Market Research Report

Therapy Dog Service APP:

A Cure to Negative Affectivity

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Introduction

It has been almost 2 years since the beginning of the COVID-19 pandemic, followed by the increasing global prevalence of negative affectivity such as depression and anxiety. According to a scientific brief released by the World Health Organization (WHO) on 2nd March 2022, such prevalence increased by a massive 25% in the first year of the pandemic. (Brunier, 2022) The pandemic itself as well as the resulting economic recession have significantly impacted people's mental health.

The purpose of our market research is to study how COVID-19 has affected people's mental health and created new barriers for people already suffering from negative emotions. Based on our findings, we would like to propose a business idea to launch a mobile application. Specifically, this mobile application is designed to help people with mental health issues, especially those resulting from or worsened by the COVID-19 pandemic, to receive the comforting services from the nearest therapy dogs available.

In the following sections, we will elaborate on the feasibility of our business idea further with our findings from social media text analyses. With our report, we aim to provide the needed information to make a preliminary decision on whether the intended business idea of launching such a mobile application will be profitable for interested parties.

Methodology and Background

1. Emotion and Sentiment Analysis

To study the effect of COVID-19 on people's mental health, we conducted an emotion and sentiment analysis on social media texts. Emotion and sentiment analysis is a means to not only detect if the emotions are positive, neutral, or negative but also to classify the emotions that the data exert. We randomly selected 30,000 tweets from the COVID-19 Twitter dataset and 27,481 pre-COVID tweets. Therefore we conducted a text analysis with R based on those data. Then we cleansed the data by getting rid of stopwords, punctuation, URLs, mentions, hashtags, etc. to obtain the main body text for further analysis.

Based on the content of those tweets, the designed algorithm will generate scores for 8 emotion categories such as anger, fear, joy, sadness, etc, and 2 polarities of emotions: negative and positive. Each of these emotion categories describes a group of different emotions. Sadness, for instance, consists of depression, anxiety, grief, hopelessness, etc. A higher score suggests a stronger sign of the presence of the underlying emotion and vice versa.

2. Word Association Analysis with Word2vec

To see what people talk about the most associated with "dog" during COVID-19, we utilized Word2vec to discover the semantic similarity and word association between "dog" and other words. The Word2vec algorithm helps us learn word associations from the large corpus of Twitter text. During the analysis process, we randomly selected 30,000 tweets contents from the tweets_Covid19 dataset and

captured word-word relationships. After eliminating unrelated stopwords, we found out that 5 words have a high similarity to “dog”. From these words, we can see how people think of dogs and what is frequently talked about regarding dogs on social media.

3. Keyword Visualization with WordCloud

To further understand what people talked about when they had negative feelings towards COVID-19 during 2020 and 2021, we first utilized the scale gained from the emotion sentiment analysis and subsetted the tweets that are scored under zero, which represents that the tweet expressed negative feelings, from the randomly selected 30,000 tweets. Then, we eliminated some unrelated words and utilized WordCloud to gain the top 200 high-frequency words through the negative tweets data. WordCloud is a simple but powerful visual object for text processing since it can provide high-frequency words and directly visualize how frequent the word is. The words that have higher frequency will be more extensive and in bolder letters while the words that have lower frequency will be smaller in size.

4. Limitation

Though we aimed for a high level of accuracy and maintained a rigorous data analyzing process, there are still some limitations to this research. The first limitation is the potentially biased dataset. The current data we use is the tweets that are exclusively related to COVID-19 from 2020 to 2021. One major advantage of using such a dataset is that we can get access to the social media content centered COVID-19 so that the detected negative emotions are all relevant to our study.

However, using such a dataset can potentially create bias due to limited access to a broader view of negative emotions caused by rather than directly related to COVID-19 on social media. What's more, COVID-19 is commonly acknowledged as a global crisis and the emotion associated with it is expected to be negative. Therefore, we could potentially overestimate the impact of COVID-19 on public emotions.

The second limitation is hardware capacity. The laptops we have are only capable of processing 30,000 to 40,000 tweets. Instead of using the entire dataset for our analysis, we randomly selected 30,000 tweets. One common fallacy that could result from using the sampled data is that the sampled data may not accurately represent the population due to the changing environment.

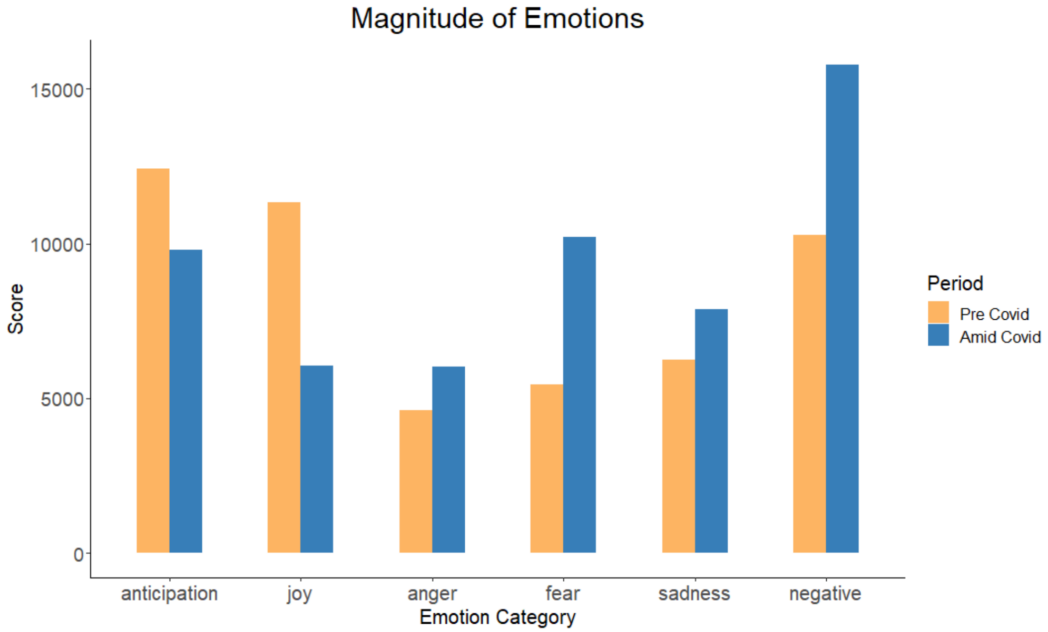
Lastly, we are subjected to the fact that no available packages are well developed to precisely distinguish various emotions in the R language. That is, if we want to provide a more accurate emotion analysis for a specific emotion using the tweets, we have to create a new package on our own. Due to the time limit and resources we are faced with, such effort was unachievable.

Executive Summary

1. Summary of Findings

a. Emotion and Sentiment Analysis

After conducting an emotion and sentiment analysis, we managed to generate the output as shown in the following chart.



Graph 1: Pre/Amid Pandemic Emotion and Sentiment Analysis

As shown from the results, the score of negative emotions increased drastically during COVID-19. It is therefore evident that during the pandemic there is a stronger presence of negative affectivity. Besides the results in emotion polarities, we captured changes in specific emotion categories. We observed massive increases in scores of sadness, fear, and anger. Meanwhile, the scores of anticipation and joy decreased during COVID-19. These results align with our intuition that people are negatively affected by the pandemic, since they faced more pressure due to various factors such as the economic downturn, loss of jobs, social panic of the virus, etc.

In conclusion, there is clear evidence that after the emergence of COVID-19, people demonstrate stronger negative affectivities on social media. With such evidence, the concern that COVID-19 impacts people's mental health is well justified. Therefore, we infer that our intended product, a mobile application that aims to help with the negative affectivities after COVID-19, has a solid and strong demand.

b. Amid-pandemic Negative Affectivity Visualization

As shown below, we managed to output a WordCloud map highlighting the most frequently used words in tweets during COVID-19. In this map, we can capture specific negative emotions related to COVID-19. People in general display negative affectivities towards death cases, governments' responses, and COVID-19's impact on people's physical health. By capturing those keywords, not only could we confirm COVID-19's impact on public emotions but also identify the causes of those emotions intuitively so as to better build a foundation to be supportive of people in need.

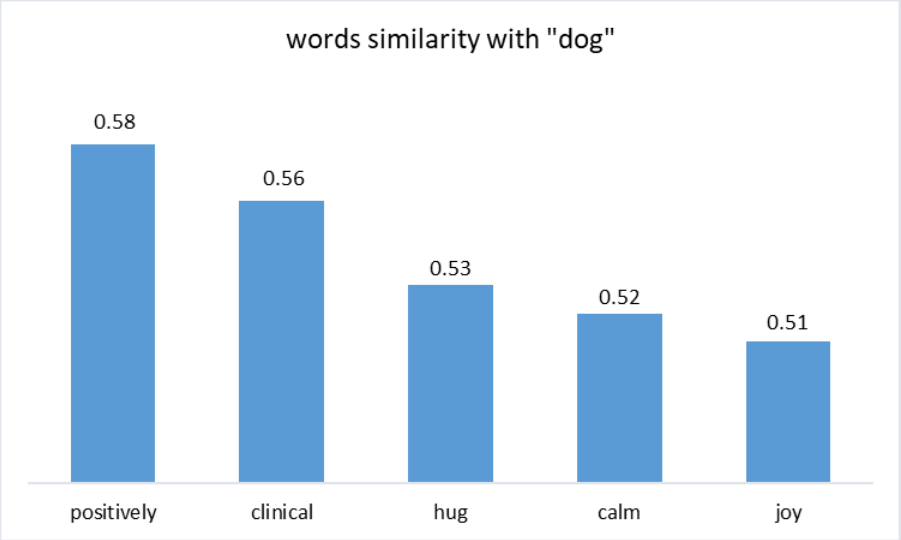
Graph 2:Negative Affectivity Visualization

c. Effectiveness of Therapy Dog Treatment

We used Word2vec to discover the semantic similarity between “dog” and other words. The word “dogs” has a high similarity with “positively”, “clinical”, “hug”, “calm”, and “joy” as shown in the following graph. “Positively” indicates that having or getting in touch with dogs has a beneficial effect on people's mental and physical health, and they respond optimistically. The high similarity between “hug” and “dog” represents that during COVID-19, people may spend more time with their dogs and have more intimate contacts or interactions with them. Moreover, the two words “calm” and “joy” are two positive emotions, compared with emotion and sentiment analysis results from part 1 that negative emotions increase dramatically during COVID-19, the high similarities reflect that interacting or getting along with a dog increases feelings of relaxation and happiness while reducing negative emotions such as stress or anxiety.

The high similarity between “clinical” and “dog” may have various explanations. It may be explained as dogs being utilized in the clinical field as a therapy to cure people or can be explained as dog owners are worried or having to deal with dogs who have been infected with a virus, or can be explained as dogs being used in clinical trials to improve treatment of disease. Even though the word “clinical” has no obvious emotional color, it still shows that dogs are closely related to medical issues and clinical purposes.

To conclude, words that have high similarity with “dogs” have obvious positive emotions, which indicates that people usually connect dogs with positive things and feelings, and dogs can be effective to promote positive moods and emotions.



Graph 3: word similarity with "dog"

Moreover, scientific studies show that dogs are effective for treating negative emotions, such as depression and anxiety. Therapy dogs have been put into use as early as the 1960s. According to a psychological report by Frontiers in Psychology, dogs can reduce stress, anxiety, and depression, ease loneliness, encourage exercise, and improve people's all-around health (Beetz, Andrea, et al., 2012). It has also been evidenced that even small interactions with dogs cause the human brain to produce oxytocin, a hormone often referred to as the "cuddle chemical." Oxytocin increases feelings of relaxation, trust, and empathy while reducing stress and anxiety. Therapy dogs can boost oxytocin levels by as much as 300% (Beetz, Andrea, et al., 2012).

Furthermore, "seven in ten (71%) dog parents say their pup has made them happier people" (Bark, 2021), according to a new study released today by BarkBox. In addition, "dogs are the ultimate therapists with 85% of dog parents saying their dog has helped them get through a difficult time in their life" (Bark 2021). The results of these researches and studies align with our Word2vec finding that dogs can help people create positive feelings, and they are widely acknowledged to relate to happiness and relaxation. Therefore, therapy dog treatment is popular and effective

for healing negative affectivity.

2. Product Design Prototype

a. Purpose & Positioning

After an in-depth analysis of the increasing negative affectivities brought by COVID-19 and the medical effectiveness of therapy dogs, we recognize the result as a business opportunity and come up with our business idea, a therapy dog APP. The APP is designed to support people who have negative affectivities by providing them easy access to the positive emotional and physical benefits of pet therapy. The primary purpose of our APP is to identify the customer needs, locate the therapy dog clinics/organizations, and then build a bridge between them. By providing an interactive and engaging interface/meeting with a therapy dog, our APP is able to provide a loving cure to people in need without any time limitations or location boundaries.

b. Functions

- Identify the customer needs, preferences, and locations

Whenever a new customer creates an account on our platform, we will require them to fulfill a survey to identify their stress level and collect their demographic information and preferences to recommend the most suitable comfort dog for them. Of course, we will also need their current location for those who prefer to have a face-to-face appointment with the comfort dog.

- Provide the updated info of therapy dog clinics/organizations

Considering that our primary service will be provided by the therapy dog clinics/organizations, we will first build a cooperation relationship with them. What's

more, since all the therapy dogs require specific training and certification, which is AKC certification, we will double-check and verify the certifications for therapy dog clinics and organizations before they have been posted on our platform. Thirdly, we will keep tracking and updating the therapy dogs' titles on our APP. Different titles of the therapy dogs will match the different levels of customer needs.

- Match and connect

Our APP will match the customer and the therapy dog based on the customer's stress level, customer/therapy dog locations, customer preference, and the therapy dog's title. The best match will be posted to the customers primarily. However, if the customers are not satisfied with the best match, there will always be the second-best and third-best matches as alternatives.

After they confirm their match, our APP will be responsible for connecting the two parties. For those who prefer to meet in person, we will provide various time slots and locations for them to select. And for those who can only meet virtually, we will provide a professional to assist the interaction between the customer and the therapy dog. (For example, if the customer wants to play a ball with the dog, the professional will help him with that on the other side of the screen.)

c. Target Users & Acquisition

Our target customers will be divided into two groups. The first group is college students. According to the American College Health Association, 65.7% of college students felt overwhelmed in 2019, and around 96% of college students favor pet therapy on campus (Pawsome Advice, 2022). We believe that the college students will be a sufficient customer group for our APP based on the huge demand.

The second customer group will be segmented through social media platforms.

In the previous section, we did an emotion analysis. In reality, certain people may frequently send tweets under one emotion category. We will promote our APP to them on the social media platform for those who frequently send tweets under negative emotion categories.

What's more, since our APP is highly correlated with people's mental health, we should be more cautious of seasonality and social events. According to research, about 10% to 20% of people in America may get a milder form of Seasonal Affective Disorder, a type of depression triggered by a change in seasons, usually when fall starts. (Cleveland Clinic, 2022) And the other study found that people showed an increase in both anxious and sad moods after only 14 minutes of watching negative news. (Collins, 2020) Both two elements will create more negative affectivity in the whole society. So, in order to help more people and capture more demand, we recommend promoting our APP more often when seasonality and adverse social events occur.

Conclusion

In this market research, we identified that people's negative affectivities spiked during the COVID-19 pandemic through emotion and sentiment analysis. The overall emotion from tweets is more negative than in the pre-COVID period, and all specific passive emotions such as sadness, anger, fear, etc. increased a lot. Regarding this problem, we want to create an APP aiming at promoting mental health for people in need. By doing research on treating mental problems and applying the Word2vec algorithm, we found that people usually associate dogs with positive things and feelings, and dogs' effectiveness in treating mental health issues has been proven by scientific studies and widely acknowledged by people. Therefore, we came up with the idea of launching a therapy dog APP to provide certificated therapy dogs to people seeking emotional support. The user can make an appointment to meet a therapy dog with specific requirements through the APP. We believe that this APP would be beneficial to help customers alleviate negative emotions like stress, depression, and anxiety, and promote a healthy mentality.

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