# SENTIMENT AND EMOTION ANALYSIS FROM PSYCHOLOGICAL SUPPORT GROUPS OF FACEBOOK

**BY**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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## APPROVAL

This Project/internship titled **"Sentiment and Emotion Analysis from Psychological Support Groups of Facebook",** submitted by **Abu Taieb Tana, Nazia Nahian Promy and Nahida Jahan, ID No: 181-15-10904, 181-15-11050, 181-15-10944** to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on **4 January, 2022.**

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# DECLARATION

We hereby declare that this project has been done by us under the supervision of **Ahmed Al Marouf, Lecturer (Senior Scale), Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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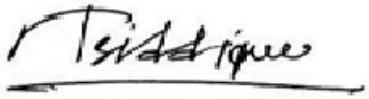

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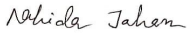

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# ABSTRACT

Sentiment and emotion analysis is the way of discovering positive, negative and neutral sentiment in text. In our paper we try to analyze the sentiment from posts/comments in psychological support groups in the most popular social media platform Facebook. The advantage of social media is it's not only used for entertainment but also for helping people who need help. Nowadays many people suffer from depression, it's one of the most serious mental health problems. psychological support groups on Facebook try to help those depressed people. We analyze many posts/comments on psychological support groups on Facebook and predict how much those posts/comments can support or help a person. In our project we collect practical examples that are posted in different psychological groups, and we calculate those posts as helping people to improve their situation. We can know the effect of how supportive these posts are or not and how this post is helping people. Is it in position, positive or neutral way? For this task we divided the complete work into two sections: sentiment detection and analyzing the ability to detect sentiment from such a special category of texts. For visualization here we use Matplotlib, Seaborn, NumPy. For graph visualization we use scatterplot, word cloud and for visualization we bring word cloud from monkey learning website. For overall tasks we have utilized Natural Language Toolkit (NLTK) and TextBlob, which are publicly available python packages.




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# CHAPTER 1

# Introduction

## 1.1 Introduction

Time to time feeling happy or sad is a normal part of life, but when continuous emotions/feelings such as hopelessness and despair take hold and you just lose interest in everything you may have depression. Depression is known as a serious depressive mental illness and mood disorder that makes you feel constant sadness or loss interest in everything. Nowadays Most people feel sad or depressed. At the worst part of depression that it can lead someone's to suicide. Over 7,00,000 people die due to suicide every year. Suicide is the fourth leading cause of death in 15-29-year-olds. Depression is a common illness worldwide, with an estimated 3.8% of the population affected, including 5.0% among adults and 5.7% among adults older than 60 years [1]. Although there are known, effective treatments for mental disorders, more than 75% of people in low- and middle-income countries receive no treatment [2].

Women stay depressed more than men. Women (10.4%) were almost twice as likely as were men (5.5%) to have had depression [3] Among males, females, teens, and children the symptoms of depression can be shown differently. Some people who are affected by depression want to get away from this depression disorder that's why they go to psychologists. But most of the people want to get away from this but they don't go to psychologists for many reasons and those people suffer most. They think that if they go to psychologists maybe it harms their position in society or maybe they think it will not work or maybe they have financial problems. Sometimes those depressed people think they have no way to get away from depression and they lost their patience and committed suicide. We can see maximum suicide are happened for depression. Before going through this critical situation, some people share their depression by posting on social media and also, they share their feelings in several Facebook groups which are made for helping depressed people. Sometimes some members of the group may come forward to help

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them. Some people do negative comments and some people just see the post, but they avoid the post. So here we can say there are 3 types of emotions : “positive”, “negative”, “neutral”. We know sentiment analysis means analyzing the text and people expressing their depressed situation by text, so we collect those posts and comments and analyze them to see if they are positive or negative or neutral.

Here we do sentiment and emotion analysis from psychological support groups on Facebook. We detect the sentiment from text.

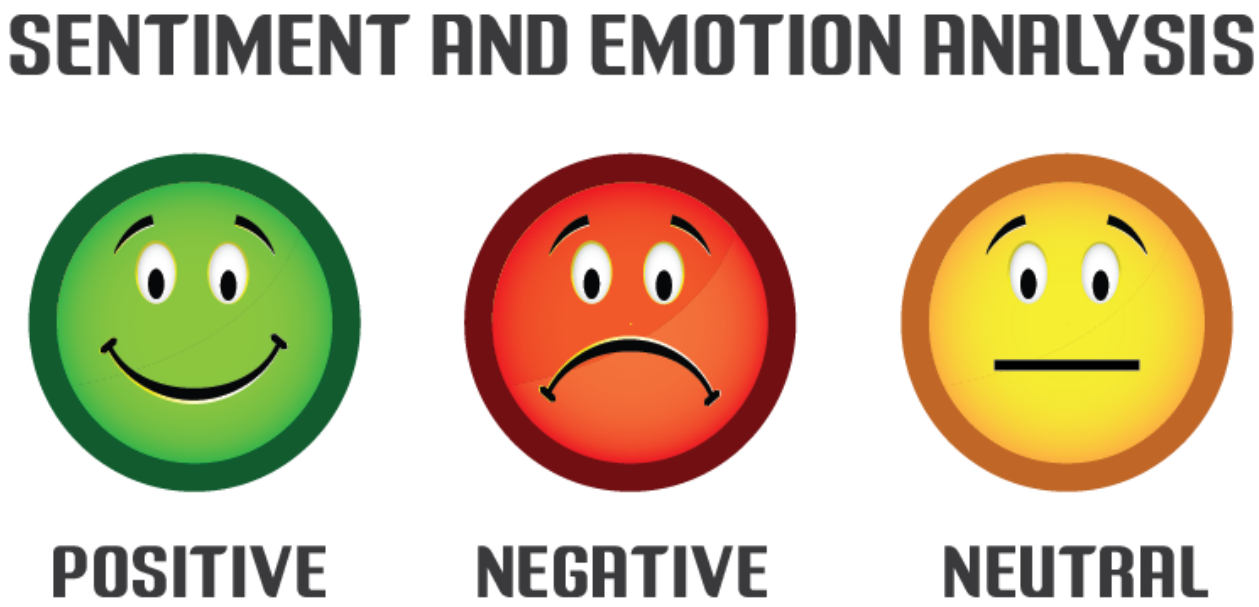


Fig: 1.1.1 Sentiment and Emotion Analysis [The above image is designed using Adobe Illustrator.]

We can detect positive, negative, and neutral sentiment and emotion from text. For that in our thesis paper we are using text2emotion for detect the sentiment and emotion from text

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Table: 1.1.1 Sentiment detection from text example

| Sentence | Sentiment and Emotion level |
|---|---|
| This restaurant foods so good | Positive |
| You are a bad person | Negative |
| He is bad person but work very well | Neutral |

## 1.2 Motivation:

Depression is a mood issue that causes a determined sensation of bitterness and loss of interest from daily life. People feel depressed for various reasons. Due to this depression many people are getting dependent on drugs, heaps of individuals can't eat, rest, work, study and so on. Many people lost their patience and, they committed suicide for that many families lost their family member. And, who keep their patience and fight with depression are not able to lead a happy normal life like depressed free people lead. Every person can express their feeling, emotions through their own language. People share their feelings on social media about how depression kills their happy life, their hopes and their dreams via writing posts. Our motive is sentiment and emotion analysis from depression related post which posted from psychological support groups of Facebook to recover all the depressed people who don’t able to lead normal happy life and who committed suicide for depression. This will help all the worldwide people for leading a normal happy and successful depression free life.

## 1.3 Research Questions:

A good research question is fundamental to get a rule for a research paper, project on thesis. It pinpoints precisely what to discover and gives work clear concentration and reason.

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**RQ1: Can we use depression related posts/comments from psychological support groups of Facebook to distinguish feelings?**

Indeed, we can use depression related posts/comments from psychological support groups of Facebook to distinguish feelings and in our paper, we have gathered depression related posts/comments from psychological support groups of Facebook to gather information and afterward process the information for sentiment and emotion analysis from text.

**RQ1: How could you detect the sentiment and emotion from text?**

We are able to analyze the sentiment and emotion from psychological support groups of Facebook posts and comments via text2emotion. text2emotion is the python bundle which will assist by extricating the feelings from the text.

**RQ3: How to analyze the ability to detect sentiment from such a special category of texts?**

We use NLTK to analyze the ability to detect sentiment from such a special category of text. NLTK means Natural Language Toolkit. It contains text processing libraries for tokenization, classification, stemming, tagging and semantic reasoning.

## 1.4 Expected Outcome:

We collect the posts and comments from psychological support groups of Facebook and analyze whether those posts and comments are positive, negative, or neutral. We analyze positive, negative, and neutral sentiment and emotion from text.

## 1.5 Project Management and Finance:

We don't need to go through any cash to do this project. We don't need to purchase any product, software or on the other hand equipment. However, for this project we need to gather

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information and invest energy, time on information handling. The measure of time spent on an action is given in the accompanying table

Table 1.5.1 Project Management Timeline

| Task | Time |
|---|---|
| Data Collection | 8 months |
| Literature review | 2 months |
| Experimental Setup | 3 months |
| Experiment and validation | 2 months |
| Report and documentation | 1 month |
| **Total** | **16 months** |

## 1.6 Report Layout:

The foundation segment of Chapter 2 contains terminologies, related works, the extent of the issue, and difficulties. The proposed technique is introduced in Chapter 3 and incorporates information assortment, statistical analysis, and execution. The Experimental Results and Discussion are portrayed in Chapter 4. The effect of Depression feeling analysis on society, the environment, Ethical Aspects and supportability are talked about in Section 5. At last, the research summary, conclusion recommendation, and suggestion for the future are remembered for Chapter 6.

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# CHAPTER 2

# BACKGROUND

## 2.1 Preliminaries:

Prior depression was of extremely minor importance to the local area, but since the absence of powerful technologies and prior forecast, it has turned into an issue of worry as it is developing progressively from one side of the world to the other. However, this field is currently applying several methods daily to anticipate or classify sentiment of depression. There are many techniques like Machine Learning, Image Processing, Support Vector Machine (SVM) that are used for this kind of sentiment and emotion analysis. A few researchers are publishing their paper to execute these procedures. A significant change in large numbers of those strategies has as of now been made by numerous researchers. We use Matplotlib, Seaborn, NumPy, Scatterplot, word cloud, automated website, Textblob, NLTK in our paper.

## 2.2 Related Works

Many scientists utilize various ways to lead sentiment and emotion analysis for depression recognition or identification yet the process is to a great extent comparable. Here we are discussing
some of them.

Tapasy Rabeya et al. introduced a sentimental analysis of Bengali song reviews from a particular YouTube channel to analyze individual people's acceptance rate of a youthful star. They used Opinion mining, sentiment analysis, acceptance rate, sentiment lexicon. They utilized a backtracking algorithm, where the core of this methodology is an opinion vocabulary. What's more, the research showed the backtracking algorithm performed over 70% accuracy to detect actual public sentiment.[4]

Anees Ul Hassan et al. for analysis sentiment, depression detection, a correlation of SVM, NB, and ME classifiers was made, and component determination methodology also used. On two

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datasets, the twitter dataset and 20 newsgroups, they really look at the proficiency of their proposed techniques.

As opposed to Naive Bayes Maximum Entropy and SVM classifiers. SVM performs better in the analysis. The SVM has a 91 percent precision. [5]

Md. Rafidul Hasan Khan et al. complete their system analysis collecting Bengali text from Facebook social networking site to predict the sentiment. They utilized six different classification algorithms based on machine learning. They got the accuracy of 86.67 percent, Random Forest has an accuracy of 66.67 percent, Decision Tree has an accuracy of 40 percent, SVC has an accuracy of 73.33 percent, K- ©Daffodil International University 7 Nearest Neighbors has an accuracy of 60.00 percent, and XGBoost has an accuracy of 53.33 percent. Multinomial Naive Bayes has this all accuracy. [6]

Geetika Gautam et al. utilized an immense dataset of audits from Twitter that had as of now been named. The naive Bayes technique outflanks the most extreme entropy strategy and utilizing SVM with a unigram model outperforms utilizing it single-handedly. Semantic investigation further develops consistency more. WordNet is then exposed to the technique, bringing about a score of 89.9%, up from 88.2% already. naive Bayes 88.2%, Maximum Entropy 83.8%, Support Vector machine 85.5%, Semantic Analysis (WordNet) 89.9%. [7]

Mohammed H. Abd El-Jawad et al. More than 1 million English Tweets were used for positive and negative sentiment classification. In this paper compared different machine learning algorithms. They made a model to compare convolutional neural networks, decision trees, Naive Bayes, and recurrent neural networks with other characterization techniques. The Hybrid Model has the most elevated accuracy of 83.6 percent, with an affectability of 87.1 percent and an explicitness of 79.3 percent, as indicated by the information. [8]

Md. Rafqul Islam et al. they done Linguistic Inquiry, temporal processes, emotional processes and Word Count (LIWC) tool for detecting depressive data which they collected from Facebook posts. They utilized They used supervised machine learning classifiers like decision trees, kNearest Neighbor, Support Vector Machine, and ensemble

to classify the data. They found that 54.77 percent of depressive indicative Facebook users chat with their friends between midnight and midday, and 45.22 percent between midday and

midnight and they analyzed 7146 depressive indicative Facebook comments to determine the most important time. [9]

Kuryati Kipli et al. used in this research different machine learning methods. Assortment and classification features were put to the test. To utilize volumetric elements of the mind to identify depression. Increase of highlights from brain SMRI is a possibility. Volumetric estimations and indicative qualities were analyzed. The discoveries exhibit the likelihood of identifying depression. SMRI Volumetric properties of diagnose depression this output results shows. Nave Bayes, SVM Sigmoid, SVM RBF, ©Daffodil International University 8 Random Forest, J48, Random Tree, VFI, LogitBoost, and Simple KMeans Classification through Clustering are the ten classifiers liked for the arrangement and afterward utilized WEKA to decide the precision rates for

the classification automatically. [10]

Neethu M S et al. They utilized Machine Learning methods to perceive sentiments from text that they gathered from Tweeter. Various classifiers, like SVM, Maximum Entropy Classifier, and Ensemble classifiers, are utilized to test the capacity vector's order precision. They all have comparative exactness, accuracy, and review. They got a 90% precision rate, contrasted with 89.5 percent for Naive Bayes. [11]

Taysir H. A. et al. In view of the most recent Arabic Slang Sentiment Words and Idioms Lexicon, a sentiment analysis way to deal with unstructured and ungrammatical clients' Arabic shoptalk remarks was proposed in this paper (SSWIL). The new vocabulary was physically collected from microblogging sites. Moreover, the SVM strategy was utilized in blend with SSWIL to recognize remarks as fulfill or disappoint. [12]

Md Rafiqul Islam et al. They exhibited the capacity to utilize Facebook information as a source for estimating and recognizing major depression among users, just as investigating four kinds of elements: emotional stage, worldly interaction, etymological style, and all highlights, and afterward preparing a model to utilize each type independently and together. The ground truth dataset result and various kinds of KNN strategy results differ by 60-70 percent as far as various measurement levels, as per their perceptions. [13]

Atiqur Rahman et al. on film audit information, they utilized a ML way to classify polarity. They split the dataset into two groups: preparing and testing. They assemble information from a film audit site and utilize a natural language processing program to preprocess the information. Likewise, add capacities. Multinomial NB, Bernoulli NB, SVM, Maximum Entropy, and Decision Tree classifiers are among the ML classifiers used to prepare the information assortment. Multinomial NB has the most elevated outcome exactness of 88.5 percent. [14]

Michael et al. assembled Depression-related information from Reddit, pre-handled them and afterward utilized N-gram, LIWC, and LDA to include extraction. After that pre-owned AI classifiers like LB, SVM, Ada Boost, RF, and MLP to improve accuracy. [15]

## 2.3 Comparative Analysis and Summary:

After reviewing these collected papers, I discovered some connected work that is pertinent to my work, as well as some of the method and accuracy they achieved in their papers. The following are the specifics.

Table 2.3.1 Comparative analysis of the existing publications

| **Authors Name** | **Year** | **Applied Methods in their work** | **Accuracy/Evaluation Metrics** |
|---|---|---|---|
| Tapasy Rabeya et al. [4] | 2019 | Opinion mining, sentiment analysis, backtracking approach, acceptance rate, sentiment lexicon. | 71.23% |
| Anees Ul Hassan et. al. [5] | 2017 | Support Vector Machine<br>Naive Bayes<br>Maximum Entropy | Support Vector Machine (91%)<br>Naive Bayes (83%) Maximum Entropy (80%) |
| Md. Rafidul Hasan Khan et al. [6] | 2020 | Multinomial Naive Bayes<br>Random Forest<br>Decision Tree<br>SVC<br>K-Nearest Neighbors<br>XG Boost | Multinomial Naive Bayes (86.67%)<br>Random Forest (66.67%)<br>Decision Tree (40.00%)<br>SVC (73.33%)<br>K-Nearest Neighbors (60.00%)<br>XG Boost (53.33%) |

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| | | | |
|---|---|---|---|
| Geetika Gautam et al. [7] | 2014 | Naive Bayes<br>Maximum Entropy<br>Support Vector machine<br>Semantic Analysis (WordNet) | Naive Bayes (88.2%)<br>Maximum Entropy (83.8%)<br>Support Vector machine (85.5%)<br>Semantic Analysis (WordNet) (89.9%) |
| Mohammed H. Abd El-Jawad et al. [8] | 2019 | Naive Bayes<br>Random Forest<br>Decision Tree<br>RNN-LSTM<br>NN (10 layers)<br>CNN<br>CNN Word2Vec<br>RNN+LSTM+Word2Vec Hybrid Model | Naive Bayes (75.5%)<br>Random Forest (73.8%)<br>Decision Tree (72.5%)<br>RNN-LSTM (82.3%)<br>NN (10 layers) (79.5%)<br>CNN (79.6%)<br>CNN Word2Vec (82.9%)<br>RNN+LSTM+Word2Vec (83.0%)<br>Hybrid Model (83.6%) |
| Md. Rafqul Islam et al. [9] | 2018 | Decision tree k-Nearest Neighbor Support Vector Machine<br>Ensemble | Decision tree (71%) k-Nearest Neighbor (60%) Support Vector Machine (71%)<br>Ensemble (64%) |
| Kuryati Kipli et al. [10] | 2013 | SVM<br>IG<br>Relief<br>EM<br>RandomTree<br>J48<br>Kmeans<br>NaiveBayes | SVM EM (85.2941%)<br>IG RandomTree (85.2941%)<br>ReliefF J48 (82.3529%)<br>IG J48 (82.3529%)<br>SVM Kmeans (82.3529%)<br>All NaiveBayes (82.3529%)<br>SVM RandomForest (82.3529%)<br>IG RandomForest (82.3529%)<br>ReliefF RandomTree (82.3529%) |
| Neethu M S et al. [11] | 2014 | Naive Bayes<br>SVM<br>Maximum Entropy | Naive Bayes (89.5%)<br>SVM (90%)<br>Maximum Entropy (90%) |

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| | | | |
|---|---|---|---|
| | | Ensemble | Ensemble (90%) |
| Taysir H. A. et al. [12] | 2014 | Classic Classification, SSWIL with Classic Lexicon Classification, SSWIL only Classification | Classic Classification (75.35%) SSWIL with Classic Lexicon Classification (86.86%) SSWIL only Classification (43.02%) |
| Md Rafiqul Islam et al. [13] | 2018 | K Nearest Neighbors (KNN), Fine KNN, Medium KNN, Coarse KNN, Cosine KNN, Cubic KNN, Weighted KNN | Fine KNN (58%) Medium KNN (56%) Coarse KNN (67%) Cosine KNN (60%) Cubic KNN (55%) Weighted KNN (61%) |
| Atiqur Rahman et al. [14] | 2020 | Multinomial Naïve Bayes, Bernoulli NB, SVM, Maximum Entropy, Decision Tree | Multinomial Naïve Bayes (88.50%) Bernoulli NB (87.50%) SVM (87.33%) Maximum Entropy (60.67%) Decision Tree (80.17%) |
| Michael et al. [15] | 2019 | Logistic Regression Support Vector Machine Random Forest Adaptive Boosting Multilayer Perceptron | Logistic Regression (89%) Support Vector Machine (90%) Random Forest (85%) Adaptive Boosting (79%) Multilayer Perceptron (91%) |

## 2.4 Scope of the Problem:

We have gathered bunches of raw text information which was from Facebook Posts and Comments from different psychological support groups, pages, and gatherings, were taken a lot of time and persevering our energy and attempt to search for similarities and differences between the text information to figure out which text data has a place with which class. What's more, to do Linguistic Feature Extraction was extremely difficult.

## 2.5 Challenges

Since the start of this review, we have been attempting to gather depression-related text data information. In any case, there is deficient text for a particular circumstance. Accordingly, gathering depression text data was extremely hard for us. We searched a lot of Facebook

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psychological support groups, pages gatherings for information, yet it was hard to track down depression related information since we needed to actually look at them from different regions and read them to check whether they were identified with depression, sadness, and assuming they weren't, we didn't gather them. Accordingly, gathering them takes a long time. It was unquestionably hard for us to get Depression-related information for this theory.

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# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.1 Research Subject and Instrumentation

We assembled text data from a social media stage. To gather information, we picked Facebook. Since nowadays many people these days utilize social media to communicate their sentiments, and Facebook is a most used social media platform for that also. So, we perform an information search on Facebook depression and psychological support related pages and groups. These pages and groups are utilized to share posts about depression, persuasive posts, and tips on the best way to survive and stop self-destructive endeavors of burdensome individuals. Work principally with individuals who are now experiencing depression. The sole reason for the pages and groups is to support them to overcome their depression. Here, we are giving the name of the groups and the pages we utilized in this research**.** And here we have mentioned the Facebook pages as (*Pg*) and groups as (*Gr*) on the right side:

- Depression Support Group (*Pg*)
- Anxiety awareness (*Pg*)
- Essential Thrombocythemia Support Group (*Gr*)
- Anxiety & Depression Support UK & Ireland (*Pg*)
- Cure Your Depression (*Pg*)
- Anxiety and Depression Support Group. (*Pg*)
- Depression Free Group (*Gr*)
- Depression and Anxiety Support Group (*Gr*)
- Women's Depression & Anxiety Support Group (*Gr*)
- Depression Support Group (*Gr*)
- Natural Remedies for Depression and Anxiety (*Gr*)
- Depression & Anxiety Peer Support Group (*Gr*)

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- Anxiety and depression fighters (*Gr*)
- Depression, anxiety, and suicide (*Gr*)
- Anxiety, Panic Attack & Depression Support Group. (*Gr*)

Here we have mentioned the pages and groups name and also how many people are active users are given below in Table 3.1.1:

Table 3.1.1 Number of users in Depression Support Groups in Facebook

| **Name of the Facebook Pages & Groups** | **Country** | **No. of users (on 17th March 2021)** |
|---|---|---|
| Depression Support Group (*Pg*) | Global | 31,933 |
| Anxiety awareness (*Pg*) | Global | 118,677 |
| Essential Thrombocythemia Support Group (*Gr*) | Global | 739 |
| Anxiety & Depression Support UK & Ireland (*Pg*) | UK & Ireland | 93,726 |
| Cure Your Depression (*Pg*) | Global | 1,752 |
| Anxiety and Depression Support Group (*Pg*) | Global | 7,079 |
| Depression Free Group (*Gr*) | Global | 20,062 |
| Depression and Anxiety Support Group (*Gr*) | Melbourne, Victoria, Australia | 2,553 |
| Women's Depression & Anxiety Support Group (*Gr*) | Global | 17,023 |
| Depression Support Group (*Gr*) | Delhi, India | 10,873 |
| Natural Remedies for Depression and Anxiety (*Gr*) | Global | 2,665 |
| Depression & Anxiety Peer Support Group (*Gr*) | Global | 52,675 |

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| | | |
|---|---|---|
| Anxiety and depression fighters (*Gr*) | Global | 1,949 |
| Depression, anxiety and suicide (*Gr*) | Global | 13,550 |
| Anxiety, Panic Attack & Depression Support Group. (*Gr*) | Global | 1,852 |

### 3.2 Data Collection Procedure

As our thesis topic is sentiment and emotion analysis from and psychological support related pages and groups so we search depression-related and psychological support related pages and groups which contain depression related so many posts and comments. So, we collect those raw data from depression-related and psychological support related pages and groups and coordinate it sequentially in excel sheets.


Fig 3.2.1 Manual data collection procedure.

In our research depression related text is generally significant. As a result, individuals frequently express their sentiments and emotions via social media by posting them on the web, and we need to work with textual information to get a precise understanding of depression.

### 3.3 Statistical Analysis

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Table 3.3.1 Statistical Properties of Collected Data

| Name of the Property | Quantity |
|---|---|
| Number of instances collected | 7657 |
| Total Number of words | 138,650 |
| Total Number of characters | 595,055 |
| Total Number of sentences | 8841 |
| Total Number of Special Character | 1833 |

### 3.4 Applied Mechanism

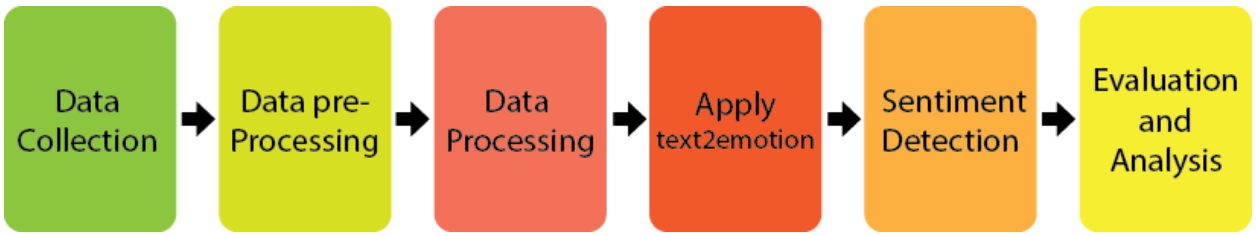


Fig: 3.4.1 Applied Mechanism

**Data Collection:** Here for collecting data we use Facebook depression-related and psychological support related pages and groups. From there we collect a lot of data, approximately 7657 raw data. We search a lot in Facebook depression-related and psychological support related pages and groups and try to collect depression related data where people express their emotion.

**Data Pre-processing:** For data preprocessing we do it by cleaning data perfectly (Remove mentions, remove Hashtags, remove URLs, remove all RTs) using python code.

**Data processing:** Here we use TextBlob for getting the function Subjectivity. It offers a simple API for performing popular natural language processing (NLP) tasks including part-of-speech

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tagging, noun phrase extraction, sentiment analysis, classification, and translation, among others. [16]

For visualization here we use Matplotlib, Seaborn, NumPy. The most popular library for data visualization in Python is Matplotlib and built directly on top of Matplotlib is Seaborn. The Seaborn library is "tightly integrated with the PyData stack, including support for NumPy data structures and statistical routines from SciPy and stats models." [17]

**Sentiment Detection:** For detecting the sentiment and emotion from text we use text2emotion. Text2emotion is a python package which help to get the sentiment and emotion from text.

**Evaluation and Analysis:** Evaluation and Analysis are described in chapter 4, section 4.2.

### 3.5 Implementation Requirements

**Hardware Requirement:**

**Personal Computer (PC) configuration**

Processor: Corei5 $10^{th}$ Gen, 8 GB RAM, 240 GB SSD, Windows 10 pro-64-bit Operating System.

**Software Requirement:**

Software: Google Colab, Python Packages (NLTK, TextBlob, NumPy, SciPy, text2emotion, matplotlib, Seaborn).

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# CHAPTER 4

## EXPERIMENTAL RESULTS AND DISCUSSION

### 4.1 Experimental Setup

In view of the proposed strategy, we have arranged our analyses. We did all the procedure like collecting data, process the data by using python and finally analyses the depression sentiment. For this analysis, we used a Personal Computer (PC) with the Corei5 10th Gen processor, 8 GB RAM, 240 GB SSD, Windows 10 pro-64-bit Operating System.

### 4.2 Experimental Results & Analysis

In this research we only analyze some textual data which are collected from Facebook's Psychological group. We did not predict the data, we only analyzed the sentiment of the data. Here are some visual representations of data in word cloud, bar plot.

| | text |
|---|---|
| 2 | I appreciate honesty more than anything.If you tell me what it is upfront, you gaveme the option to take it or leave it. I respect that. |
| 3 | Talking to an old friend makes you realize how much your life has changed. |
| 4 | You can't force someone to care or love you, they either do or don't . Don't waste your time and energy on those who don't. |
| 5 | Good relationships don't just happen. They take time and patience and two people getting through all the hard times together. |
| 6 | Hugs matter. One hug from the right person takes all your stress away. |
| 7 | 80% of people remain quite even when they really want to say something in order to avoid an argument with someone they can care about |
| 8 | Women who complement other women genuinely are just a whole diffrent breed. Real Queen |
| 9 | If you look at the people in your circle and don't get inspired, Then you don't have a circle, you have a cage. |
| 10 | Strong people aren't born but made by surviving the vicissitudes of life |
| 11 | Not all stroms come to distrupt your life, some come to clear the path |
| 12 | Your salary is a trap. They give you to forget your dreams. |
| 13 | The  brain treats rejection like physical pain, according to scientists. |
| 14 | Sometimes the hardest thing and the right thing are the same |
| 15 | There's a rare mental disorder where people imagine that they are decomposing, dead or non-existent. |
| 16 | Your favorite song is probably such because you associate it with an emotional event in your life. |
| 17 | Stop giving people the power to control your smile,your worth and your attitude |
| 18 | Shy people are smarter and more trustworthy. |
| 19 | When women are talkind to you about their problems, they're likely not looking for an answer and just want someone to listen. |

Fig 4.2.1: Sample dataset

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| | | Happy | Angry | Surprise | Sad | Fear | text |
|---|---|---|---|---|---|---|---|
| 2 | 0 | 0.67 | 0 | 0 | 0.33 | 0 | appreciate honesty anythingIf tell upfront gaveme option leave it respect that |
| 3 | 1 | 0.33 | 0 | 0 | 0.33 | 0.33 | Talking old friend makes realize life changed |
| 4 | 2 | 0.5 | 0 | 0 | 0 | 0.5 | cant force care love you waste time energy dont |
| 5 | 3 | 0.33 | 0.33 | 0 | 0.33 | 0 | Good relationships happen time patience people getting hard times together |
| 6 | 4 | 0 | 0.25 | 0.25 | 0 | 0.5 | Hugs matter hug right person takes stress away |
| 7 | 5 | 0 | 0 | 0 | 0 | 1 | 80 people remain want order avoid argument care about |
| 8 | 6 | 0 | 0 | 0 | 0.67 | 0.33 | Women complement women genuinely diffrent breed Real Queen |
| 9 | 7 | 1 | 0 | 0 | 0 | 0 | look people circle inspired circle cage |
| 10 | 8 | 0.33 | 0 | 0 | 0.33 | 0.33 | Strong people born surviving vicissitudes life |
| 11 | 9 | 0 | 0 | 0 | 0.5 | 0.5 | stroms come distrupt life come clear path |
| 12 | 10 | 0 | 0.5 | 0.5 | 0 | 0 | salary trap forget dreams |
| 13 | 11 | 0 | 0 | 1 | 0 | 0 | brain treats rejection like physical pain according scientists |
| 14 | 12 | 0 | 0 | 0.67 | 0 | 0.33 | hardest thing right thing |
| 15 | 13 | 0 | 0 | 0.5 | 0.5 | 0 | Theres rare mental disorder people imagine decomposing dead nonexistent |
| 16 | 14 | 0.25 | 0 | 0 | 0.25 | 0.5 | favorite song probably associate emotional event life |
| 17 | 15 | 0 | 0.25 | 0 | 0 | 0.75 | Stop giving people power control smileyour worth attitude |
| 18 | 16 | 0 | 0 | 0 | 0 | 0 | Shy people smarter trustworthy |
| 19 | 17 | 0 | 0 | 0 | 0 | 1 | women talkind problems theyre likely looking answer want listen |
| 20 | 18 | 0 | 0 | 0 | 1 | 0 | learn lot people want |

Fig 4.2.2: Output scores of text2emotion on the dataset

```
0  {'Happy': 0.2, 'Angry': 0.0, 'Surprise': 0.4, ...
father daughter look mother woman together exchange meaningful glances misses point agree bright are reason do collusion save daughter mothers fate
                                                   0
0  {'Happy': 0.25, 'Angry': 0.0, 'Surprise': 0.25...
Blind acceptance leads solution best leads standstill paid heavily generation
                                                   0
0  {'Happy': 0.0, 'Angry': 0.0, 'Surprise': 0.33,...
needed hear voice time time remind real
                                                   0
0  {'Happy': 0.0, 'Angry': 0.0, 'Surprise': 0.0, ...
Laughter natures ok signal
```

Fig 4.2.3: Output scores of text2emotion for some sample sentences.

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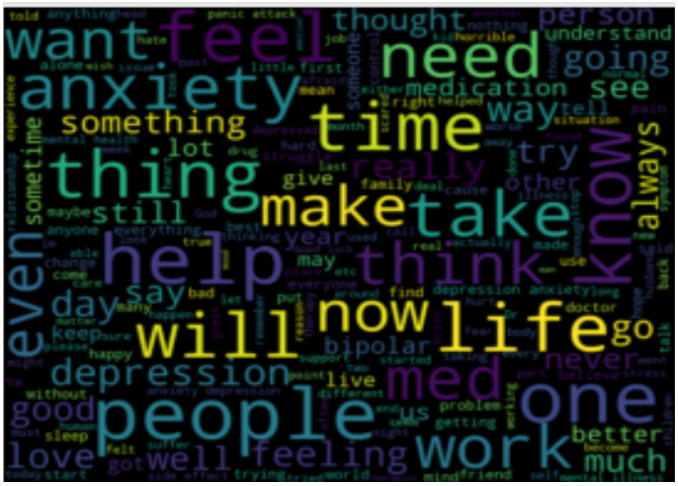


Fig 4.2.4: Word-Cloud from the textual Data


Fig 4.2.5: Word-Cloud from automated site

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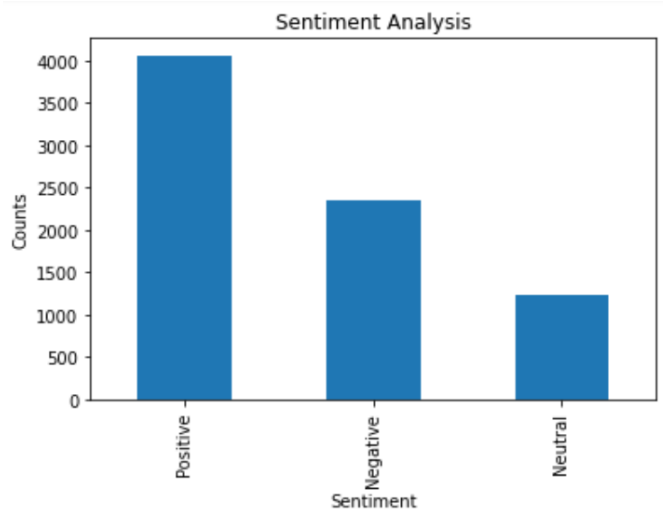


Fig 4.2.6: Counting of labels from the dataset.

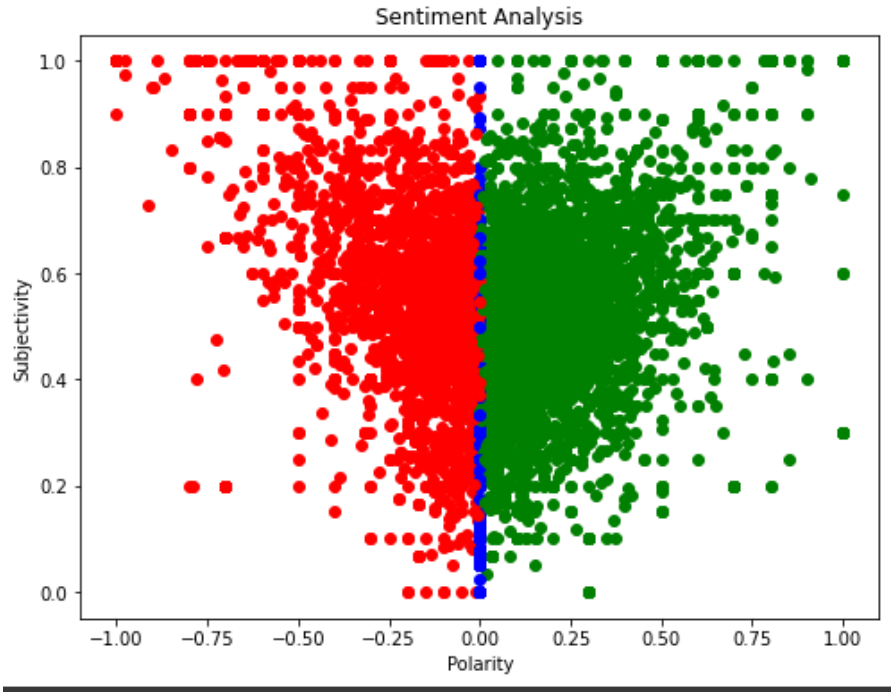


Fig 4.2.7: Subjectivity vs. Polarity values in the scatterplot.

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### 4.3 Discussion

In this research, we did not predict, but extracted the inner sights of the collected textual data; that is why we did not represent the traditional measurements of machine learning systems through accuracy. However, we detected the textual data and got the sentiment label for each data object.

We have utilized the word cloud to illustrate the most important words from our collected dataset. The words are said to be most important because of their high frequency of occurrence. A scatter plot diagram was generated based on the number of data labels and we get a closely looking V-shaped diagram. The subjectivity vs. polarity is the axis values in the scatter plot.

A bar diagram is used to understand the counting of three different labels of sentiment (positive, negative, and neutral).

The simplest ways to represent the overall outcomes of the thesis are chosen, to understand the significance of the words, the comparative between the subjectivity vs. polarity and the counting.

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# CHAPTER 5

## IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

### 5.1 Impact of Society

Nowadays, depression is the most common mental health condition. By this psychological despondency a few episodes like suicide, self-destruction, drag compulsion expanding broadly. As per World Health Organization (WHO) suicide is the second leading of reason for death among individuals at 15-29. On the other hand, drag addiction is another problem which occurs in society because of depression. That's why people of the society suffer a lot by the crimes and suicidal cases. We disclose how to distinguish melancholy feelings in this exploration. The question is, Though, how its ramifications the society and how it accomplishes. By this research, individuals will want to perceive depression sentiment more effectively and find the proper ways to oversee it. In case we utilize this technique to diminish the recognition of discouragement of opinion.

### 5.2 Impact on Environment

This project has impacted the environment also. One of them has a positive impact and another one has a negative impact. Positive impact is, an individual can easily find out others mental health conditions by their comments or posts on social media. And can find out the solution for the particular depressed person, as soon as possible. On the other hand, the negative is, an individual doesn't want to expose his/her mental or emotional conditions to others. But by this project people can easily find out their mental condition, which they are not willing to share.

### 5.3 Ethical Aspects

- Personal information of the users is not collected from social media for future tracking.
- Information will be taken from the individuals without illegally entering exploitative ways.

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- Information will not sell to any institutes for their business or individual reason.

### 5.4 Sustainability Plan

In this research by detecting sentiment of depression it will help all those individuals who are facing mental anxiety and depression. It will help those depressed individuals to cope with depression effortlessly. It can help those depressed individuals who are in beginning phase of their downturn, in case they can distinguish their downturn level then it tends to be extremely simple to get out from it

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# CHAPTER 6

**SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH**

## 6.1 Summary of the Study

In this research we have attempted to observe the sentiment of depression from depression related posts and comments from Facebook's psychology groups. For this we have gathered textual raw data from the psychological groups which are generated by the individuals. Firstly, we have collected raw data from the psychological groups of Facebook, then we have pre-processed and processed the collected data in python. After that we implement the code in Google Colab. We used NLTK, TextBlob, Pandas, NumPy, SciPy, regular expression, matplotlib, string and some python packages. Then we did linguistic feature extraction in python using NLTK. After that we import the text2emotion function to detect the emotion of the textual data. Then we used scatterplot, word cloud, seaborn library function for the visual representation of the collected data. After that we used an online platform like monkeylearning.com for a word cloud which represents a visual picture of the necessary data.

## 6.2 Conclusions

For mental depression a person faces many mental problems. In our society we only notice our physical health. But we always avoid the mental health fact. Sometimes, we pretend that mental health is nothing but ignorable things. But mental health is very important to keep a person physically strong. Only depressed people know how unbearable it is to be depressed. In this research we are identifying the feelings of depression so that we will be able to support those mentally depressed peoples and they will benefit from this method and gain additional help to beat their downturn all the more adequately. It will help them to know their sentiment level of depression and they can easily find a way to relieve this problem.

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### 6.3 Implication for Further Study

In this project, we only analyze the comments and posts which we collect from social media. In the future we can use machine learning algorithms to detect any kind of text data and, we can use deep learning algorithms.

For such cases of textual data representations, the following ML algorithms and deep learning methods could be applied.

- Logistic regression
- Support vector machine
- Multinomial Naïve bayes
- Random forest
- Convolutional Neural Network (CNN)
- Recurrent Neural Network (RNN) etc.

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