vgennamartin","description":"business email: g
23343770","name":"seungjun enthusiast","screen_name":"ultleehongbin","location":"trieuhomies \u0022 rana & jas","url":null,"description":"seungjun \u00ab knk vixx ifnt svt ztao
reen_name":"knightofdark","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA","url":"http://Vapple.co
in_reply_to_screen_name":"M_Mynarski","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA","url":
64522,"id_str":"45364522","name":"M4RC","screen_name":"MarcRudnick_","location":null,"url":null,"description":null,"protected":false,"verified":false,"followers_count":17,"friends
in_reply_to_screen_name":"HpGregory","user":{"id":"18768513","id_str":"18768513","name":"Samsung Support USA","screen_name":"SamsungSupport","location":"Greenville, SC
oly_to_screen_name":"VicSWATonair","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","u
_to_screen_name":"Ry94_","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA","url":"http://Vapple.
in_reply_to_screen_name":"jayhof52","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","u
,"user":{"id":"347497738","id_str":"347497738","name":"Michal Mynarski","screen_name":"M_Mynarski","location":"Wroc\u0142aw","url":"http://VInkd.in/VbX-nREx","description":"Pr
USA","user":{"id":"533248545","id_str":"533248545","name":"George King","screen_name":"GeorgeKingJr","location":"Stage Right","url":null,"description":"Husband, Father, Bass
upport","user":{"id":"2234246881","id_str":"2234246881","name":"Aina","screen_name":"GoldnGlobelsaac","location":null,"url":"http://Vvisaacoscar.tumblr.com","description":"your ob
in_reply_to_screen_name":"W5IEM","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","url"
e":"_nole_","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","url":"http://Vwww.lg.com/Vus\
549921265","id_str":"549921265","name":"\u004f55\u00fd0\u005f3a","screen_name":"stillhah","location":"\u005e7f\u004e1c, \u004e2d\u00534e\u004eba\u006c11\u005171\u00548c\u0056fd","url":null,"descrip
4","in_reply_to_screen_name":"VickenCode","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","u
18768513","in_reply_to_screen_name":"SamsungSupport","user":{"id":"26527128","id_str":"26527128","name":"Dennis Karus","screen_name":"DKarus","location":"ATL","url":null,"
9925058560","in_reply_to_screen_name":"thebige73","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood
amsungSupport","user":{"id":"17313147","id_str":"17313147","name":"Jim Sias","screen_name":"JimSias","location":"New York","url":null,"description":"PR & Entertainment/VInfluer
e":"AppleSupport","user":{"id":"154588101","id_str":"154588101","name":"Martin Mazurski","screen_name":"Martomazu","location":null,"url":null,"description":null,"protected":false,
_name":"CtrlChris","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","url":"http://Vwww.lg.c
user":{"id":"196750326","id_str":"196750326","name":"Guy LaT\u00f4chp","screen_name":"schmuft","location":"Hessen","url":null,"description":"Nerdy! Terdy! Beardy! Musik I Game
2","in_reply_to_screen_name":"AmyLouClark87","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA
_in_reply_to_screen_name":"WilliamAamodt","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ
to_screen_name":"Nicky_Johns","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA","url":"http://Va
":"Nate the great","screen_name":"N8DuhGr88","location":null,"url":null,"description":null,"protected":false,"verified":false,"followers_count":22,"friends_count":112,"listed_count":
screen_name":"Groucho1062","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","url":"http://\
in_reply_to_screen_name":"friolz","user":{"id":"3309375033","id_str":"3309375033","name":"Apple Support","screen_name":"AppleSupport","location":"Cupertino, CA","url":"http://V\
e":"clawdaddy12","user":{"id":"193818082","id_str":"193818082","name":"LG USA Mobile","screen_name":"LGUSAMobile","location":"Englewood Cliffs, NJ","url":"http://Vwww.lg.cc
":"JimSias","user":{"id":"18768513","id_str":"18768513","name":"Samsung Support USA","screen_name":"SamsungSupport","location":"Greenville, SC & Austin, TX","url":"http://V\
le","user":{"id":"17543841","id_str":"17543841","name":"Mark Ganchrow","screen_name":"Groucho1062","location":"Boca Raton, FL","url":null,"description":"Computerist, sports fan
```

# Data analysis

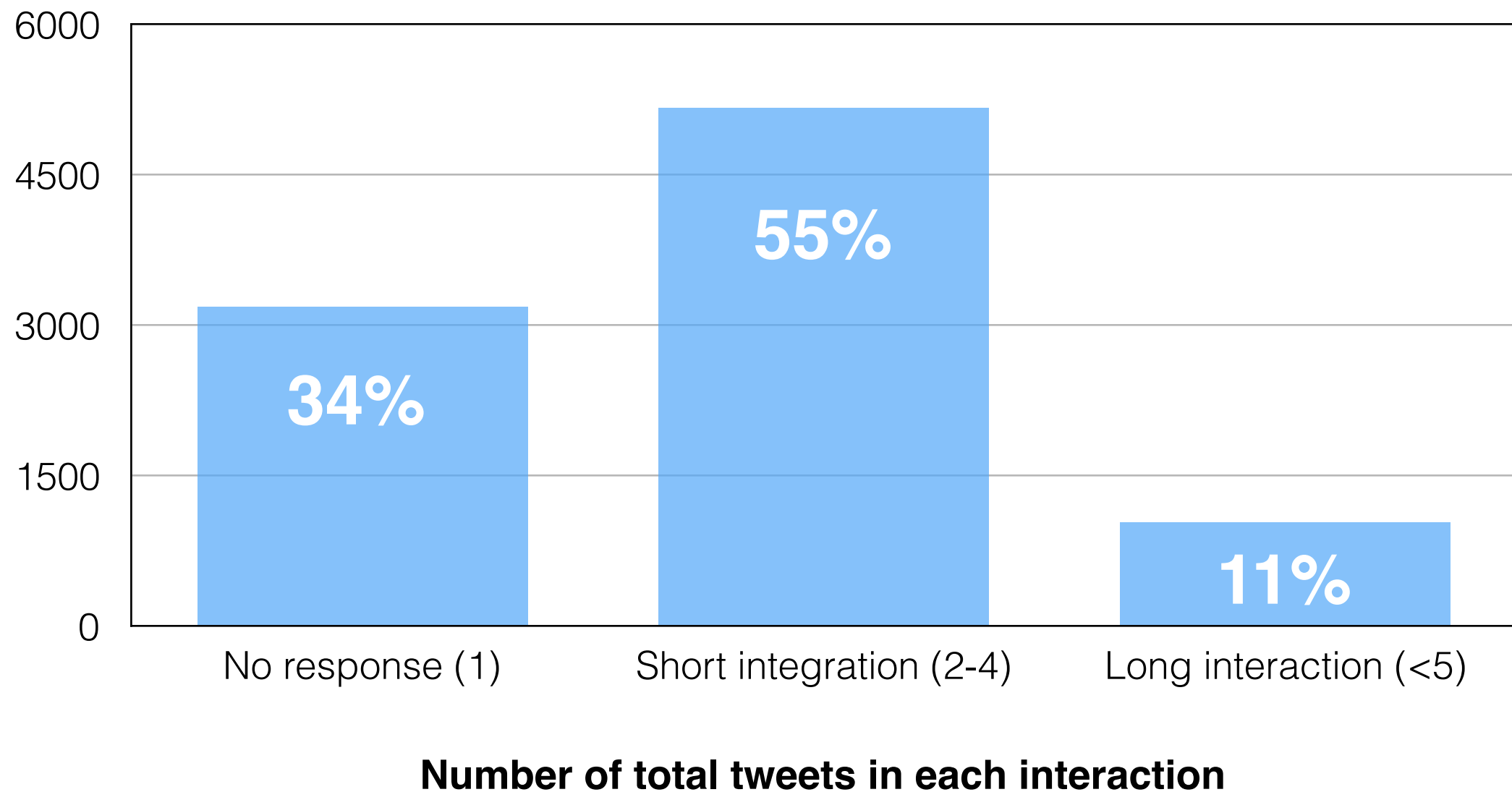
Tweets —> Conversations

Conversations - List (9355 elements)				1910 - DataFrame				
id ▲	Type	Size	Value	user_name	user_id	message_to_name	message_to_id	reply_to_id
1906	DataFrame	(3, 7)	Column names: user_name, us...	arushimehta8	2492457037	AppleSupport	3309375033	nan
1907	DataFrame	(3, 7)	Column names: user_name, us...	arushimehta8	2492457037	AppleSupport	3309375033	7.24e+
1908	DataFrame	(1, 7)	Column names: user_name, us...	arushimehta8	2492457037	AppleSupport	3309375033	7.24e+
1909	DataFrame	(4, 7)	Column names: user_name, us...	AppleSupport	3309375033	arushimehta8	2492457037	7.24e+
1910	DataFrame	(5, 7)	Column names: user_name, us...	AppleSupport	3309375033	arushimehta8	2492457037	7.24e+
1911	DataFrame	(6, 7)	Column names: user_name, us...					



# Customer service sessions

**Figure 1 Length of interaction**

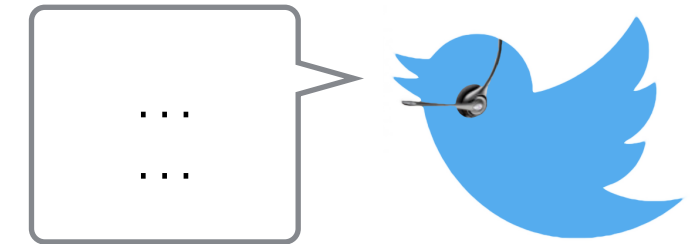




# Why no response???

@AppleSupport When is the iPhone 7 going to come out?

@AppleSupport why do you never reply to questions?



@AppleSupport fuck you and your shitty products

@SamsungSupport you can't replace the drain pump without those rods.

That's just wrong. Thanks for checking on this. #lostcustomer

@AppleSupport thank you!!

@HTCUSA I want! Sucks I am on AT&T & depend on the ATT

Next to purchase...#Losinghope #loyalcustomer #Newphone #Searching

If not including those messages, response rate is close to 100%



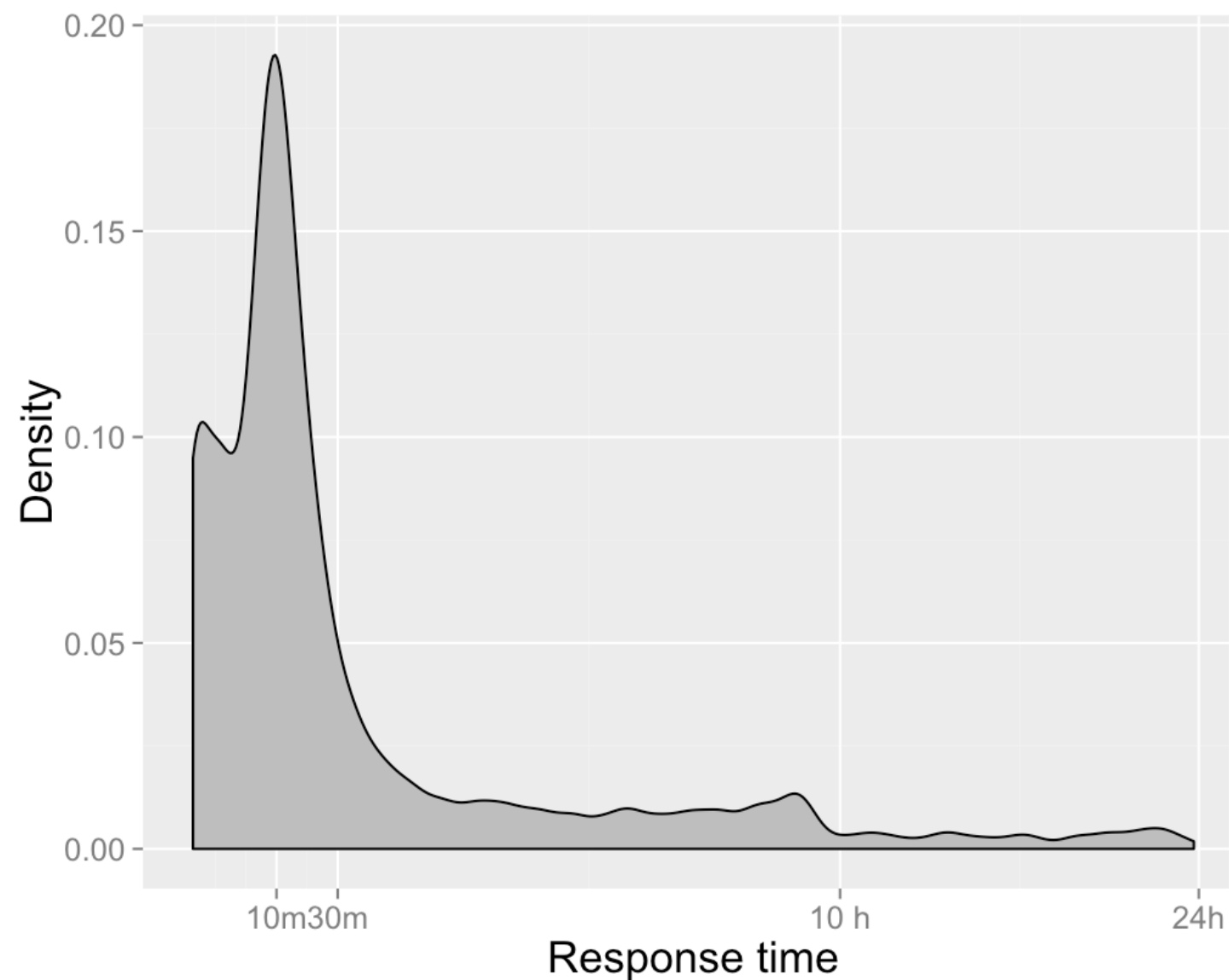
My mac book is slowly dying on me, its been an hour and its still like this!! @AppleSupport #helpme #macissues #ahhh

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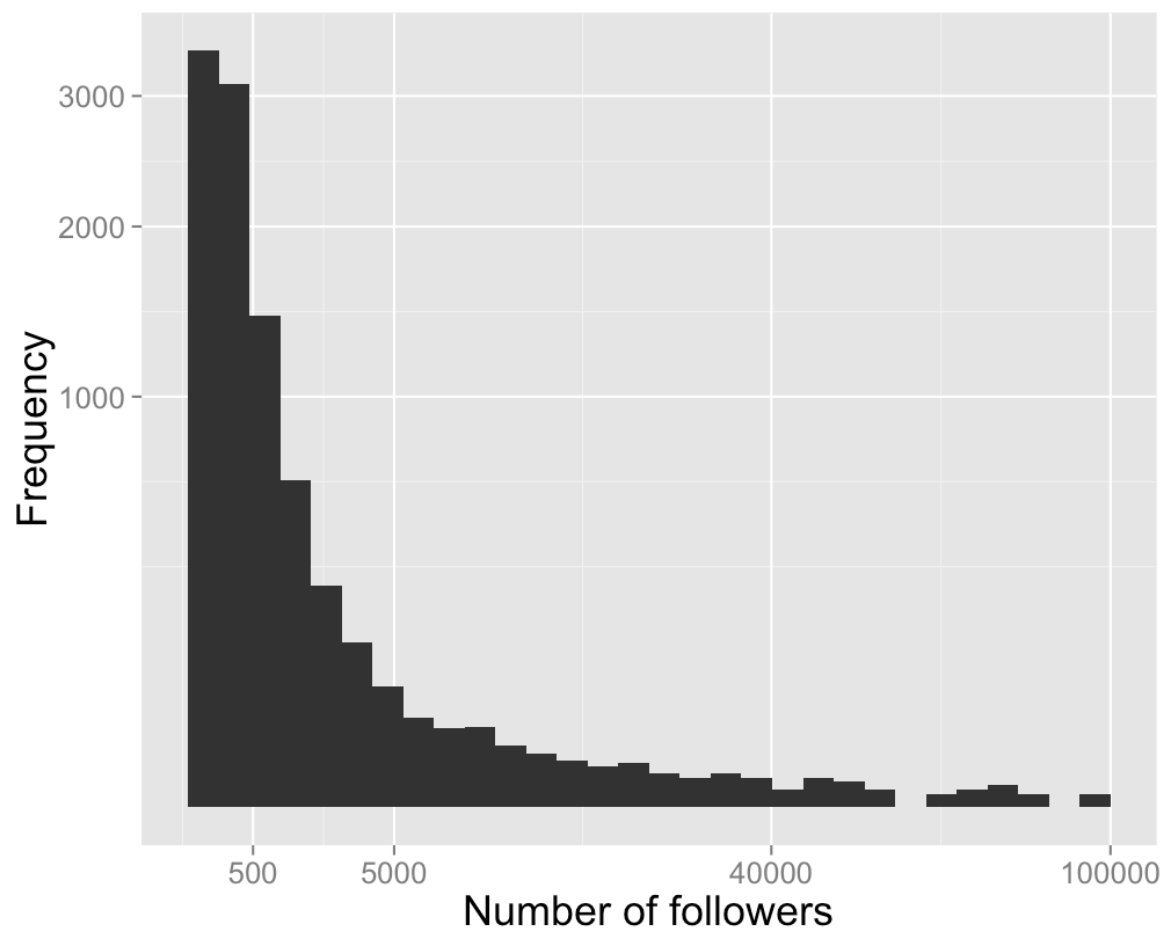
# Response time

**Figure 2 Response time distribution**



# Customer analytics

**Figure 3** Follower count of Twitter customers



**Table 1** Most influential customers

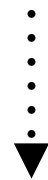
<i>Username</i>	<i>Number of followers</i>	<i>Number of tweets</i>
DrJimmyStar	1,257,615	168,069
MattPrior13	241,876	7,977
TheEricYoung	206,098	27,598
Jon4Lakers	158,030	42,430
Melofication	150,217	19,223



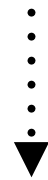
# Text analysis

Natural language processing + Machine learning = Insights

Text preprocessing



Sentiment analysis



Text mining

# Text preprocessing:

Tweets have complicated linguistic features

## Tweets

- > Tokenize: “#”, “RT”, “: )”, “http://bit.ly/23BJwMB”
- > Stemming: “u” = “you” = “ya”
- > Stopword removal: “is”, “,” , “would”

# Text mining

What the tweet is about?

<i>Frequent problems</i>	<i>Frequency</i>
Update	600
iTunes	482
Screen	426
Battery	401
iCloud	312
Emoji	271
Wifi	180
Charger	179
Security	110

# Sentiment analysis

Is a tweet positive or negative?

Naive Bayes Classifier + Supervised machine learning =  
smart computer

$$V_{nb} = \operatorname{argmax}_{v_j \in V} P(v_j) \prod P(a_i | v_j)$$

$$P(a_i | v_j) = \frac{n_c + mp}{n + m}$$



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# Sentiment analysis

“Computer, learn this pls”

Sentiment	SentimentText
4	@jamievaron I am undecided on the high/lowne
0	@karinb_za too busy now but I'll def watch it 2c
4	1.They change the lyrics to the sex version2.Wh
4	Landed in sioux falls Thank You Jesus for a safe
0	Damn forgot the #cougarpoll
0	Damn, macbook still have problems... Now som
4	@BobbyBroad I introduced myself to someone I
4	@SoapyChica2 have fun on soap day!
4	watching &quot;may bukas pa&quot;. Just so yc
4	Ooo, that motorcycle cop is pretty tricky! Ken's
0	I tripped on the external hard drive cord and it
4	En route to Minnebron, where cell reception is i
4	@zariat oooh nice one. ears burnin', linkage ah
4	so pumped for Land of the Lost (mcbride, FTW)

10,000 Training tweets

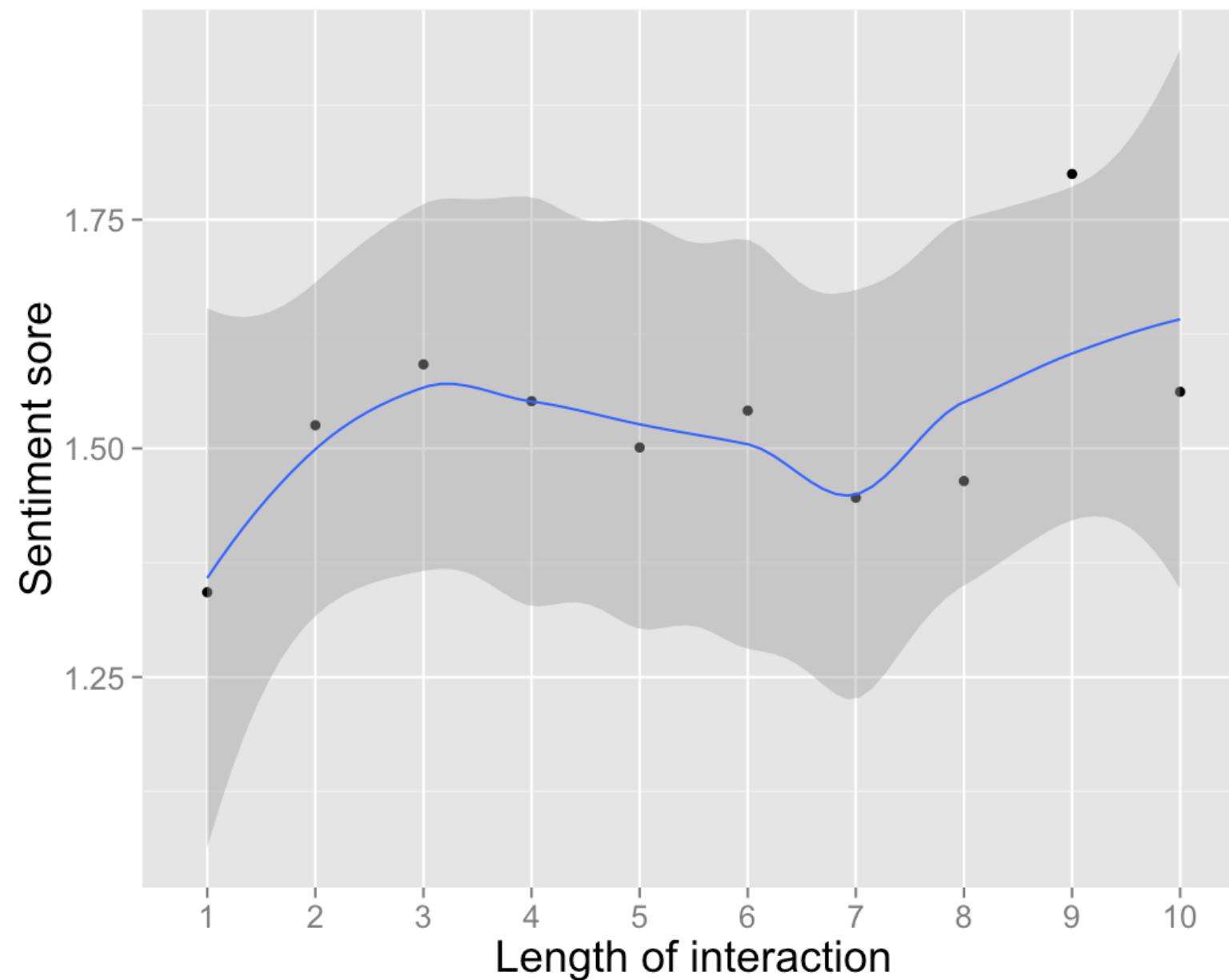
“Now tell me the sentiment of those”

text
@AppleSupport start making products that don't fucki...
@knightofdark We'd like to help. DM us where the iPh...
@M_Mynarski Please wait for the reset link and follow...
@AppleSupport Does the new Siri Remote work with t...
@HpGregory We do understand your concern and you...
@VicSWATonair So sorry to see this. Please send a dir...
@Ry94_ We'd love to help. Please DM us more details,...
@jayhof52 Please reach out to a Product Specialist at ...
@AppleSupport I have one but I can<e2><80><99>t D...
@HTCUSA will my HTC BoomBass speaker that I use w...
@AppleSupport please upload the full video of the Ru...
@W5IEM Please reach out to a Product Specialist at 80...
@_nole_ We hate to see that. Our support team is avai...

2,000 Testing tweets

# Sentiment analysis

**Figure 4 Sentiment score of interactions with various length**



# Conclusions

- Market leader's Twitter customer service - responsive & effective
- Twitter customers - more active and influential
- Customers expect fast problem resolution, although long service effort is appreciated too
- Twitter is a rich information source - performance monitoring, market insights, customer opinion & feedback



# Questions & Answers

