Business project

Effect of User engagement in Toyota Motors using social media analytics

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Supervised by: Dr. Laeeq Ur Rehman
Submitted By: Raazia Bibi

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Discovering the effect of user engagement in Toyota Motors Evidence from Twitter, Assessment of sentiments and thematic analysis using setistrength and voyant tools

Executive summary

Reading Toyota Motors Company related details this became cumbersome both because of the type of reports and because of contents discussions generated in the 'comments'. It was taking more time to read through those, but it was no till we read Toyota Motors articles and reports that were considered investigating the opinions and thoughts of people. It is recognized that this would not essentially be a simple task considering all comments, to study 1000 comments. It would not be thinkable to read through every comment, it would not be applied, and after particular time getting exhausted and missing central key words or opinions was sure. So analytics were used for business project, which is on Toyota Motors that go over through these comments and find trends or pick out most important themes within comment segments.

Abstract

Social media forums like Facebook, LinkedIn and twitter has brought revolution in the world of technology. These medias tends to connect people together especially in businesses. These can be used widely for sharing information with their customers about their products. Through twitter, people are now engaged in dealing with their business partners more conveniently. The present study enables us to inspect the impact of on line community Toyota motors and their engagements with communities. First Tweets have been analyzed, which are collected from Twitter and their pattern of engagements with their respective company. Secondly, we have studied how different types of engagements would effect on customer sentiments. The composite analysis came out with the outcomes that, the length, level, and attitude of retailers' engagement with the users of social media, have greater influence on their sentiments. Further our study, recommended some applied implications.

1. Introduction

Founded in 1937, Toyota Motors Corporation is a Japanese company that engages in the design, manufacture, assembly and sale of passenger cars, minivans, commercial vehicles, and related parts and accessories primarily in Japan, North America, Europe and Asia. Current Brands include Toyota, lexus, Daihatsu and Hino. Toyota motors Japanese is the eighth largest company in the world.

Social media analysis on Toyota Motors Japanese has been conducted. The data obtained from the twitter, micro blogging and social networking service. For identifying patterns in tweet data three techniques are used: word frequency, content analysis and network analysis. The data was further sorted out using MS Excel. This clean data used for performing sentiment analysis on Toyota motors Japanese. For the sentiment analysis we took the aid of sent strength which is an opinion mining program capable of processing 16000 web texts per second. In addition we conducted a thematic analysis conducted on the data using voyant tools, an online tool in order to analyze important themes and topics also did network analysis for accessing communication patterns.

Thus, our study is designed to explore the relationship and tendencies of engagement between company and customers that will be helpful for enhancing services. There are several concerns on how this brand community will influence company retail businesses. Hence we explored:

1) What are the general sentiment tendencies of Toyota motors on the social media?
2) What are the patterns of commitment between company and customers on the micro blogging platform?
3) How does the meeting affect the users' sentiment on the social media?

To address these project questions, we analyzed Toyota motors' tweets data. The expressions or sentiments of these tweets are assessed.

2. Literature Review

Web based life, for example, a micro blogging administration is changing the way individuals interact and observe data and assessments online. The term web based life by and large alludes to sites and online devices that encourage associations between customers by giving them chances to impart insight data and interests. (Hasen, Shneiderman, &Smith, 2010). Interactions encouraged by web based life have become a vital piece of individuals' day by day lives in contemporary society and an amazing tool for advancing interactions among consumers and online retailers in business area. A few studies revealed that social life has changed the manner in which businesses or organizations connect with their customers and furthermore there changed the   manner   in   which   business   is   directed

(Leeflang,Verhoef,dahlstrom,&freundt,2014;patino,pitta,&quinones,2012;Schultz&peltier,2013). Organizations begin to apply web innovations including web based life to run their activities since more individuals like to shop online at accommodation and better costs.

2.1 Social media and engagement

Engagement is named as interaction or communication amongst users on social media platforms. Llic, Brodie, Hollebeek and Juric argued "it can also be referred to psychological state and process that could lead to customer loyalty". Engagement can be theorized as, being connected, interested and involved in something. As engagement between consumers and enterprises e. g retailers has fascinated a lot of attention in recent times. We interpreted engagement happens in three different ways these include subjective, objective and knowledge sharing. Engagement through groups enables retailers and businesses to magnify their markets. So social media has become an innovative business communication network that allows enterprises to get involved with customers and internet users. There exist various insights of the role of engagement on social media, like user engagement on Twitter influenced the loyalty of customers to the business of Toyota motors. Social media also plays important role in enhancing engagement and creating ease in online activities. Arrival of social media has directed an explosion of interest in customer engagement and the opportunities of close connection among customer and different communities.

2.2 Brand management and social media

As customers speak of brand image, awareness and satisfaction on social media which affects company's branding. As said by 'Scott Silverman', the director of National Retail federations, "Branding is a tremendous advantage and cross promoting it over the internet and the physical stores will open up new selling opportunities". Twitters concentrating in branding area, so brand managers are required to actively involved in social media as users communication mostly associated with brand satisfaction.

2.3 Social Media and twitter

The fundamental significance of Twitter is that it provides instantaneous data for community to express sentiments and thoughts as well-suited basis for opinion mining and sentiment popularity exposure. The motive why companies should concern about social media is because tweets from the public would be an image of public sentiments towards their products due to optimistic and negative impacts on other customers as well as prospective customers in precise. Tweets can considerably affect public insight of the brand image and how companies involve with the social media and handle customers' tweets could also impact public opinions. As we know, tweets, reviews, comments and sentiments that have been disseminated online could influence existing and new-fangled customers' decision making. The content of the tweets has become dynamic for worldwide brands for their branding strategy. Given the relevance of engagement shown by other

studies, we try to fill the gap by discovering the relationship of sentimentality of tweets communicated on micro blogging site and its diffusion of information.

2.4. Summary

This study showed that public on social media is progressively becoming vital and relevant. It has become more extensive nowadays in business and public sector simultaneously. Oliveira, Huertas, and Lin (2016) gave argument as "we found that most of studies in the existing literature mainly focused on engagement in government, politics and education but little in online retailing especially those that use micro blogging platform like "Twitter" this argument highlighted there were fewer prior workings on the engagement between companies and social media users.

3. Analysis Methodology

Social media such as blogs, forums and micro blogs has been progressively used for public opinions exchange and information sharing nowadays. It has changed the way how online public interacts and somehow has led to a new tendency of get-together for online vendors particularly on micro blogging websites such as Twitter. In this study, we investigated the impact of online suppliers' engagement with the online brand communities on consumers' insight of brand service and image. We obtained data set by using Twitter. Tweets were extracted using "Twitter search Application Programming Interface" Tweets are cleaned by removing the duplications and unnecessary noise.

Tweets that mentioned Toyota motors brand name, opinion and expression are collected and cleaned in order to analyze the sentiment of each of these tweets. Tweets related to Toyota motors comment on whether customer like or hated Toyota motors, so this information will be helpful for marketers. It is not feasible to read each and every tweet related to Toyota motors Japanese so for finding marketing insights from the tweets we used text mining which is as using statistical methods to gather useful information from unstructured text. So we exported unstructured data as tweets from twitter and transformed it into spread sheet format. After cleaning it we applied sentistrength to evaluate: whether Toyota motors Japanese' related reviews are positive or negative? Whether customers are happy with Toyota motors Japanese? What is the reaction of customer on Toyota motors Japanese?

Publication date formatted using the text to column function. Applied filter on all columns in order to access required information. Raw data is full of noise. Data of languages other than English found, spam was also there in raw data, also found retweets and redundant tweets, so in order to make clean data file these were need to be removed. Selected redundant tweets by highlighting, and then deleted selected rows. Also irrelevant and duplicate tweets selected and then deleted for sake of cleaning data.

The Retweets related to the Toyota Motors were identified by applying the "*RT*" filter on the title names as description. All the identified rows consisting Retweets were selected and removed using the delete row function. A number of other unnecessary columns deleted during this cleaning exercise. The guide and link column were redundant, hence we removed the guide column. The link, pub date, source columns were renamed as Web link, Date of tweet, social media source respectively. To enlist the tweets consisting the word Toyota, the filter "*Toyota"* was applied to descriptions. Further two types of analysis used.

3.1 Descriptive Analysis

It is method for reporting "what exists and what is going on"

Rate of recurrence analysis is a useful procedure in descriptive analysis to quantify how frequently words, expressions, and actions occur. Frequency analysis is used to examine the number of tweets our project data set. Frequency analysis is used with words and hash tags to analyze significant meanings and features. We analyzed the overall sentiment trends of Toyota Motors Japanese brand and the patterns of commitment between company and customers using the collected tweets posted on social media platform, Twitter. Then, we studied how diverse type of accomplishments affects customer sentiments. This analysis demonstrates that engagement has an influence on sentiments that associate with brand image, insight and customer service of the Toyota Motors. Our findings indicate that the level, length, category and approach of retailers' engagement with social media users have a major influence on their sentiments. Our results develop several important managerial implications.

3. 2 Network Mapping Analysis

Network analysis performed by using Name network and chain network, representing association through "follow", message pattern through "reply" and "mention" dissemination through "retweets" and societies of practice through "hash tag". We examined the relationship through follower/following in twitter. So analyzing associations provide valued understandings and visions into message patterns and information dissemination.

4. Results

4.1 Text Analysis (Netlytic)

The data was extracted using Net lytic. "Netlytic is a community-supported text and social network analyzer that can automatically summarize and visualize public online conversations on social media sites" (Netlytic, 2019). Micro blogging service such as twitter is the one of the most widespread social media platforms that has become a foundation of information and effective communication tool with hundred millions of users. Twitter allows users to create, read and send short messages called tweets with 140-characters and talk about everything and anything happening in their daily and work accomplishments. In precise, a growing number of businesses

and customers have involved in social media on brand-related activities such as creating and dispersion of information and content about brands. At this time, a brand community or what we discussed as online community in this learning comes into existence. This community normally shares related interests about brands, interacts and discusses with each other about brands that they are involved in. They can facilitate roles such as reply, like, retweet, and share information from others and spread openly with people within the public. Basically text analysis focuses on content like (what is being said e.g. themes, subject matter).

As mentioned earlier, for the text analysis we got tweets from twitter through the netlytic tool. As shown in the below visualization. The data set we searched was Toyota motors Japanese and the keywords that were selected in the search were Toyota motors. On searching this information retrieved a Dataset of 1000 records on the preview.

The next screen that appears is called the preview screen. It gives the glimpse of the data collected for text and network analysis. Total no of records belonging to the dataset are 1000. In the records menu bar there are two drop down menus, the first called the filter field allows to sort the data by specific fields. This can be used if we are looking to find a specific piece of information. Let's select the author field from the dropdown list the second dropdown list will appear for choosing a specific author, e. g author selected as AVNNewsFeed. It opens relevant information in which author tells methods of repairing front door handle. The second menu called row label fields permits to select the row labels that appear on the screen. This can help to hide column we don't want to view it helps to get rid of cumber some data on the screen. For instance if we uncheck the link box. In addition to extraction of data (in this case tweets) from a social website, netlytic also processes the text and creates visual graphics that depict meaningful information. These visual projections can be accessed on the text analysis tab:

4.2 Word clouds

As adjusted the sorter to display top 100 words with. The first visualization we created is the word cloud net lytic generated this visualization by counting number of times each word appeared with the course of dataset the word cloud displayed frequency by associating a size to each word. This graph shows us commonly used words in the Toyota motors related tweets. Each word has a count. The bigger the count of a word, the bigger its font becomes making it prominent among the cloud, hence the word quickly catches the attention of the reader. For instance words like Toyota was among frequently used words in Toyota motors scenario. So we used keyword extractor for extracting meaningful words. One has the control to view the top 100, top 50 and top 30 words in relation to the count of each word. Noise words/stop words which were not useful for content analysis, these are words such as: of, will and to etc. are removed. In addition to standard stop words we also reviewed the word cloud and removed terms which are redundant or insignificant for our analysis. For instance in this dataset the word 1ST is removed**.** The outcomes show that not only words associated to Toyota motors are frequently used but also data correlated to competitors of Toyota motors, emotions and

characteristics of Toyota motors like price, color and premium also used in writing tweets. Such results help in implementing and developing marketing strategies. The brand name was most frequently used so it is removed from the frequency calculation. Once the word is removed the top keywords and topic counts will be recalculated so other frequent words can come to the forefront.


By clicking on any word it shows specific information like total no of members who used the concept and the number of unique messages occurring. It also shows history of the world trend. The number of uses among the top ten users or participants. The keyword extractor box highlights a few pieces of key information.

We can view each message in which the word occurs If we click on the word shown in red message details displayed which include the date and time of the posting as well as the message content. So social media provides platform where customers share their opinions and get information about different brands e.g. Toyota motors Japanese. Social media plays powerful role for spreading the information of Toyota motors 'brand, products and services.

4.3. Words over Time:

Graph for the month of January 2020:
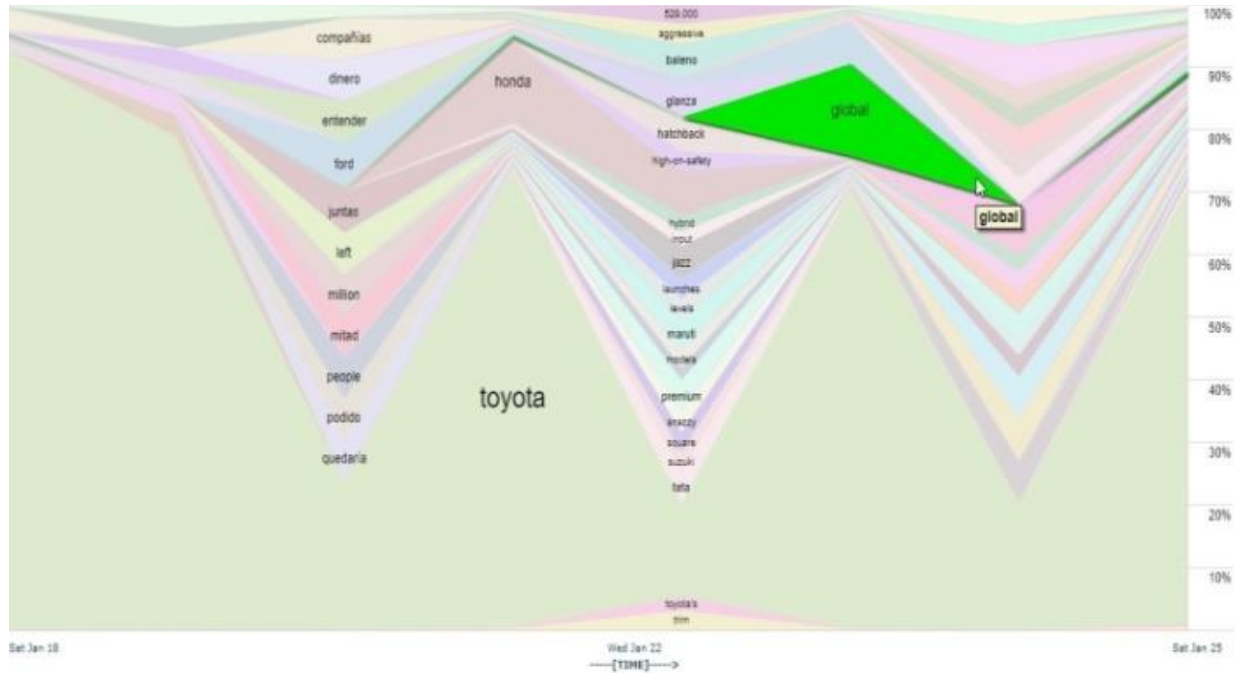
This visual gives us a graphical representation on the quantum of words used over a time period. Each word is represented by unique color and a specific area on the graph. The larger the area covered on the graph the more popular a word was during that time period. As shown the word Toyota is most popular in January 2020. In this graph we can use the scroll button to shuffle between the top 10 and top 100 topics during a time period.

This visualization shows the popular topics from the word cloud. On this visualization the horizontal axis measure time and the vertical axis measure the frequency of words in the form of percentage. This graph becomes important to illustrate how topics popularity changes over time. For instance if we select a stack graph, we notice **Toyota** is quite popular in the conversation around Saturday Jan 18 to Saturday Jan 25. We can also see each individual instance.

4.4 Visualization:

Another feature on the netlytic text analytics tab is the visualization info graphic. This visual demonstrates user feedback on a certain topic. For instance in the Toyota Motors data set includes feedback of users on various aspects such as "what they feel about the Toyota"? Shape, size, appearance, quality etc. The larger the word quantum, the larger rectangle it is represented with. After visualization of predefined categories, we can see mostly people used word "good" for Toyota motors around 28 posts used word "good" and only 4 used word "bad", by looking at

this picture we can presume that overall image of Toyota motors is good over twitter and people seems to happy with services of Toyota motors

Visualization showed interactive tree map which creates size to frequency, so larger the square and associated category the more frequently it occurs in the data set. Through this visualization we can see larger picture of the conversation specific details of each message that contributes to these categories. For instance, this tree map which is visualizing the tweeter conversation happening around Toyota Motors, we first see the top level categories. Here the good feeling category is largest.

On clicking a particular attribute various related sub-attributes open up. e.g. on clicking good feelings further sub categories open up.

To see what exact tweets are related to the sub-attributes we clicked on it and navigated to the details.

5. Sentiment Analysis:

Sentiment analysis helps in natural language processing. It gives semantic analysis in linguistic familiarity. Sentiments are thoroughly related to behavior of people and different contexts of relationships related to Toyota motors have been emerged from this analysis.

Data source — Toyota Motors → Analysis — Sentiment analysis → Findings — Trends of brand sentimentsPatteren of engagement between toyota motors and customers
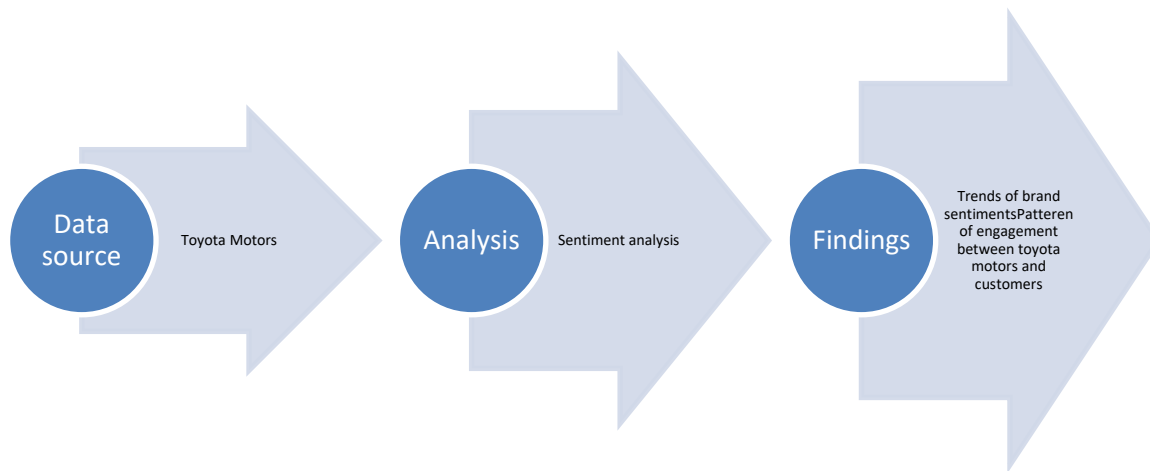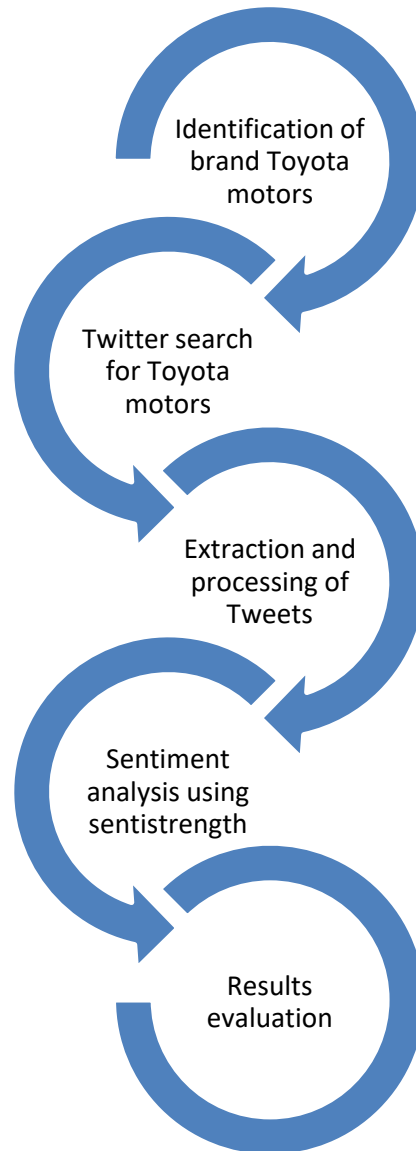
Quarrying sentiment provides an amazing potential that assists brand managers to understand human behavior and beliefs better with great accessibility. Here sentiments analysis helps Toyota motors Japanese to have a review of popular products at the same time helps users find the best products without having to read all of the reviews. This is also known as opinion mining because its objective is to data mine sentiments from texts. Sentiment analysis helps in to identify specific features of the products liked or disliked. Sentiments classified based on their polarization. To categorize the polarity, sentistrength software computes the occurrence frequency of the expression in a large interpreted corpus of text. For example, if the positive word occurs more repeatedly in a corpus, it means polarity is positive, on the other hand if negative words occur frequently then polarity is negative, otherwise, if the positive and negative

words both occur in same frequency the polarity is neutral. Sentiment analysis accompanied using Sentistrength; this program compared social media text of Toyota motors Japanese against a lexicon-based classifier of sentimentalities. This program finds the strength of sentiments by assigning scores "ranging from +5 to -5". Positive numbers indicate "favorable attitude" negative numbers indicate "negative attitude". The example of positive words in this program dictionary include: great, wonderful, good, kind, lovely and nice. Negative sentiments include: bad, crazy, heart, terrible, lazy and disappointed.

Table

Coding Pattern in SentiStrength:

Score	Code	Description
-2, -3, -4, -5	*Negative*	*Mild negative, moderate, strong,* *Extreme sentiment*
2, 3, 4, 5	*Positive*	*Mild positive, moderate, strong,* *Extreme sentiment*
-1, 0, 1	*Neutral*	*No negative, no sentiment, no positive*

Impact of engagement on customer sentiments
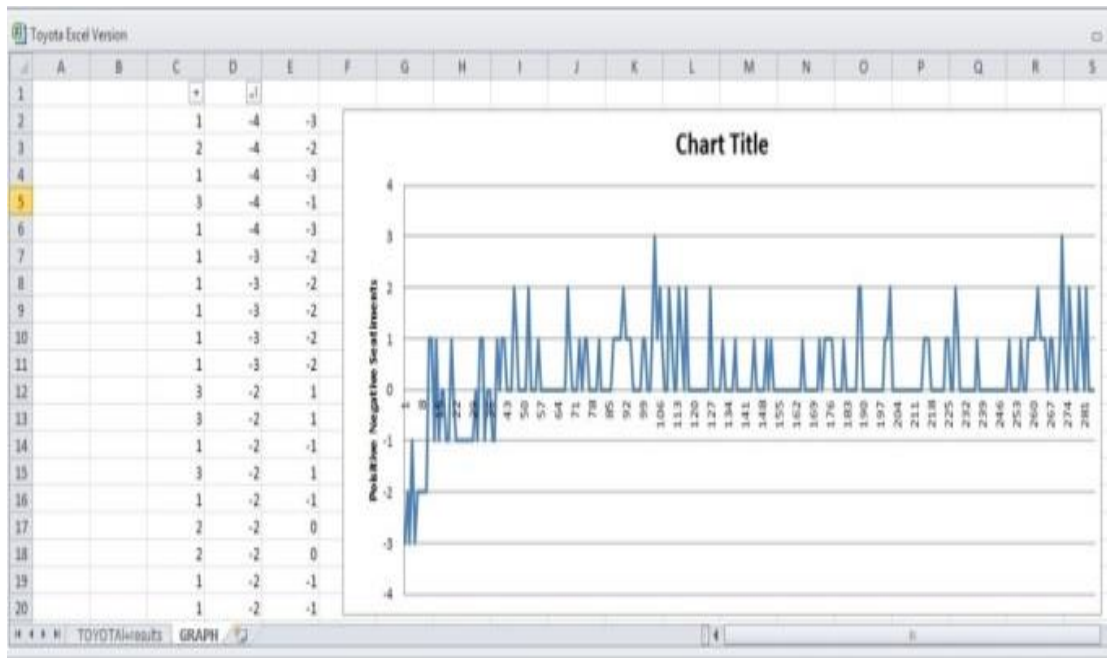
As detailed analysis accomplished for the specific tweets those resulted after data cleaning expressing sentiments, 7% tweets show negative sentiment 15% tweets show positive sentiments, 78% tweets are neutral in sentiment. This specifies that public uses twitter for accessing general information, other information seeking and sharing activities and for asking brand and product related questions, mostly. Here Toyota motors received positive tweets more than negative tweets it means lower percentage of negative sentiment identified. So this analysis shows that micro blogging is very helpful for Toyota motors to use for competitive intellect. For brand management of Toyota motors it is important to know people's opinions about products and brand.

5.1. Pattern of Engagement:

Above analysis shows the impact of online retailers' engagement with the online brand community as Toyota motors Japanese on user perception of brand image and service. So we analyzed the overall sentiment trends of Toyota motors and pattern of engagement between company and customers. Our analysis shows that engagement has an influence on opinions that associate with brand image, customer service of the retailers.

As per overall situation from senti-strength tool, Toyota Motors Japanese has positive image. Average of the score is 3 which are good and on positive side but not very good. It means overall people are happy with Toyota Motors' services but not excited, there is a huge room for improvement to inspire sentiments of customers. Weak points of sentistrength are as; it does not perform well for identifying opinions in product reviews. It cannot identify objective of a

communication of sentiment. It cannot distinguish between different categories of positive and negative opinions.

5.2. Overall trend of brand sentiment:

Microbloging is a promising measure for companies like Toyota motors to use for competitive intelligence such as, for developing better vehicles based on information and knowledge found on social media. It is very important for Toyota motors to know customer's opinions about its products and brand for brand management. Another aspect is Toyota motors can use microbloging for differentiating it from other brands.

5.3. Influence of engagement on customer sentiments:

This analysis showed overall pattern of vibrant responsive evolutions occurred during discussions and how number of replies, sentimentalities of tweets, media types and length have influence on the engagement. For this analysis we selected tweets from #toyota account because it has high engagement.

5.4. Overall sentiment:

The tweets which are sent by #toyota, majority of them were neutral and there are a small percentage of negative sentiments, positive sentiments were higher than negative sentiments of tweets sent by #toyota. In this account negative sentiments were higher than positive sentiments in customers tweets sent to #Toyota. The higher neutral sentiments indicate that the sentiments if #Toyota tweets sent to customer were most positive than those sent from customers to #Toyota. As a well-recognized brand of e-retailer Company, it is important for Toyota motors to help customers positively irrespective of unpleasant complaints sent to Toyota motors. The reason why higher negative comments posted on account #toyota is as this account itself is channel for customer queries and complaints. The account #toyota itself is responsible for handling complaints and enquires from customers. As #toyota is dedicated channel for customers, as they can express their sentiments, they are more likely to send negative tweets through this network. If we look from retailers prospective, Toyota motors can observe the online customers' sentiment more efficiently and can take required action when it is necessary.

5.5. Sentiments change in three stages:

- ✓ Beginning
- ✓ The middle
- ✓ At the end of conversation
    The decrease of negative sentiments was greater than the increase of positive sentiments for customer' tweets and retweets among the beginning, middle and final phase of conversations. Toyota motors should focus on handling negative tweets subsequently until these turn into optimistic this will result in more feedback and replies from

customers which will assist in sustaining positive image of brand. We observed there was a minor conversion sentiments from initial stage of conversation to final stage of conversation. The reason of this minor conversion is the sentiments of majority of twets is neutral. Yet, it show that brand engagement with customers resulted in positive influence on the customers' opinions towards the brand Toyota motors.

5.6. Effect of attitude of engagement:

These analyses conducted to check study how the attitude of #toyota will influence the sentiments of customers through the conversation. The result was as positive replies from #toyota resulted in a significant deduction of negative tweets in the last phase of conversation. It demonstrates, at the start customers were neutral or commenting negatively , concluded being positive, or neutral, when Toyota motors responded to them positively. It demonstrates that Toyota motors is aware of that negative tweets must be handled carefully ever since negative sentiments quickly spread on twitter and damages company reputation and brand image. We also noticed that negative sentiments in reply of #toyota resulted in sharp fall in positive opinions of customers. This observation specifies that #toyota should have a appropriate manner in initializing and communicating with online customers as twitter is a social media stand that is continuously in the eyes of customers.

5.7. Effect of the tweet length:

This explores how the length of the tweet from #toyota effects the sentimentalities of customers' tweets. This analysis demonstrates the change of sentiments at the beginning and at the end of conversations. #toyota replies are divided into three categories: short length (tweet up to 15 words), medium length (tweet up to 20 words), and long length (tweet which contains more than 20 words). There was most significant fall in negative sentiments for lengthy tweets, than for those with short tweets. By using all of these categories of tweets Toyota motors transformed negative sentiments of the customers into positive or neutral sentiments. Often, lengthy reply is required as to resolve customer problems and issues, and for the time being, customer do appreciate on company's struggles in answering back in details.

5.8. Impact of mass media types of engagement:

Most of the tweets were in the form of text. Some tweets were containing links. There was decrease of negative sentiments due to tweets of #toyota containing links. The tweets comprising links led to tweets with positive sentiments, it indicates that existence of link in the tweets focuses on solving customer's queries and problems, which results in change of customer attitude from negative to positive sentiments in the end of discussion.

6. Thematic Analysis (Voyant Tools):

As visual text analytics is an evolving field that balances information visualization and computational semantics, so we used a range of visual text analytics approaches which are appropriate for analyzing thematic trends in text based social media data related to Toyota motors Japanese. Basic intention for why thematic analysis performed is to sketch what conceptions and themes arise from the data in its totality and search how these concepts and themes relate with each other.

The online tool voyant-tools .org was used in conducting a thematic analysis on the tweets clean text file. We loaded the clean data of our analysis into http://voyant-tools.org.

It has shown a fascinating preview, and we can see here a lot of motivating tools.

The below visualization gives us with a birds-eye view of the tweets of our data without demanding thorough reading of every single tweet related to Toyota motors Japanese. This is advantageous way to reduce the prospective for interpretive favoritism as any perceptible concepts that arise from the data will emerge because they are indeed stated repeatedly. It shows frequency of words and spreading statistics. For Toyota Motors analysis here the themes are divided into four main themes as Toyota, Motors, t.com and https, as these are most frequent words occur in the text. The other good thing is we can increase terms show, currently these are 155 terms which are popular ones:

This shows similar patterns of words like: thanks, new, happy, fans, good, boomers, best, important are consistently mentioned in data set. Thanks shows sentiment related to brand image

and also tells about customer perception about brand. It shows customers are happy and satisfied with the service of Toyota Motors Japanese. The word cloud positions the words, such that the terms that occur the most repeatedly are positioned centrally and are sized the biggest. Clicking on words causes one or more other tools to react; hovering over a word will cause a box to appear that shows the frequency count for that term. Another interesting thing found is other rival brands of Toyota Motors Japanese like general motors and Tesla motors are frequently mentioned in tweets along with Toyota motors, this shows in this innovative and competitive industry customers are doing price and service comparision among different brands in their tweets.

Car model, sevice and technology are among important factors influencing customers' decisions when they purchasing vehicles. Voyant tools extracted characteristics of a corpus of Toyota motors quickly and accurately. Also helped in determining underlying themes in corpus. Selecting words from the word cloud, a word trends graph appears showing the relative frequency of the selection associated to its position in the text. This helps to determine the consistency of the theme throughout the text.

Below visualization shows related words and their thematic trends.
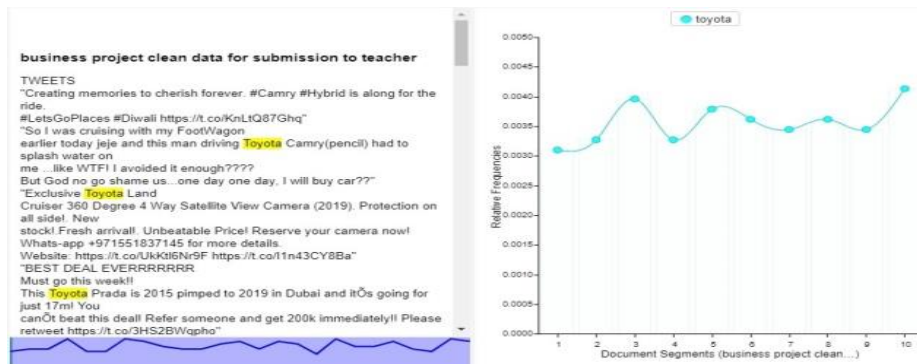
Now let's explore some particular terms. For instance by clicking on Toyota here we can see Toyota is frequently coming after or before t.co which is its company. It occurs 85 times also we can see terms as Toyota motors, Toyota corolla, and Toyota car, Toyota price etc. All these terms are related to Toyota.

Toyota thanks shows people are happy with its services, Toyota sharing shows it is being recommended to other people, Toyota service gives idea of whether customers are satisfied with the services of Toyota Motors or not? Toyota model gives idea of which model of Toyota preferred.
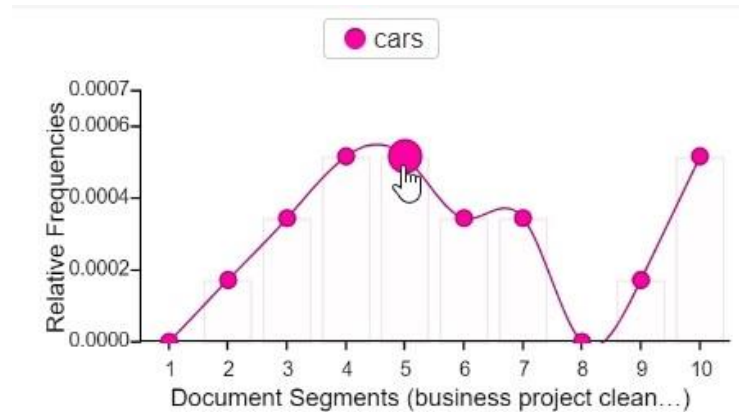
The last part is context we have to pick word which we are looking for we can see what is happening in the text right before and right after the specific word. We can create hypothesis for our data. Let's take the example of car as car can be a Toyota company, Car model can be Honda, car price can also be discussed. Cars can be used for pickups, car price can be in millions, car type can be Mercedes, car can be derived by a man or women, cars can have fans with respect to service quality etc. All the terms above mentioned can be used for thematic analysis. So all above stated terms were found in comments and wide discussions with population. In phrases section we will see most frequent phrases, their count and length in all the clean text which is uploaded for thematic analysis.

Moving on another popular tool in thematic analysis is bubblelines, what it shows us is the frequency of occuring of dissfferent words in text overtime. We can analyse each term seperately. we see aggregation of comments responses in the form of cicles. Appearantly toyota, https, motors t.co occurs more frequently. Car occurs less frequently.

So we can see the most popular word is Toyota, less popular term is petrol.This analysis give best comparison of occurances of different words. In these visualization comments are checked in beginning of the month as well as at end of the month. We can hide the terms in which we are not realy interested in, like pertrol. These circles shows the exact time and place where comments occur.

These Visualizations highlights the theme collections using the colored circles and the individuals represent the concepts.
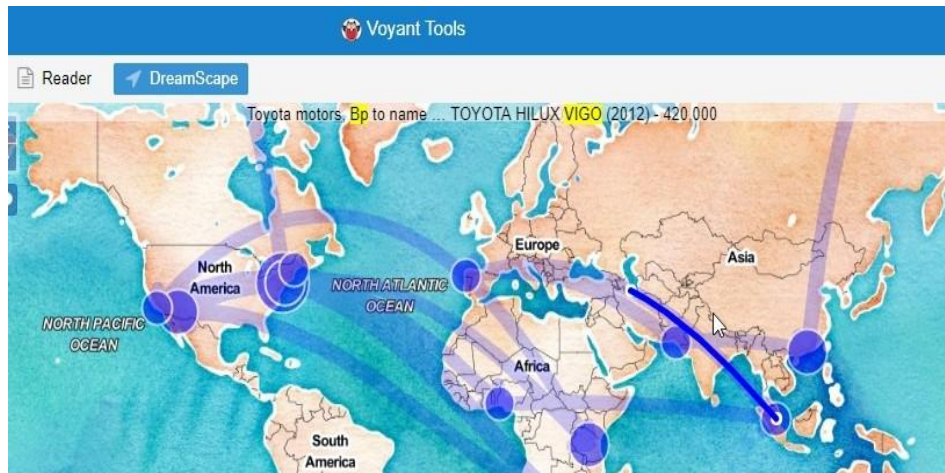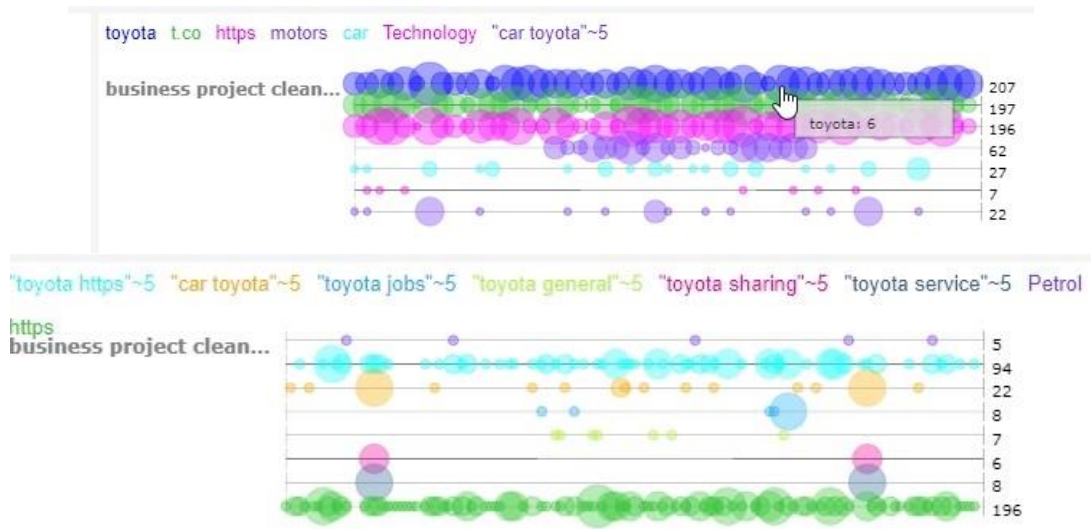
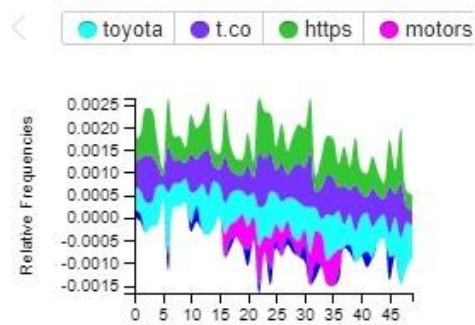Fig. Dreamscape showing geographical existence of Toyota Motors

Fig. a beautiful view of occurrences of themes

Vocabulary density is 0.298 this shows strong relationship among different themes. Average word per sentence is 19.8.

Limitation of thematic analysis is as use of sarcasm and irony will not essentially be identified, and a huge limitation of the above analysis is that the importance of a theme or concept does not reveal a specific approach towards that theme. As one example, the importance of a theme such as 'Toyota searchers' does not by itself expose whether tweeters are responding positively or negatively towards Toyota motors.

7. Network Analysis:

From an analytical perspective, one of the advantages of taking a social network perspective is that the focus is on what people do with each other rather than the medium or face-to-face context through which they do it. This allows exploration of the types of interactions that create and define different kinds of relationships and communities. Thus, friendship may be recognized by pairwise exchange of personal information and emotion, discussion of multiple topics, co-participation in events, frequent interactions, and the use of multiple media. Social support emerges as small and larger exchanges between people, trust in networks to provide services in time of need, and a generalized reciprocity in communities where resources are distributed more generally than in a strictly give-and-take fashion. Principles of social network analysis are derivative from graph theory and consider *actors'* e. g, people, organizations as nodes in a network, connected by *relations* "what they do with each other, e. g, provide new information, resources, emotional support, resources, other services that form interpersonal *ties"*. It consists of components of social network analysis and how to build social network in net lytic.

7.1 SNA (SOCIAL NETWORKS ANALYSIS)

This model visualizes how individuals interact with one another through online conversations. So network analysis focuses on relationships and connections happening within a network. There are two compounds for visualizing a network Nodes represent People and edges represent connections. Individuals, organizations and other entities are represented by dots.

Edges are lines between the nodes illustrate an interactive connection. i. e. conversation. Netlytic discovers two types of networks, Name network= who mentions whom, *Chain Network= who replies to whom*

7.2 Name Network:

In Toyota motors Twitter networks are used through the practical means of *hash tags*, usernames *and followings*. Twitter usernames identify nodes in the network. A direct communication

connection made person to person by specifying the one recipient by prefixing the message or tweet with "@" and the username (e. g, @ bretcurro1).

Topic hash tags and follow show social connections between nodes. Mostly people are following @Toyota. People are also using relational connections by using hashtag,

They see messages related to Toyota motors without following that person. There are many people who tweet with a common hash tag; this is creating connections among posts based on a common hash tag relation. For example, the hash tag ethan280904 was used at the 2018 Toyota motors new model launch ceremony, Japan. Contributors both in Japan and elsewhere could monitor messages with this hash tag to engage with the Twitter conversation regarding the ceremony. Both following and hash tags provide the structure for social networks, that is, the supporting structure from which and on which communities develop and flourish.

As mentioned before Name Networks are built based on who mentioned whom specifically this approach identifies Personal Names in the body of each message and connects the sender to every one mentioned in his or her message.

In the below diagram connection between Toyota and

1. bretcurro1

2. ethan280904

3. juanitob18

4. vdivanov
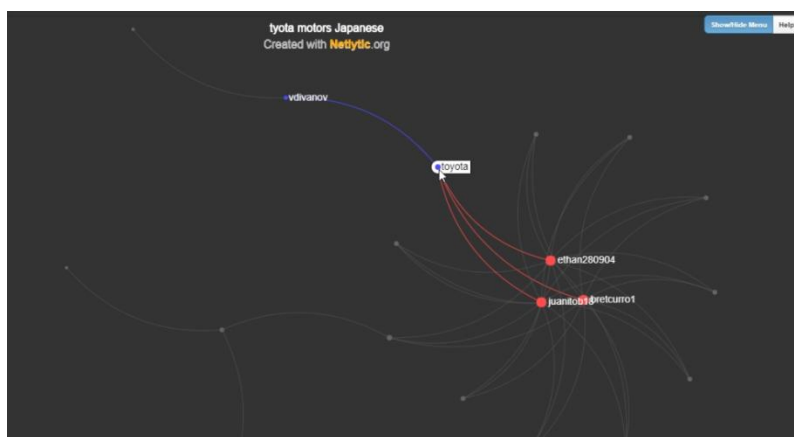

Here in Toyota motors network analysis shows in-degree centrality as personal messages influence other users and encourage them reply or retweet. As in above diagram Toyota influences other nodes. In degree centrality is 4 and out degree centrality is 0.

People with high in-degree are good candidates for regulating future discussions as their messages are clearly resonating with this brand.

People having high values of in-degree centrality considered as trusted information sources whose comments and opinions are recognized as having value for the community, as demonstrated by the frequency with which their messages are retreated or they are frequently mentioned by others. These people are important for this community as they create a lot of "sharable" and trusted information that generates discussion, also sustains conversational interaction and the life of the #Toyota Twitter community.

Connection spectatorindex playing central role as its in degree is 31 and out degree is 0 so it is influential on the network Connection.

Spectatorindex has a very active online presence in network, not just in this community. This node is very passionate and active reviewer on Toyota motors service related matters. So the most connected account is Spectatorindex.

Diameter: 1

Density: 0.031250

Reciprocity: 0.00000

Centralization: 0.500000

Modularity: -0.0000000

Diameter one shows size of network and speed of network, so in the above visualization size of network is smaller but speed of network faster due to small network size. Also it is more centralized network in which a few members control the information. Density which measures the closeness of participants is 0.03 lower it means participants are not close to each other.

Reciprocity: it is zero it means there is one way communications occurs. Centralization is .50, it's good so, spectatorindex is central to all other nodes in the visualization.

7.3 Chain Network:

Chain network (also known as a 'who replies to whom' network) is a communication network built based on participants' posting behavior. To build Chain networks, Netlytic provides a range of opinions for tie discovery: from 'Connect a sender to the last person in the post chain only' to 'connect a sender to all people in the reference chain with decreasing weights'. We can analyze interaction levels using this visualization. For instance, we analyzed that "jonijob 18" account is acting as middle binding between some networks and when we had a look at this account, it belongs to Pakistan Government and its verified official account.
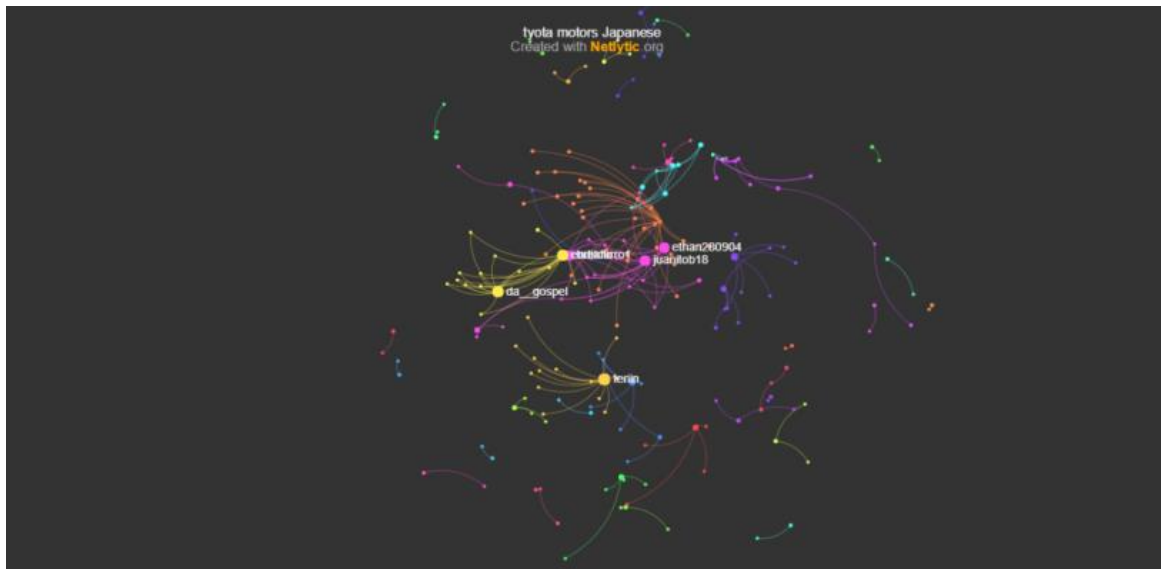

8. Reports

Net lytic creates reports automatically based on our sample. Here are some reports extracted from netlytic;

8.1 Frequency

The below visualization shows in 2020-Jan-20 there were highest numbers of tweets related to Toyota Motors which were 600. Spectorindex is the main account, the content of tweets is mostly about product advertising, information and promotion. @Toyota has its account which

has second highest number of tweets that manages and looks after customer relationship management. While on 2020-jan-20 there was lowest number of tweets.
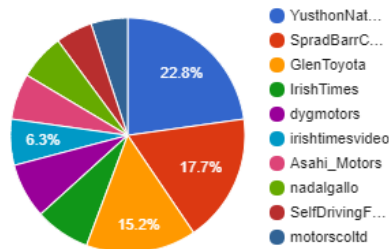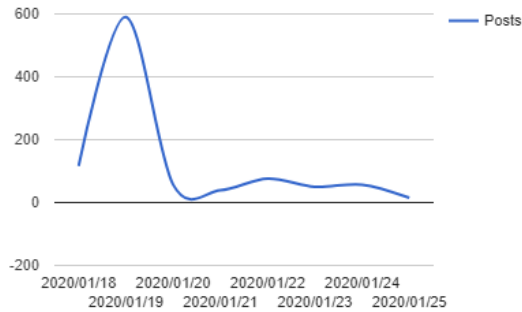
Above figure shows the top 10 active members of this community based on the total number of messages posted to this community. Who are these people and what they have been saying will be analyzed for meaningful understanding. Not surprisingly, the group organizer, @YusthonNat, posted the most number of messages (22.8% of all messages posted by the top 10 posters). He is basically consultant that works with company owners to be more effective. He is in tweets mostly taking about vehicles shape, appearance, size, condition and colors. He is following 250 persons and his followers are 7480.

2nd highest is spredBerryChey it is the Inc. of Cheyenne carries #Ford, #Toyota, #Lincoln, #Mazda, #Hyundai sales, parts, and service(17.7%). He retweets on learning how block chain technology can improve Toyota motors and develop new values and new business models. He is following 350 persons and his followers are 4888.

3rd highest is Glen Toyota it is between Bergen and Passaic countries this user is advertising Toyota motors by comparing with other vehicle companies basically this user works on promotion of Toyota motors. Followers are 414 and following are 644(15.2%).

4th highest is Irish times which gives the latest business news, analysis and commentary this is has 908 following and 69.9k followers. This account gives diverse opinion (7.6%)

5th is dygmotors IT IS advertising company of Toyota motors its tweets are mostly related to Toyota motors consultants contact numbers and other super offers. Number of followers are 391 and followings are: 834 (7.6%)

6th is irsh Times video this is news channel this give latest news about Toyota motors, sports, businesses and information about other brands. No. of Following is 13 followers are 8925. (6.3%).

7th is Asahi_Moitors which is the account of vehicles company advertising different features of vehicles. No of followers is 451 and followings are 35. (6.3%)

8th is Nadagallo who is having 573 followings and 381 followers. He is the manager of Toyota Motors who conveying vision and passion of Toyota Motors (6.3%)

9th SelfdrivingFeed this account consist of all articles about self-driving cars this account mostly discusses latest technology related topics in vehicles companies. (Followers=1257 followings=622. (5.1%)

10th is motors co ltd this is sales portal for individuals and traders of second hand and new cars in Thai and Japan, followings=2989 followers =306 (5.1%) In starting an online community, leaders play a key role by their philanthropic or proactive participation, providing more posts to the community than they receive and thus helping create a critical mass of interactions that act as a draw for others.
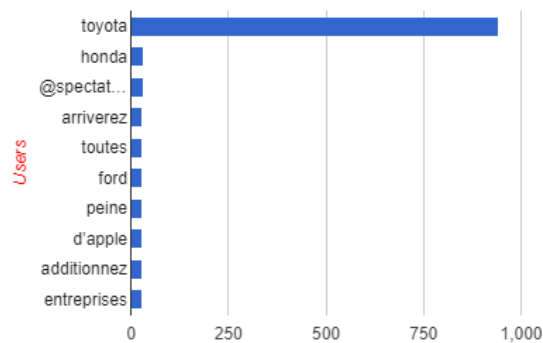

Fig. Tweets associated with Toyota motors are higher comparatively in January 2020.

9. Limitations:

Social web is changing over time both in terms of the usual user profiles and the sites that are more general and usage approaches. Therefore, the finding of our studies, even these are best, are likely to be outdated in future and for the next period we have to repeat them. So follow up is important in this case. Few of studies are dynamic, specially limited to a specific country or bound time period, in such cases these findings cannot be taken as conclusive in most advanced cases. Another limitation is thousands of messages are needed to give dynamic confirmation and so research of doubtful online topics are expected to be unproductive.

10. Discussion and implications:

This study gave several insights as an effort to explore Toyota motors and customer engagement on microbloging platform. We observed the impact of engagement on customer sentiments through the sentiment data of Toyota motors and customers. We explored word frequency, timings and different types of engagements for understanding engagement patterns. Different types of analysis are performed to observe the different points of engagement e. g number of replies, sentiments of replies, length of words and media types on the transformation of customer sentiments. Our findings shows that the way Toyota motors involve with micro blogging users has a significant impact on the customer sentiments which is associated with customer perception of brand service and brand image. For example we observed number of replies effect positively in changing customer negative sentiments. So high number of replies from brand which indicates more interactions with customers, could change the mind of customers from negative to positive as they feel brand is willing to help customers and solve their problems. Same case happens when company replies in form of lengthy tweet. The explanation of this is, customers reply positively, when they receive positive response from customer service representative and longer reply might help, as it requires resources and time to do so, which shows company's passion to pay attention on customers. Therefore, twitter accounts are smart idea for companies to convey information to customers and to monitor brand related discussions. Data gathered on how people engage and adverse about some specific products opens the doors for the advertising prospect as it will be helpful when designing a marketing campaign

Our sentiment analysis also showed that the presence of the link in the tweet encourages an improvement of customer sentiment. This finding showed how Toyota motors leveraging microbloging for branding purpose. For example, there is a central place where customers can, provide feedback, give opinion, complaints and get answer for their questions. This could be done by crating twitter account as a place to involve with customers as a different way to heighten branding image. For example having multiple accounts for various purposes like @toyota and @toyotamotors are used for the purpose of campaigns, information dissemination,

events and surveys, in the meantime #toyota is used for handling complaints, suggestions and queries.

As the literature on relationship marketing shows, "customers who are satisfied with how company manages the complaints will commit to a high degree of engagement where an effective company-customer interaction is essential for strong company-customer bond."(Cambra-Fierro-Polo, & J avier Sese,2015). A decrease in negative word of mouth would increase profitability, competitiveness and stabilize relationships with the companies. (Kaltcheva, Winsor & Parasuraman, 2013)

By employing effective and suitable approaches of engaging with customers, businesses can go in win-win situation by getting feedback of customers that gives a better understanding of customer expectations and needs which leads to value-added services.

11. Conclusion:

This study showed that public on social media is progressively becoming vital and relevant. It has become more extensive nowadays in business and public sector simultaneously. Oliveira, Huertas, and Lin (2016) gave argument as "we found that most of studies in the existing literature mainly focused on engagement in government, politics and education but little in online retailing especially those that use micro blogging platform like "Twitter" this argument highlighted there were fewer prior workings on the engagement between companies and social media users. So for sake of doing different from previous studies we focused more on emotional evolutions involved in between Toyota motors and customers. We used different types of indicators such as word count, length of tweet, the attitude of sentiment etc.

In recent years, social media has emerged into huge outburst stimulated by the growth of the internet and mobile technologies. It is creating its way into companies, education, media and other situations by providing a highly collaborating platform where people can generate, share exchange information and appealing way of online collaboration. It has been broadly used by companies such as Amazon to interrelate with customers and develop the corporate name and brand image. Leveraging of this new media wants companies to continuously monitor data related to their products. According to a recent study by Nagy and Midha, "almost 80% of Twitter users were found habitually mentioned brands in their tweets". It shows that Toyota Motors can start using Twitter to involve with public for several commitments including brands enrichment, product marketing and modernization. For the past years, 72% of large companies have already organized social media based networks in their operations. In principle, the beginning of micro blogging platform has given chance to customers to involve and conveying their thoughts towards the brands. Toyota Motors must pay more responsiveness on online opinions about product and service area for instance customers perceptions generated on social media can help company in their brand positioning, marketing, growth and product expansion.

Toyota Motors have need of insights and acquaintances with their customers on the Internet to retain the evolving customer behavior assisted for the high-tech progression. There are only few literatures on the powerful sources that can facilitate companies to improve their brands image and increase user satisfaction, in return for an improvement in reputation and overall customer satisfaction over time. However, Toyota motors Japanese is lagging behind of using social media as a tool to improve their branding. It is important to be shown some lights on how social media could help to involve with the innovative generation of customers.

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