Sentiment Analysis of Gun Ownership Without a License (1470 words)

Introduction:

Firearms have been used in civilization for a long time for a variety of objectives, such as hunting, self-defence, and warfare. The issue of gun regulation is frequently contentious. The policy's proponents contend that it preserves the Second Amendment and is an essential step to safeguard self-defence. Since criminals can easily obtain firearms, critics assert that it compromises public safety. “Studies show that about 44 per cent of adults in America say they know someone that has been shot and approximately 5 per cent claim that either themselves or someone in their family has been threatened by someone who has a gun [2].” This study demonstrates how weapons can be used to threaten people, which may lead to each individual carrying a gun for protection. “Most Americans, including most gun owners, support restricting public places legal gun owners can carry firearms. These views contrast sharply with the current trend in state legislatures of expanding where, how, and by whom guns can be carried in public [1]”. Indiana passed firearm legislation known as the Indiana constitutional carry law in 2022[4]. Gun massacres that have recently happened have rekindled the controversy over gun control. If a person is not forbidden from owning a gun, this study would allow them to carry weapons without a permit. Currently, Indiana is one of only a few states that enable open carry of firearms. Those opposed to the idea claim that because criminals would have easy access to firearms, there would be a hazard to the general population. A large percentage of Americans (84 %) support the idea that an in-depth background check should be carried out on whoever wants to buy a firearm [3]. The topic will probably still be discussed in the legislature and society. Therefore, this research will contribute to the overall assessment of public opinion on this subject.

Research Question:

How do people feel about Indiana firearm legislation? Which sentiment is felt by the majority?

Method:

Data:

In Indiana, gun control legislation was passed in July 2022. In order to analyse the sentimental changes brought about by the law, 1200 data samples from both before and after Indiana's passage of the firearms legislation were collected. It contains several attributes, including DateTime, Tweet ID, Text (text of the tweet), and Username. The samples were gathered using the text search query method of the Python snscrape module. It also helped to filter tweets in a certain DateTime range with the maximum required samples.

Here, the keywords were the input parameter in the TwitterSearchScraper method and are case-sensitive. "Permit less gun Indiana," "Gun Law Indiana," "Firearms Law Indiana," and "Concealed carry Indiana" are the keywords. Data was gathered using these keywords from January 2022 to October 2022, and data were further separated into two groups based on the law commencement date. In addition, 300 data points were gathered during the same time period with the phrase "gun crime in Indiana" to examine the effects of gun crime due to the law.

Analysis:

The CSV file was processed using Python's Pandas package, and the results were saved in a data frame. The read_csv function in pandas was used to read a CSV file. It can accept a wide range of inputs, including the path to the file, the separator that was used in the file, whether or not the header should be included, and more as shown below.

	Datetime	Tweet Id	Text	Username
307	2022-02-26 18:04:58+00:00	1497633806068682752	@Fishinforhaters @Lana63997778 @DoyouknoDway @...	ajaz0810
308	2022-02-24 01:11:23+00:00	1496653954922561538	@kaitlin_lange @ScienceSoprano Great, but ther...	nobullcongress
309	2022-02-17 19:14:43+00:00	1494389869468135428	@rjocore989 @stopthepewpew @ziggywilde @TheSpo...	Badams820
310	2022-02-05 23:01:33+00:00	1490098297092165635	@jillwow @yesisworld So if all the guns are in...	sclarkguy
311	2022-01-16 23:36:19+00:00	1482859289626783753	@imeaannn @shannonrwatts Here's the thing - th...	TheRealNJJediZ

Table1 DataFrame from Scraped data

Data cleaning:

In the step of data cleaning, 'Datetime' has been changed to 'Date' (Table 2), as the only requirement was to analyse according to month. The function was created using the re (regular expression) library in python to remove @mentions, '#', re-tweet (redundant data) and hyperlinks from the 'Text' attribute.

	Datetime	Tweet Id	Text	Username
307	2022-02-26	1497633806068682752	Ah yes the typical democrat playbook. "W...	ajaz0810
308	2022-02-24	1496653954922561538	_lange Great, but there's still the delay of ...	nobullcongress
309	2022-02-17	1494389869468135428	_Largo _Renquist ...	Badams820
310	2022-02-05	1490098297092165635	So if all the guns are in Indiana, why isn't...	sclarkguy
311	2022-01-16	1482859289626783753	Here's the thing - they're all law abiding t...	TheRealNJJediZ

Table2 Cleaned Data

Sentiment Analysis:

VADER (Valence Aware Dictionary and Sentiment Reasoner), a tool from the Python library, was utilized to analyse the research. As Twitter limits allow for the sharing of tweets with 140 characters, people often shorten their statements by utilizing emojis, slang, and other techniques. As a result, people also use polysemy and sarcasm to communicate their opinions, which makes Twitter language unorganized. VADER is a lexicon- and rule-based sentiment analysis program that searches for particular word patterns using a rule-based methodology (e.g., positive or negative words). Additionally, the text uses a lexicon-based method that checks the sentiment rankings of certain terms in a pre-defined vocabulary (e.g., AFINN or SentiWordNet). It also uses a machine learning-based strategy that makes use of a classifier that has already been trained to estimate the sentiment of a text. Due to the informal and condensed character of social media texts like tweets, VADER is made to function effectively on these types of texts.

Looking forward to Table 3, VADER classifies the post as either positive, negative, or neutral. Additionally, VADER calculate compound scores for each post, ranging from -1 to 1, to measure the sentiment of the communication, using the compound score the post was precisely categorized into Very Negative (<= -0.5), Neutral (==0), Positive (>0) else Negative.

	Datetime	Tweet Id	Text	Username	Positive	Negative	Neutral	Compound
307	2022-02-26	1497633806068682752	Ah yes the typical democrat playbook. "W...	ajaz0810	0.057	0.124	0.819	Negative
308	2022-02-24	1496653954922561538	_lange Great, but there's still the delay of ...	nobullcongress	0.250	0.229	0.521	Positive
309	2022-02-17	1494389869468135428	_Largo _Renquist ...	Badams820	0.058	0.195	0.747	Very Negative
310	2022-02-05	1490098297092165635	So if all the guns are in Indiana, why isn't...	sclarkguy	0.000	0.312	0.688	Very Negative
311	2022-01-16	1482859289626783753	Here's the thing - they're all law abiding t...	TheRealNJJediZ	0.026	0.202	0.773	Very Negative

Table3 Sentiment Labelling of tweets

Representation:

The visualizations of the line graph are done by the plotly library in python. The data represented in the line graph are grouped by month against the number of tweets in positive, negative and very negative. The first line graph visualises the sentiments of people before the law commencement from Jan 2022 to Jun 2022. The X-axis shows the months and Y-axis shows the number of tweets. The sentiments are classified and differentiated in the graph by different colours such as; Red – Very Negative Sentiment, Orange - Negative Sentiment and Green – Positive Sentiment.

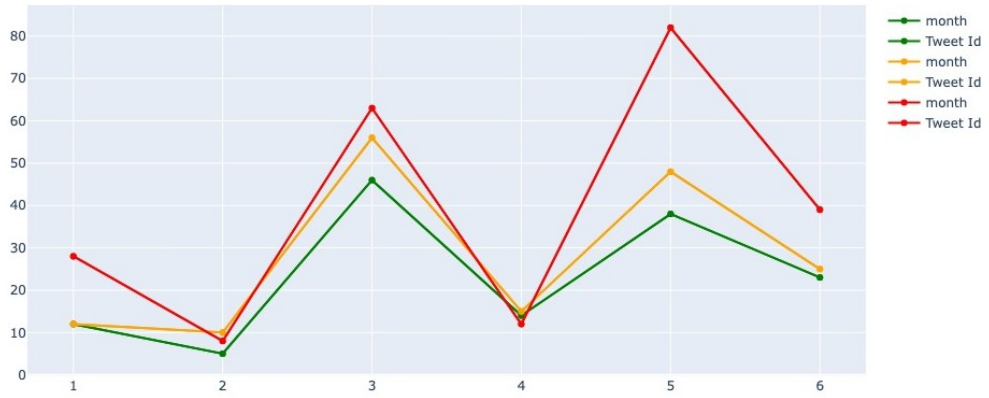

Figure1Sentiments before the Law

The second line graph (Figure 2) shows the data in the same manner from July 2022 to October 2022.

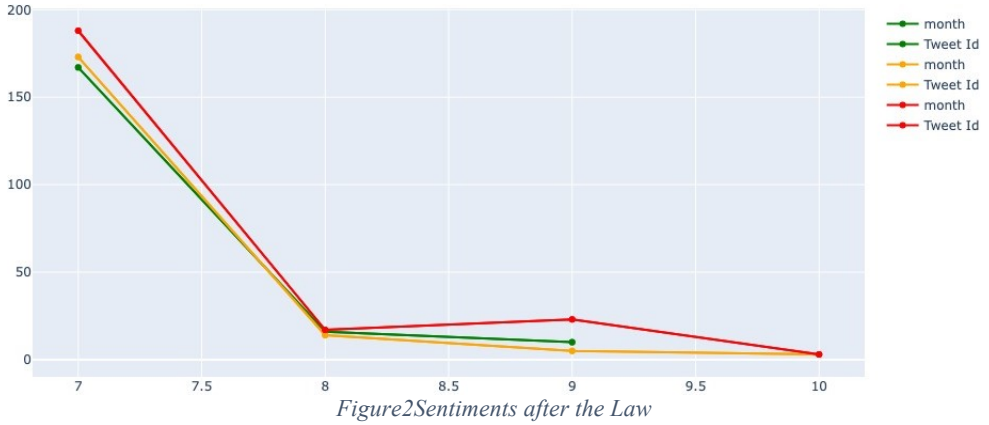

Figure2Sentiments after the Law

Figures 1 and 2 highlight some intriguing trends between the months of February and August 2022. So, Figure 3 shows the bar chart made with matplotlib library of Python, which was used to investigate the sentiments from February to August when the law was also put into effect. It has the same classification of data points and colour schema as the above line graph.

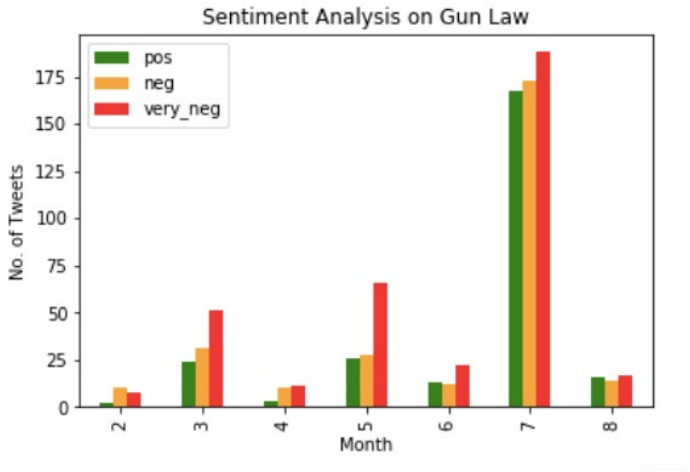

Figure3 Sentiment Analysis on Gun Law

Result:

Both phases—before and after the law was passed—had to be examined in Figure 4, to see if the sentiments differed. According to the data, the 'very-negative' sentiment among the tweets was increasing rapidly, whereas the other two sentiments; 'negative' and 'positive' were gradually increasing. It was clearly observable how they all varied from one another.

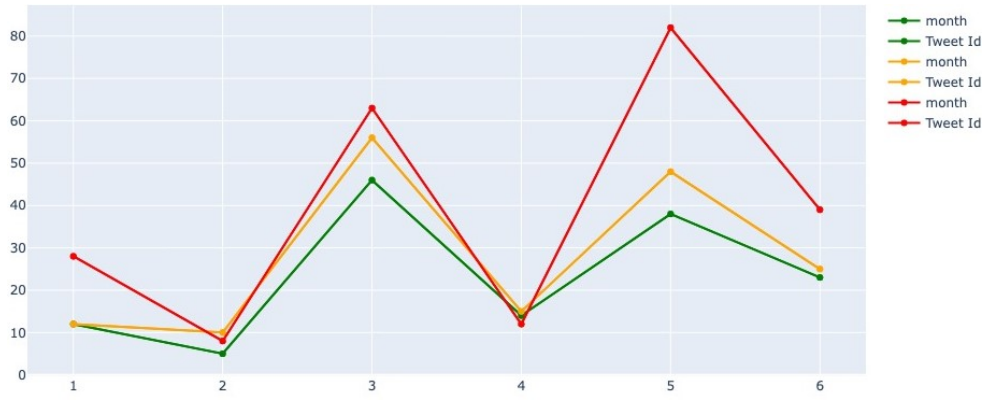

Figure4 Sentiment Before the Law

Figure 5 illustrates that all three sentiments were at their greatest point ever during the month when the law was passed. In 2022, both the ‘positive’ and ‘negative’ sentiments reached a record high. It also demonstrates that July was the month with the most tweets overall. Strangely, all of them returned to normal and have remained stable since the beginning of the following month. From July, the difference between them was remarkably small.

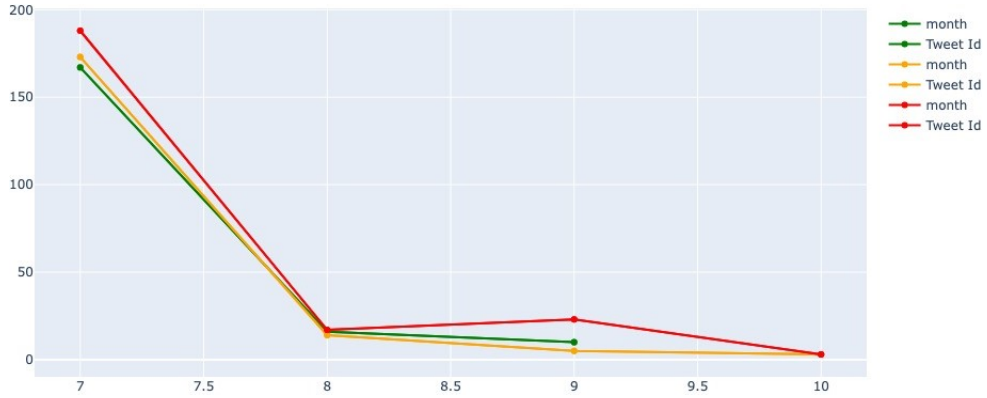

Figure5 Sentiments After the Law

The surprising result (in Figure 6) was that mixed sentiments increased in the month of July 2022. (In which the law was passed). No matter, they all abruptly returned to normal in August 2022. The ‘positive’ sentiment was always below average, but in the month of July, it reached almost the same to the ‘Very-negative’ sentiment. That implies that the number of tweets endorsing the act increased mysteriously. However, the "very-negative" sentiment was always the highest. That demonstrates that the general public reaction to the gun control law was largely negative.

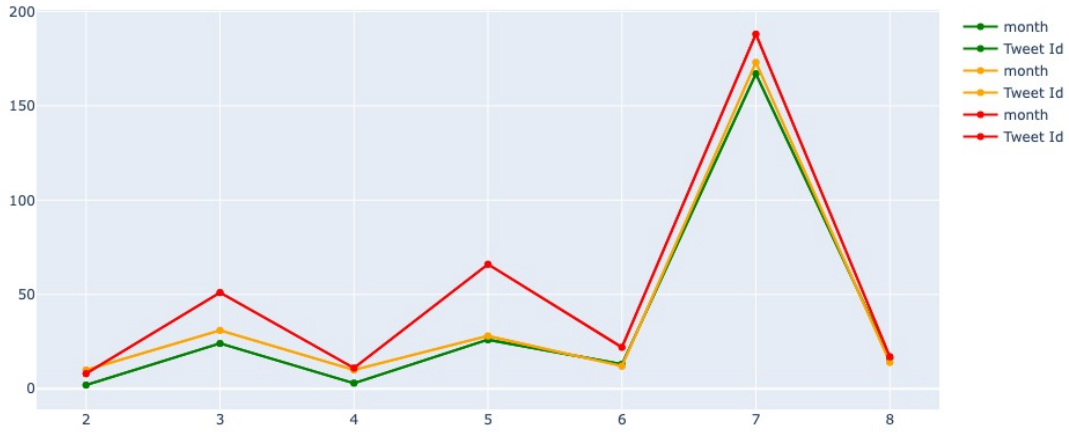

Figure6 Line Graph on Gun Law

The line graph of Figure 7 shows the separately collected dataset by the keyword ‘gun crime in Indiana’ to study the impact of the law on the sentiment of people’s tweets, there were more gun crime-related tweets during a certain period when the law was going to pass till the month of August.

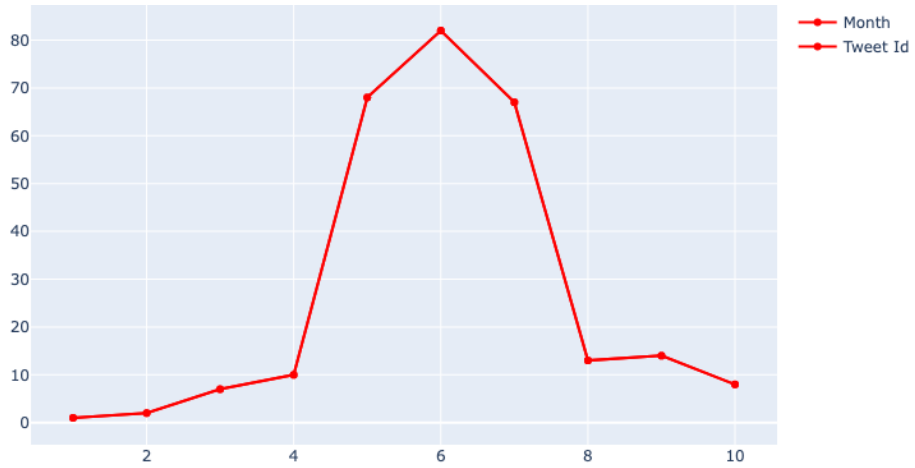

Figure7 No. of Tweets on Gun Crime

Limitations:

The data might be limited due to the limited usage of keywords. Additionally, some data might not be simpler enough to be understood by the VADER library. False tweets (like advertisements) might also deflect the analysis a bit.

Conclusion:

The ‘positive’ sentiments on Indiana's Firearm laws were much less frequent than the ‘very-negative’ sentiments. Although it was almost as many as in July of 2022 when the number of ‘very-negative’ sentiments peaked. Also, the Law of Firearms in Indiana was commenced in July 2022. This helped to analyse that people were more prioritized to self-defence, as the ‘positive’ sentiment was incredibly raised near to the ‘very-negative’ sentiment. Despite this sharp increase, tweets with ‘very-negative’ sentiments consistently outnumbered positive ones. In general, people have negative sentiments toward the law.

References:

1. Julia A. Wolfson, Stephen P. Teret, Deborah Azrael, and Matthew Miller, 2017: US Public Opinion on Carrying Firearms in Public Places. *American Journal of Public Health 107*, 929_937, https://doi.org/10.2105/AJPH.2017.303712

2. UKEssays. (November 2018). Research Paper: Gun Violence in the United States. Retrieved from https://www.ukessays.com/essays/america/research-paper-gun-violence-in-the-united-states.php?vref=1

3. Paper Example on Gun Laws. (2022, May 16). Retrieved from https://proessays.net/essays/paper-example-on-gun-laws

4. Hirschauer, K. (June 09, 2022). What Permitless Carry in Indiana Really Means, https://www.indyjustice.com/blog/2022/june/permitless-carry-in-indiana/

5. "TWITTER SENTIMENT ANALYSIS USING VADER ON PYTHON", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.7, Issue 5, page no.1025-1031, May 2020, Available :http://www.jetir.org/papers/JETIR2005456.pdf