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**SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
(SCOPE)**

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**CSE2004: DATABASE MANAGEMENT
SYSTEMS**

SENTIMENT ANALYSIS

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Abstract:

The Tweet Sentiment Analysis, serves as a means for understanding the emotions of a set of people entered by the user.

By going through this project, one can surely understand on what is Database Management System understand it's roll with the Frontend and the Backend connectivity. Simplicity and Understanding can be key entities for a budding DBMS developer.

Prompting between Twitter and Python using Tweepy, the simple Python source code analysis of text entered by thousands of people using Textblob, data storage in MySQL and the display of the analysis using a pie chart.

Overall this project deals to forge all the above actions into one sweet application that would be helpful for an apprentice who wishes to take a step forward in DBMS.

Introduction:

Sentiment analysis is the gathering of various responses from vast masses and grouping them under certain group of emotional sets to better understand and give back appropriate feedback after the analysis. In simpler words it's used to detect the positive, negative and neutral sentiments or emotions in the provided input and give a response corresponding to it.

Sentiment analysis is becoming an essential tool to monitor and understand sentiment and opinions of people. It helps to learn what kind of preferences people have and how they wish to tailor products and services according to their tastes, also it is a means to evaluate what majority of people like and use more, thus helping the manufactures to have better idea of which products might sell more.

It seeks to understand a subject's attitude or emotional reaction toward a specific topic (or brand). It uses particular tools, techniques, and methods to understand what people say about a

matter. Sentiment analysis can be automated, therefore decisions can be made based on a significant amount of data rather than plain intuition that isn't always right.

Sentiment analysis has a lot to offer. The benefits of sentiment analysis spread from more empathetic service for each customer, to better tailor fit products, to an insight to the overall performance of employees and establishment.

It can be applied to wide range of fields and its applications are endless if used in daily life. Its principle can be applied in almost all kinds of product reviews, surveys, and responses, individuals and organizations issues, topics, events, training, online and social media content.

It is continually evolving from being mostly one dimensional in its perspective (good, bad or neutral) to being more involved in its assessment of the subtle variation in emotions and the differentiation of those feelings (for example distinguishing anger and grief).

Motivation:

Data is a multi-purpose word, everything we see around is built up of data. Data can be boring sometimes, but it's application can make it one of the fascinating products that can be looked up to admiration.

One such application of Data is Sentiment Analysis, ranging from politics to the basic necessities a person likes, sentiment analysis could be used on a wide range, in one perspective, to know what a person thinks about the world around him, his data, his info, his messages could be run through this analysis to figure up his nature, in another perspective to understand what people think about the world set up entities around them can be appealing to know a certain thing or movie or game or incident, in short it is easy to understand the overall thought towards a particular subject, that is what made us students choose one of its amazing applications.

Requirements:

REQUIREMENTS AND PRE-REQUISITES TO RUN THIS PROGRAM :

I. SYSTEM REQUIREMENTS (MINIMUM)

1. Windows 7 or later
2. Processer : Core i3-3220 or later
3. RAM : 4GB or later
4. ROM : 200GB or later

II. GENERAL REQUIREMENTS:

1. Python 3.x version
2. MySql (Latest version)
3. MySql Connector for Python installed with MySql instalation

III. PRE-REQUISITES FOR EXECUTION:

1. Active Internet Connection
2. Active Twitter Developer Account (with active project in it)

IV. PYTHON REQUIREMENTS (USING PIP COMMAND IN CMD)

1. pip install tweepy
2. pip install textblob
3. pip install mysql.connector
4. pip install matplotlib

V. SQL REQUIREMENTS:

1. Database : SENTIMENTAL_ANALYSIS
2. Tables (inside database) : TWITTER_REVIEWS , EXTRACTED TWEETS

Terminologies:

Python:

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

SQL:

SQL (Structured Query Language) is a domain-specific language used in programming and designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS). It is particularly useful in handling structured data, i.e. data incorporating relations among entities and variables.

Twitter API:

API stands for Application Programming Interface. This software provides "middleman services" between two applications that want to communicate with each other. Any requests you make go to the server first and the response given comes through the same route.

The Twitter API lets to read and write Twitter data. Thus, we can use it to compose tweets, read profiles, and access your followers' data and a high volume of tweets on particular subjects in specific locations.

Tweepy:

Tweepy is an open source Python package that gives you a very convenient way to access the Twitter API with Python. Tweepy includes a set of classes and methods that represent Twitter's models and API endpoints, and it transparently handles various implementation details, such as:

- Data encoding and decoding
- HTTP requests
- Results pagination
- OAuth authentication
- Rate limits
- Streams

Textblob:

TextBlob module is used for building programs for text analysis. It is a simple library which supports complex analysis and operations on textual data.

The approach that the TextBlob package applies to sentiment analysis differs in that it's rule-based and therefore requires a pre-defined set of categorized words. These words can, for example, be uploaded from the NLTK database. Moreover, sentiments are defined based on semantic relations and the frequency of each word in an input sentence that allows getting a more precise output as a result.

Once the first step is accomplished and a Python model is fed by the necessary input data, a user can obtain the sentiment scores in the form of polarity. TextBlob's output for a polarity task is a float within the range $[-1.0, 1.0]$ where -1.0 is a negative polarity and 1.0 is positive. This score can also be equal to 0, which stands for a neutral evaluation of a statement as it doesn't contain any words from the training set.

MySQL.connector:

MySQL Connector/Python enables Python programs to access MySQL databases, using an API that is compliant with the Python Database API Specification v2.0.

- ✓ Use the `connect()` method of the MySQL Connector class with the required arguments to connect MySQL. It would return a `MySQLConnection` object if the connection established successfully
- ✓ Use the `cursor()` method of a `MySQLConnection` object to create a cursor object to perform various SQL operations.
- ✓ The `execute()` methods run the SQL query and return the result.
- ✓ Use `cursor.fetchall()` or `fetchone()` or `fetchmany()` to read query result.
- ✓ Use `cursor.close()` and `connection.close()` method to close the open connections after the work is complete.

Matplotlib:

Matplotlib is a cross-platform, data visualization and graphical plotting library for Python and its numerical extension NumPy. As such, it offers a viable open source alternative to MATLAB. Developers can also use matplotlib's APIs (Application Programming Interfaces) to embed plots in GUI applications. One of the greatest benefits of visualization is that it allows us visual access to huge amounts of data in easily digestible visuals. Matplotlib consists of several plots like line, bar, scatter, histogram etc. Plots helps to understand trends, patterns, and to make correlations. They're typically instruments for reasoning about quantitative information.

Regular Expression (re):

A regular expression is a special sequence of characters that helps us match or find other strings or sets of strings, using a specialized syntax held in a pattern. Regular expressions are widely used in UNIX world.

The Python module re provides full support for Perl-like regular expressions in Python. The re module raises the exception re.error if an error occurs while compiling or using a regular expression.

SQL Pre-requisites

1. Create SENTIMENTAL_ANALYSIS Database

```
mysql> CREATE DATABASE SENTIMENTAL_ANALYSIS;  
Query OK, 1 row affected (0.14 sec)  
  
mysql> USE SENTIMENTAL_ANALYSIS;  
Database changed
```

2. Creating TWITTER_REVIEWS Table and presenting its Description

```
mysql> CREATE TABLE TWITTER_REVIEWS  
-> (HASHTAG VARCHAR(20) NOT NULL,  
-> NO_OF_TWEETS INT NOT NULL CHECK (NO_OF_TWEETS>0),  
-> POSITIVE FLOAT DEFAULT 0,  
-> WPOSITIVE FLOAT DEFAULT 0,  
-> SPOSITIVE FLOAT DEFAULT 0,  
-> NEGATIVE FLOAT DEFAULT 0,  
-> WNEGATIVE FLOAT DEFAULT 0,  
-> SNEGATIVE FLOAT DEFAULT 0,  
-> NEUTRAL FLOAT DEFAULT 0,  
-> GEN_REPORT CHAR(30) NOT NULL DEFAULT 'Neutral');  
Query OK, 0 rows affected (1.15 sec)
```

```
mysql> DESC TWITTER_REVIEWS;  
+-----+-----+-----+-----+-----+-----+  
| Field          | Type          | Null | Key | Default | Extra |  
+-----+-----+-----+-----+-----+-----+  
| HASHTAG        | varchar(20)   | NO   |     | NULL    |       |  
| NO_OF_TWEETS   | int           | NO   |     | NULL    |       |  
| POSITIVE       | float         | YES  |     | 0       |       |  
| WPOSITIVE      | float         | YES  |     | 0       |       |  
| SPOSITIVE      | float         | YES  |     | 0       |       |  
| NEGATIVE       | float         | YES  |     | 0       |       |  
| WNEGATIVE      | float         | YES  |     | 0       |       |  
| SNEGATIVE      | float         | YES  |     | 0       |       |  
| NEUTRAL        | float         | YES  |     | 0       |       |  
| GEN_REPORT     | char(30)      | NO   |     | Neutral |       |  
+-----+-----+-----+-----+-----+-----+  
10 rows in set (0.05 sec)
```

3. Creating EXTRACTED_TWEETS Table and Presents its Description

```
mysql> CREATE TABLE EXTRACTED_TWEETS  
-> (TWEET_TEXTS VARCHAR(120) NOT NULL);  
Query OK, 0 rows affected (1.15 sec)
```

```
mysql> DESC EXTRACTED_TWEETS;  
+-----+-----+-----+-----+-----+-----+  
| Field      | Type          | Null | Key | Default | Extra |  
+-----+-----+-----+-----+-----+-----+  
| TWEET_TEXTS | varchar(120) | NO   |     | NULL    |       |  
+-----+-----+-----+-----+-----+-----+  
1 row in set (0.33 sec)
```

Source Code:

[illegible]


```
1) {str(positive)} % people thought it was positive
2) {str(wpositive)} % people thought it was weakly positive
3) {str(spositive)} % people thought it was strongly positive
4) {str(negative)} % people thought it was negative
5) {str(wnegative)} % people thought it was weakly negative
6) {str(egative)} % people thought it was strongly negative
7) {str(neutral)} % people thought it was neutral
```

```

inserting into sql
truncate_stmt = ("TRUNCATE TABLE TWITTER_REVIEWS")
cur.execute(truncate_stmt)
truncate_ex = ("TRUNCATE TABLE EXTRACTED_TWEETS")
cur.execute(truncate_ex)
insert_stmt = (
    "INSERT INTO TWITTER_REVIEWS(HASHTAG, NO_OF_TWEETS, POSITIVE,WPOSITIVE, SPOSITIVE, NEGATIVE, WNEGATIVE, SNEGATIVE, NEUTRAL, GEN_REPORT)"
    "VALUES (%s, %s, %s, %s, %s, %s, %s, %s, %s, %s)"
)
data = (searchTerm, NoOfTerms, positive, wpositive, wnegative, snegative, neutral, report)
cur.execute(insert_stmt, data)
conn.commit()
select_stmt = ("SELECT * FROM TWITTER_REVIEWS")
cur.execute(select_stmt)
details = cur.fetchall()
info=[a for a in details[0]]
for a in self.tweetText:
    insert=("INSERT INTO EXTRACTED_TWEETS(TWEET_TEXTS)"
           "VALUES (%s)")
    val=(a,)
    cur.execute(insert,val)
    conn.commit()
conn.close()

```

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Results:

Front-End (Python):

```
*****
*                                     *
*                                     *
*                                     *
*          TWITTER SENTIMENTAL ANALYSIS          *
*                                     *
*                                     *
*                                     *
*****
```

Enter any Keyword / HashTag to search in Twitter: teacher

Enter how many tweets to be searched: 50

Let us get to know how people are expressing on teacher by analyzing 50 tweets

General Report : Weakly Positive

DETAILED REPORT

- 1) 16.00 % people thought it was positive
- 2) 22.00 % people thought it was weakly positive
- 3) 4.00 % people thought it was strongly positive
- 4) 4.00 % people thought it was negative
- 5) 12.00 % people thought it was weakly negative
- 6) 0.00 % people thought it was strongly negative
- 7) 42.00 % people thought it was neutral

Back-End (MYSQL):

In TWITTER_REVIEWS Table (1 Entry)

```
mysql> SELECT * FROM TWITTER_REVIEWS;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| HASHTAG | NO_OF_TWEETS | POSITIVE | WPOSITIVE | SPOSITIVE | NEGATIVE | WNEGATIVE | SNEGATIVE | NEUTRAL | GEN_REPORT |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| teacher | 50 | 16 | 22 | 4 | 4 | 12 | 0 | 42 | Weakly Positive |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
1 row in set (0.02 sec)
```

In EXTRACTED_TWEETS Table (50 Entries as given by user while executing the source code)

```
mysql> SELECT * FROM EXTRACTED_TWEETS;
+-----+
| TWEET_TEXTS |
+-----+
| _H My mum was a primary school teacher during section 8 and said she kept getting this https://t.co/SHAbXeKEhe
RT Start a new life Teacher Tin??? everything will better than before ? OFFICIAL MV #MV??????? https://t.co/kPZThI0veg
RT Keep RUNNING beyond SUCCESS NO EXCUSE. #businesslessons #business #businesspassion #passion #motivation #wisdom #suc?
RT _coliseum The Art Coliseum is a family of artists Knowledge is the ultimate teacher Misusing knowledge is not wisdom #theartcol?
RT The hallways would look like this and the teacher would still have the nerve to ask you why you're late https://t.co/GX2Uw?
RT yes I am a teacher of 20 years. the difference between vaxxed and unvaxxed is dramatic immediately obv?
RT Be the coach not the ref of the classroom Help the students succeed yelling and sweating invested in the game We don't?
IT ACTUALLY WAS :0 THE TEACHER MADE MA PANCAKES TO THANK ME ?
it was a 59 (F but he brought it up to 75 for some reason? idek but that teacher was chill
I love Cardcaptor Sakura but I don't think the teacher romances were anything but disgusting
Then they gave the job to Norman Dale the next season Great coach Shitty history teacher.
RT #????? UP_????_??_????_?? #?????_????_????_????_????_?? ?
i cant wait to become a teacher and be off summers so i can enjoy #paspeedweek with my boyfriend instead of missing out every year ??
RT The impact of a teacher lasts a lifetime https://t.co/B50of1XJbT
So now at PSERS predictably focus has "circled back to the "funny money propped investments of H https://t.co/FFDvtvGGKV
RT Every public school classroom in America should have a camera where parents can watch &amp; listen during teacher instructio?
teacher _sex_xx1 _sex_xx1 _sex_xx1 _sex_xx1 83812251
RT "Florida teacher mistook a third grader's drawing of a person hugging a rocket for male genitalia police seized the c?
As someone else on the spectrum with a mild form of aspergers I have been able to be a successful teacher #QandA
RT _AnilKumarINC Kejriwal promised to provide 8 lakh jobs in 5 years in his 2015 manifesto to mislead the people. The manifesto promis?
There's a convo about how good BMI is to measure peoples health right now and I just wanna say since School I've le https://t.co/VMcqHhyceI
RT ?His Advanced History of Magic class filled so fast each year it was impossible to get in First years always looked around,?
RT #?????_?????_?????_??_??_?? Please fulfill your promise towards shikshamitra that making them a genuine teacher w?
RT hoshi tattletaling on carats to hannie bc we kept calling him hamster is like when kindergarten kids reporting to their teach?
RT _akua_henewa We will put in place a comprehensive National Teacher Policy &amp; implement a National Digital Literacy Project for teach?
RT It's a rare combination indeed to find a brilliant technologist who is also a brilliant teacher of is both L?
HI Ms Goldberg I am a teacher in a Special Ed school in New York and have a student who absolut https://t.co/M52LCfCuCL
Wooooo0000000000 We want somebody next time that makes Trump look like a purple haired CRT teacher.
RT products are used by over 2 million learners in more than 74 countries Are you an experienced educational?
What a fantastic year with these amazing children I'm so lucky and excited to be their teacher again in P5 I hope https://t.co/3R5ogu3Dsr
RT ?URGENTLY NEEDED ? An OPTICIAN to change the outlook of people. An ARTIST to draw a smile on everyone's lips. A GAR?
AND today is the day jab dharti phatte aur mai usme sma jau in my online class i forgot to mute after saying smth https://t.co/yDv5D5arbB
Each of us most likely had at least one teacher coach or a school affiliated person who had a significant impact https://t.co/sgvnLurGNf
The transformation from Einstein to a humble PE teacher ?
RT _Yadav_ On the holy occasion of #624thKabirSahib_PrakatDiwas must watch Satsang by Sadhana TV Channel today at 09:20 am to 12:2?
kinda regret didn't follow my teacher's advice before ?
RT _akua_henewa We will provide all tertiary students who cannot pay fees with the exception of teacher and nurse trainees who are pa?
RT Ma can you bring my homework I left on dining table I wait at sch gate for you okay My teacher wants it after recess.
teacher _sex_xx1 _sex_xx1 _sex_xx1 _sex_xx1 337643831
Nah I'm saying racism still exists. Is it so hard to accept we aren't taught an a https://t.co/pDBqvCzkyA
?No one had told me that I had the aptitude to be an engineer I didn't even know what an engineer did That teache https://t.co/OwS4Fv5SMm
Awww I feel sorry for the kids in Bradford who wrote the song They were trying to be inclusive presu https://t.co/GRFf53bpvh
RT This teacher is fuming that she can't teach CRT. Her whole account is fucking crazy I will post some of the best in this?
If it hadn't been for that math teacher I probably would have been a mechanic or a logger, Mueller says ?Thanks https://t.co/30SGfWwaVT
_Confession I took Geology in college and during a section of sedimentary rocks my teacher struggled to filter https://t.co/A1fpg9DlYb
I tackled our English teacher that is teaching us wrong tenses
?Then in my first year in high school my math teacher asked if I was going to be an engineer I said no He was as https://t.co/Fx9Gv1T4ye
pro acting teacher tip utalize your emotionally fragile state by teaching your students about crying on command
Ms Hill is #CuisingIntoFun this morning Summer Learning Camp Each class elected an outstanding s https://t.co/1H1j9sHZdo
RT Pedro Castillo the rightful president-elect of Peru describes his journey from elementary school teacher to trade union mili?
+-----+
50 rows in set (0.00 sec)
```

Analyzed chart displayed by the program (after inserting data in MySql):

