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Autonomous Feedback Generation Technique for Effective Decision-Making Process

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ABSTRACT: Today, the world has become a buyer's economy, and this leads everyone to the race in the domain of customer satisfaction. Customer feedback plays an important role in collecting data to analyze the satisfactory level provided by an organization's service or product. But there should be a way to collect feedback without letting the customers know about it. Also, people do not like to invest time in giving feedback. Then walking through the consecutive steps, it was found to have a beneficial application in various fields. The Autonomous Feedback Generation technique for effective decision-making process intends to analyze the data from the social media to get a clear picture about a substance. The goal was to collect data with honest sentiments from the people about a particular substance. Social media is a platform where people put forward their real and honest sentiments about a product, service, matter, etc. and there is no use of the data that is taken from the physical feedback method, which is often taken playfully by a huge amount of audience, therefore the data or feedback isn't trustworthy if taken through the conventional method. This project begins from obtaining data from the social media platform like, Instagram, Facebook, twitter, etc. and then cleaning them into a useful data. The significant data is then analyzed through sentimental analysis. Through this we get a proper text classification which then turns out to be useful to know about the sentiments of the audience about a particular substance. A perfectly classified output of a diversified data now becomes an input for the decision-making process.

KEYWORDS: Sentimental Analysis, data analysis, text classification, decision making, social media data, Python.

I. INTRODUCTION

Usually, to save time the consumers ignore the questions and give feedback by randomly ticking "Very good", "Excellent", "Poor", etc. in random aspect's checkboxes without noticing it. This type of feedback can never be termed as genuine for organizations. These random ratings will only stop an organization to improve in an aspect in which they actually lag. Also, insufficient information filled by the customers in the feedback forms leaves them clueless about their problems. Therefore, there should be a way to collect genuine feedback from users without taking a single second of the customers. Automatic genuine feedback generator (AGFG) is a model which will use machine learning to analyze the thoughts and sentiments of individuals or groups for an organization without involving them in the feedback collection process. This model will require a platform where people consider themselves free and unjudged. Social media is a platform where consumer expresses their genuine feelings and thoughts about anything. Our model will use posts, tweets, articles, etc., as the data for public input. Further, the collected data will be analyzed through RNN-LSTM and sentimental analysis to discover people's thoughts and behaviour for any organization. This will eventually eliminate the need for organizations to collect physical data for feedback from their consumers. This technique can be used by many types of organizations like:

1. Colleges/Universities/Schools,
2. Corporate industries,
3. Large scale retailers, etc.

This technique is advantageous for organizations in the following ways:

1. Time-saving
2. True feedback
3. More scope for improvement



II. OBJECTIVE

We aim to build a sentimental analysis model to collect consumers' feedback from social media sites. Our work is based on machine learning, deep learning, text classification, and human psychology. The proposed model will predict the thoughts of people for any organization. The initial objective of this work is to maintain the importance of feedback for an organization without involving the customers in the process. Furthermore, our dead-end for this project is to make our model highly advanced which can give the customers feedback to the organization at a single click. In the future, this model may have the potential to make the decision-making process of any organization faster as this doesn't wait for customers to give feedback. Our work for this project would be two ways—the data extraction and Text Classification. Text classification will need some psychological information to differentiate between words used in social media to conclude their impact as positive or negative.

III. METHODOLOGY

Topic selection and brief: Feedback of people about the Indian Education system. Sentimental analysis done on Education system of India for finding the genuine feedback from the data extracted from the social media platforms such as the twitter. Also, the work extends for doing the decision making for the above problem statement. This problem is identified as getting genuine feedback for this system is very difficult and hence it makes difficult for the students to make decisions. Hence this not only used for generating feedback and used for decision making in Education System but also at various college level programs too.

Data Extraction: A sample of 17 tweets was extracted from the twitter API. The tweets were randomly selected from the program. The twitter API requires a keyword to find the tweets for the required topic. The keyword used by us for this study was "Indian Education System." The dictionary used in this code was TWEETPY. We were asked to register at the Twitter API platform to get the access token, consumer key, consume_secret key, and access key. Following is the code to activate twitter API in python.

```
from tweepy import *  
  
import pandas as pd  
  
import csv  
  
import re  
  
import string  
  
import preprocessor as p  
  
consumer_key = <enter your consumer key>  
  
consumer_secret = <enter key>  
  
access_key= <enter key>  
  
access_secret = <enter key>
```

Fig 1. Data Extraction code (Twitter)

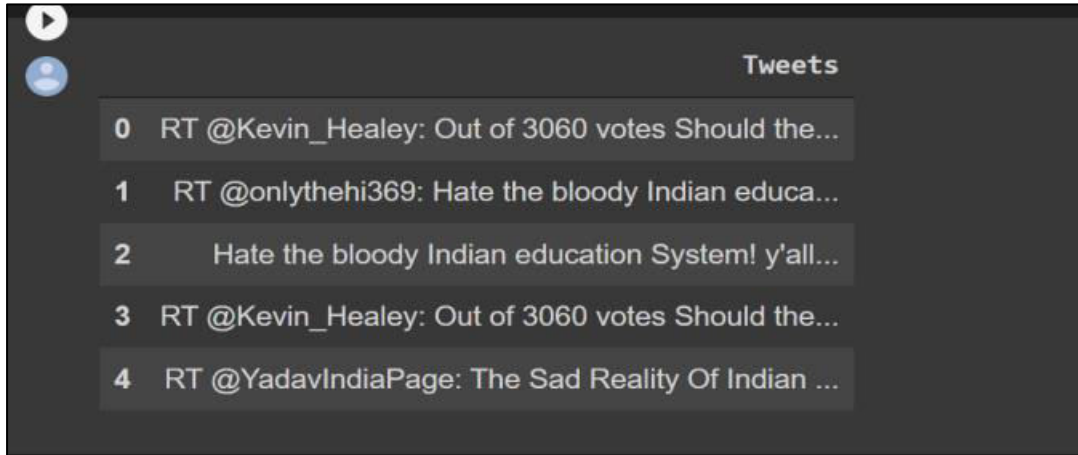


Fig 2. Extracted Data

Data Cleaning: This process was required because all the tweets consisted of unrequired things like mentions and hyperlinks.

```
#clean the data
#create a function to clean the tweets
def cleanTxt(text):
    text = re.sub(r'@[A-Za-z0-9]+', '', text) #removed @mentions
    text = re.sub(r'#', '', text) #removing the #
    text = re.sub(r'RT[\s]+', '', text) #Removing RT
    text = re.sub(r'https?:\/\/\S+', '', text) #remove the hyper link

    return text

df['Tweets'] = df['Tweets'].apply(cleanTxt)
#show the cleaned text
df.to_csv("cleanedtweets.csv")
df=pd.read_csv("cleanedtweets.csv")
print(df)
```

Fig 3. Cleaning Data code



sr_no	Tweets
0	0 _Healey: Out of 3060 votes Should the Indian I...
1	1 : Hate the bloody Indian education System! y'a...
2	2 Hate the bloody Indian education System! y'all...
3	3 _Healey: Out of 3060 votes Should the Indian I...
4	4 : The Sad Reality Of Indian Students, with the...
5	5 _Healey: Out of 3060 votes Should the Indian I...
6	6 Our(Indian) education system has fuck the educ...
7	7 : I would like to thank all of these Angels wh...
8	8 We re...
9	9 : *World going through covid-19, war, financia...
10	10 Indian education system:
11	11 _Indian: This is in stark contrast to Indian ...
12	12 : Pura Indian education system phaltu hai un...
13	13 Pura Indian education system phaltu hai unho...
14	14 : *World going through covid-19, war, financia...
15	15 Indian education system:
16	16 Had a debate at uni yesterday on foreign vs in...
17	17 I chained my own soul to the Indian educati...

Fig 4. Cleaned data

Data Translation: Sentimental analysis currently can only do the text classification for English language. While the data we got from the twitter was in different languages like:

1. English
2. Hindi
3. Marathi
4. Bengali, etc.
5. Different languages written in English words.

For this we needed a model which could convert all the data in English. Google Translation API was the most suitable method for this job. It converted all the tweets into English language. The data was now ready for the classification.

```

translated = []
src_lang_keys = []
full_source_language = []

for element in df['Tweets']:
    translated.append(translator.translate(element).text)
    src_lang_keys.append(translator.translate(element).src)
    full_source_language.append(LANGUAGES[translator.translate(element).src])

print(translated)

['_Healey: Out of 3060 votes Should the Indian IN education system be more supportiv
<

df['translated']=translated ##adding a new column in dataframe with translated line
df['src_lang_keys']=src_lang_keys
df['full_source_language']=full_source_language

print(df)
    
```

Fig 5. Data translation code (Google translation API)



	translated	src_lang	keys	\
0	_Healey: Out of 3060 votes Should the Indian i...	en		
1	: Hate the bloody Indian education System! y'a...	en		
2	Hate the bloody Indian education system! y'all...	en		
3	_Healey: Out of 3060 votes Should the Indian i...	en		
4	: The Sad Reality Of Indian Students, with the...	en		
5	_Healey: Out of 3060 votes Should the Indian i...	en		
6	Our(Indian) education system has fuck the educ...	en		
7	: I would like to thank all of these Angels wh...	en		
8		en	We re...	
9	: *World going through covid-19, war, financia...	en		
10		en	Indian education system:	
11	_Indian: This is in stark contrast to Indian m...	en		
12	: The whole Indian education system is useless...	hi		
13	The whole Indian education system is useless, ...	hi		
14	: *World going through covid-19, war, financia...	en		
15		en	Indian education system:	
16	Had a debate at uni yesterday on foreign vs in...	en		
17	I chained my own soul to the Indian education ...	en		

Fig 6. Translated Data

Text Classification: In sentimental analysis the model is trained to classify the tweets into two categories:

1. Subjectivity: A degree to know about the nature of the text as a factual information or a personal belief.
2. Polarity: A degree to determine the nature of the text as negative to positive.

All the tweets were then analyzed on the basis of subjectivity and polarity by allotting a particular value to the text in these two domains. In polarity, the value ranges from -1 to 1, if the value is -ve then the text is negative and if the value is +ve then the text is positive. The magnitude of the value depends on severeness of the words use. In subjectivity, the value ranges from 0 to 1. Of the value is near to one then it is termed as a personal belief and if it is close to 0 then it is termed as a factual information.

```
#create a function to get the subjectivity
def getSubjectivity(text):
    return TextBlob(text).sentiment.subjectivity

#Create a function to get the polarity
def getPolarity(text):
    return TextBlob(text).sentiment.polarity

#Create two new columns
df['Subjectivity'] = df['translated'].apply(getSubjectivity)
df['Polarity'] = df['translated'].apply(getPolarity)
```



```
#Create a function to compute the negative, neutral, and positive analysis
def getAnalysis(score):
    if score < 0:
        return 'Negative'
    elif score == 0:
        return 'neutral'
    else:
        return 'Positive'

df['Analysis'] = df['Polarity'].apply(getAnalysis)

#Show The data frame
df
```

Fig 7. Text Classification Code

Unnamed: 0	sr_no	Tweets	translated	src_lang_keys	full_source_language	Subjectivity	Polarity	Analysis
0	0	_Healey: Out of 3060 votes Should the Indian 1...	_Healey: Out of 3060 votes Should the Indian 1...	en	english	0.750000	0.500000	Positive
1	1	: Hate the bloody Indian education System! y'a...	: Hate the bloody Indian education System! y'a...	en	english	0.875000	-0.700000	Negative
2	2	Hate the bloody Indian education System! y'all...	Hate the bloody Indian education System! y'all...	en	english	0.866667	-0.666667	Negative
3	3	_Healey: Out of 3060 votes Should the Indian 1...	_Healey: Out of 3060 votes Should the Indian 1...	en	english	0.750000	0.500000	Positive
4	4	: The Sad Reality Of Indian Students, with the...	: The Sad Reality Of Indian Students, with the...	en	english	1.000000	0.050000	Positive
5	5	_Healey: Out of 3060 votes Should the Indian 1...	_Healey: Out of 3060 votes Should the Indian 1...	en	english	0.750000	0.500000	Positive
6	6	Our(Indian) education system has fuck the educ...	Our(Indian) education system has fuck the educ...	en	english	0.800000	0.050000	Positive
7	7	: I would like to thank all of these Angels wh...	: I would like to thank all of these Angels wh...	en	english	0.300000	1.000000	Positive
8	8	We re...	We re...	en	english	0.000000	0.000000	neutral
9	9	: "World going through covid-19, war, financia...	: "World going through covid-19, war, financia...	en	english	0.000000	0.000000	neutral

Fig 8. Classified data

IV. EXPERIMENTAL RESULTS

We used scattered diagram, text cloud and histogram to visualize the analysis of the data. These tools gave us exact picture about the sentiments of people on Indian Education System.



```
# Plot the Text Cloud
allWords = ' '.join( [twts for twts in df['translated']] )
wordCloud = WordCloud(width = 500, height = 300, random_state = 21, max_font_size = 119).generate(allWords)

plt.imshow(wordCloud, interpolation = "bilinear")
plt.axis('off')
plt.show()
```

Fig 9. Text cloud code

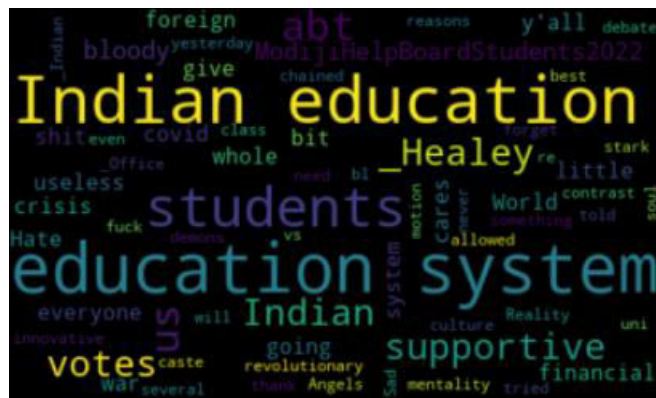


Fig 10. Text Cloud

```
# Plot the polarity and subjectivity
plt.figure(figsize=(8,6))
for i in range(0, df.shape[0]):
    plt.scatter(df['Polarity'][i], df['Subjectivity'][i], color='Blue')

plt.title('Sentiment Analysis')
plt.xlabel('Polarity')
plt.ylabel('Subjectivity')
plt.show()
```

Fig 11. Scatter Diagram code

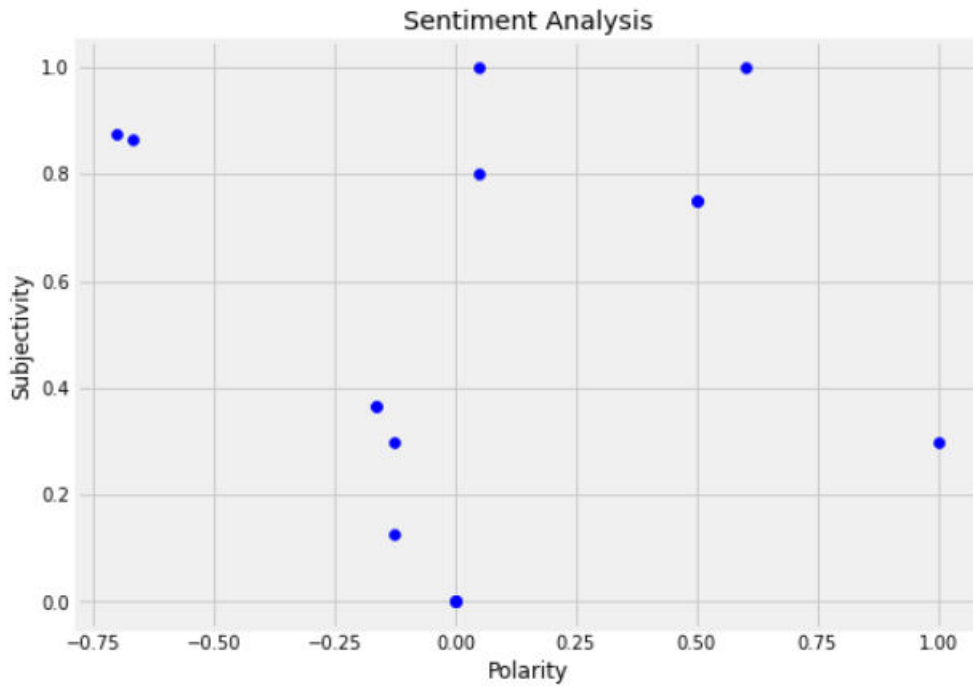


Fig 12. Scatter Diagram

```
#show the value counts
df['Analysis'].value_counts()

#plot and visualize the counts
plt.title('Sentiment Analysis')
plt.xlabel('Sentiment')
plt.ylabel('Counts')
df['Analysis'].value_counts().plot(kind='bar')
plt.show()
```

Fig 13. Bar Chart Code

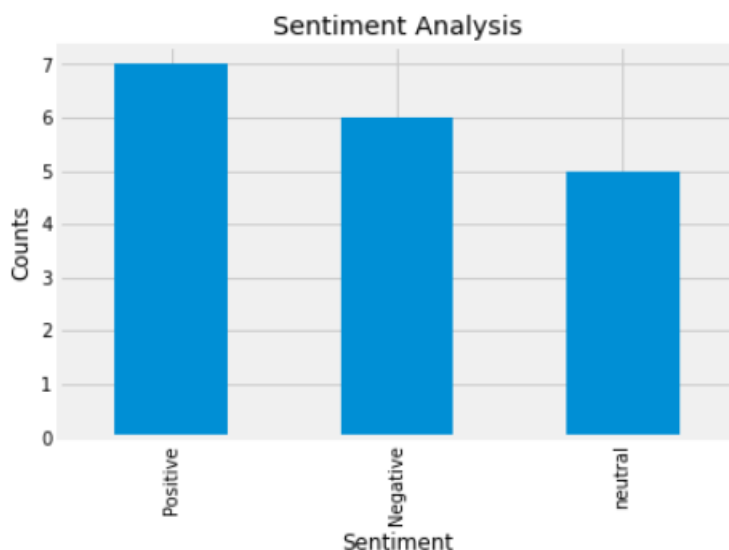


Fig 14. Bar chart

V. CONCLUSION

Sentiment analysis allows for the precise measuring of people's attitudes toward a corporation in the information age. When a firm is monitoring online interactions, sentiment analysis, a type of text mining, can uncover and extract subjective information from the source material to help the organisation better understand the social sentiment surrounding its brand, product, or service.

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