

BUS5PR1 Analytics Project 1 Assignment 02: The Hustle – UN's Sustainable Development Goal
Twitter Discussion Analysis



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Topic: Zero Hunger

N-Grams Analysis

Technique Description:

N-grams analysis is a text mining method for word sequence (or phrase) frequency analysis of a text. An N-gram in natural language processing (NLP) is a continuous series of N elements from a given text sample. Unigrams, or single words, bigrams, or two-word phrases, and trigrams, three-word phrases are the most often occurring N-grams.

This study facilitates the identification of recurring themes, words, and debates in big text collections therefore enabling improved knowledge of the context and main subjects of a corpus.

Input:

Only the “text_lemmatized” column, which has been pre-processed (lowercasing, stop-word removal, lemmatization),

Outcomes (Visualizations):

1. Unigrams:

- The dataset consists of common words such "food," "security," "malnutrition," "agriculture," and "hunger".
- These unigrams draw attention to the most often used words in talks on Zero Hunger and Sustainable Development.

2. Bigrams:

- Two-word terms that show up often include "food security," "sustainable agriculture," "climate change."
- Bigrams offer information on relevant, linked subjects such how food security and agriculture are being addressed jointly.

3. Trigrams:

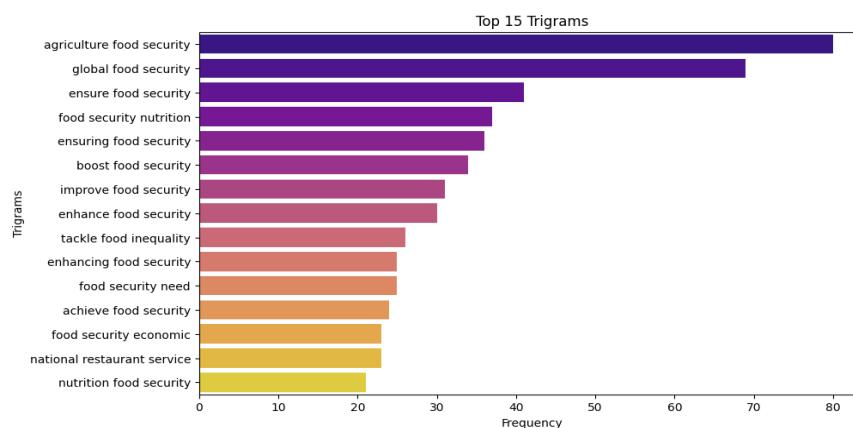
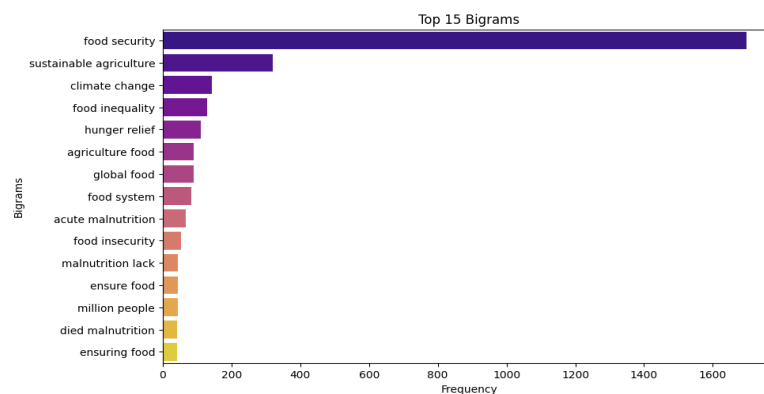
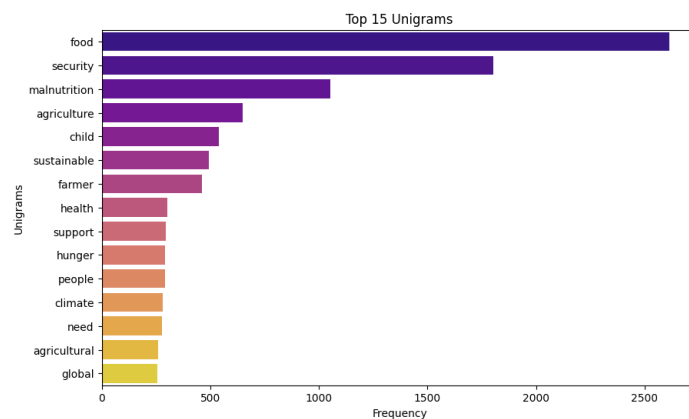
- Three-word phrases most often occurring are "global food security", "agriculture food security", and "ensuring food security".
- These trigrams relate food security problems to more general challenges, therefore illustrating how worldwide efforts are being framed.

Insights:

- The unigrams, bigrams, and trigrams highlight hunger, sustainable agriculture, and food security very strongly. These subjects are often discussed as public conversations focus on the necessity of sustainably enhancing food access and nutrition.
- Words like "sustainable agriculture" and "climate change" imply that people are talking about how environmental elements affect food production and security.
Public Opinion on Food Safety: Often coupled with words like "global," phrases regarding "food security" reflect the universal relevance of the topic.

Recommendations:

- Give Sustainable Agriculture priority. The regular debates between sustainability and agriculture point that governments should give sustainable agricultural techniques top priority.
- Governments could undertake awareness campaigns using the increased public interest in food security, therefore promoting more sustainable agricultural methods and consumption. Policies should stress the long-term advantages of sustainable food systems to help to solve hunger.
- Highlighting the worldwide character of food insecurity, international organizations should leverage the findings of N-grams analysis to customize their activities. To help to reduce poverty and advance food equality, they should support measures enhancing world cooperation.



Tweet Count Stats Over Time

Technique Description:

Tweet count statistics over time is a temporal analysis method that lets us see patterns in tweet activity, therefore illustrating how conversations on subjects change with time. We can determine the frequency of tweets by day, month, or year by aggregating tweets depending on their timestamp. This helps to pinpoint public participation periods, which could line up with actual events, policy debates, or Zero Hunger and Sustainable Development Programs. Upon analyzing the dataset, it is clear the tweets scraped are recent. I have used the drill-down technique to further analyze the tweet count statistics over time.

Input:

The “Day” column has been used for this. It is already in datetime64 format.

Outcome (Visualizations):

- The total count of tweets from 2019 to 2024 displayed on a graphic display. This provides a broad perspective on the evolution of food security and sustainability debates across time.
- 2024 shows a large increase, which explains the reason why the tweets collected are recent.
- A more narrowly focused line chart shows twitter activity in 2023 and 2024. Particularly around July, which corresponds with world events such as the 2024 High-Level Political Forum (HLPF) and other international conferences, twitter activity in mid-2024 is sharply rising.
- Further focusing on July 2024, the graph displays daily tweet counts and points up surges in interaction during this month. This suggests significant days when public conversation on sustainability and Zero Hunger peaked, most likely connected to significant announcements or events during the HLPF.

Insights:

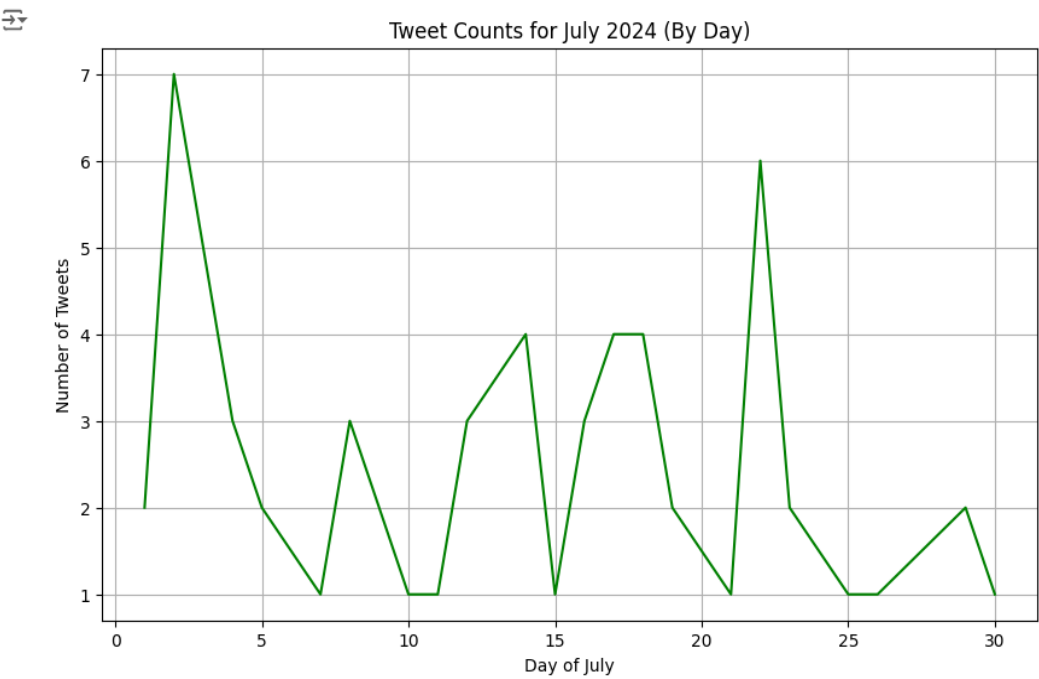
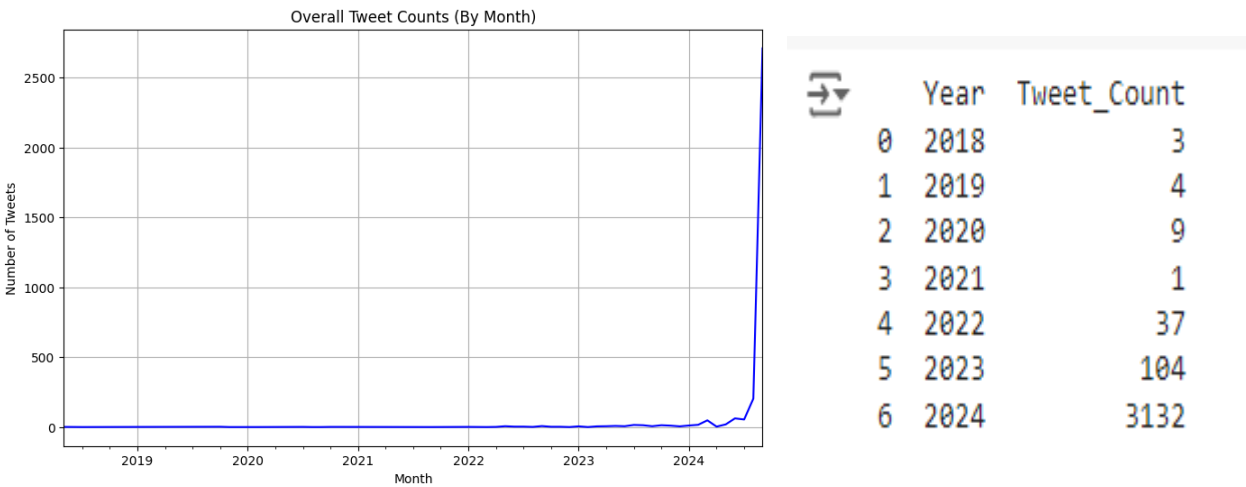
- Rising twitter activity in July 2024 can be linked to important events such the 2024 High-Level Political Forum on Sustainable Development (held from July 8–17, 2024). highlighting important concerns like Zero Hunger (SDG2), this event spurred worldwide social media activity and dialogue.
- Online debates sparked by these events attracted a lot of activity on social media, particularly on reducing poverty, attaining food security, and advancing sustainable agriculture. The rise in tweets most likely resulted from governments, NGOs, and public participation with the forum's themes during the event.

Recommendations:

- Major announcements, policy changes, or campaigns should be timed by governments, so they align with times that attract significant public participation—like worldwide forums (e.g., the HLPF). These times present a great chance for open to everyone communication on advancements in the fight against poverty and support for sustainable development.
- Policymakers should seize the growing public interest in food security by implementing projects that fit popular concerns, including tackling effects of climate change on agriculture. Policy

initiatives should be well communicated during these high points to order to guarantee public support.

- Finding certain trends in twitter activity helps NGOs to choose important days for best effect. Starting campaigns or supporting projects on these highly involved days can help to raise awareness and involvement.
- NGOs and International Bodies should actively participate in worldwide events like the HLPF as these times of public interest demand it. These events allow companies to highlight their Zero Hunger efforts, increase awareness, and encourage donations or involvement in projects connected to this goal.



Sentiment Over Time

Technique Description:

Sentiment analysis is the method of identifying the emotional tone underlying a body of text, which aids in knowledge of attitudes, views, and feelings conveyed. We compute the sentiment polarity of every tweet in this study and classify them as either positive, negative, or neutral. Sentiment over time looks at how the general sentiment—positive, negative, or neutral—has changed over a certain period, therefore providing insights on public sentiments changing in reaction to significant events or debates on Zero Hunger and related subjects.

Input:

The “text_lemmatized” column and the “Day” column has been used.

Outcome (Visualizations):

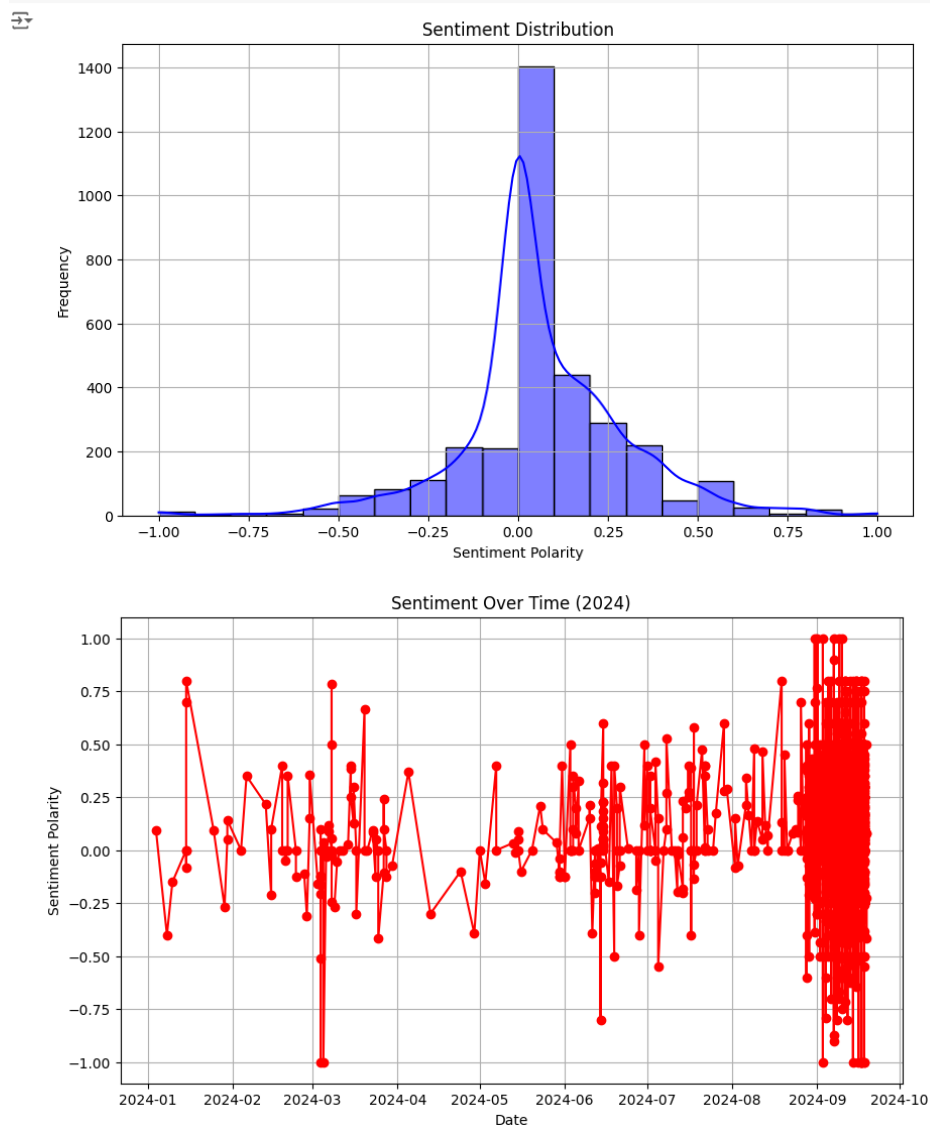
- Based on a histogram displaying the general sentiment score distribution, most tweets fall either neutral or somewhat positive. Though less often, negative attitudes still dominate a good number of conversations.
- Sentiment changed from 2019 to 2024 shown on a line chart. Positive emotion surges often correlate with major world events like conferences or effective campaigns. Negative mood declines have been connected to crises or accounts of growing food shortages or famine.
- Focusing on the years 2023 and 2024, the line chart shows more minute emotion swings. Important world events like the 2024 High-Level Political Forum and international debates on food security might help to explain the considerable rise in both positive and negative attitudes that July 2024 displays.
- Average weekly mood on a line graph for 2024 shows that public attitude changed quickly in response to news or events. Some weeks exhibit more negative mood, perhaps reflecting crucial news on world hunger or policy changes; others show more optimism.

Insights:

- The most of tweets have a neutral attitude. This suggests that many debates on sustainable development and food security are either factual or educational without conveying strong emotions.
- In early 2024 and mid-2024, when the 2024 HLPF and other significant international gatherings coincide, see positive mood spikes. These surges point to hopeful responses to fresh policy announcements, joint projects, or success stories told during these events.
- There are some stages of unfavorable decline in the sentiment polarity which suggests that news on food security usually leads to emotional responses ranging from annoyance to concern to disappointment.

Recommendations:

- Positive attitudes surrounding world events like the HLPF present a great chance for legislators to show development on Zero Hunger programs. To maximize public participation and support, governments should match policy announcements with these events.
- Drops in mood most likely reflect popular worry or displeasure with bad events or crises connected to hunger. Clear communication, updates, and solutions to minimize negative reactions and encourage public confidence will help governments actively solve these problems.
- NGOs and International Bodies should actively assist hunger-related projects by means of active participation during times of positive sentiment since these times offer chances for fundraising, awareness-raising, and mobilizing of support.



Topic Modelling

Technique Description:

Topic modelling is a form of unsupervised machine learning used to find underlying themes or subjects inside a large textual corpus. It clusters related words to create “topics,” which can then help one grasp the core ideas under discussion. Latent Dirichlet Allocation (LDA), which allocates each document a mix of themes and each topic a mix of words, is the most often used method for topic modelling. Within the framework of this study, topic modelling enables us to identify the main ideas in debates concerning Sustainable Development and Zero Hunger.

Input:

- Preprocessed (lemmatized and cleaned) tweets about Zero Hunger and Sustainable Development make up the dataset; these help to produce the text_lemmatized column.
- Every tweet has been tokenized—that is, broken up into words—and a dictionary is developed to link words to IDs. The text is then TF-IDF (Term Frequency-Inverse Document Frequency) modelled or Bag of Words representation.
- Using LDA, we identify a designated number of topics—say, 10 or 15—each of which is symbolized by a group of keywords that often co-occur in the text.

Outcome (Visualizations):

- Intertopic Distance Map: visualization displaying the separation between the LDA model's found themes. Every circle stands for a topic; the distance between the circles shows the variations among the subjects. This map clarifies which subjects are unique and which are more closely connected.
- We may understand the meaning of every issue by using a bar chart showing the most often occurring terms connected to each one.
A topic may be defined, for instance, by words like "food," "security," "hunger," "sustainable," and "agriculture," therefore stressing food security and sustainability initiatives.

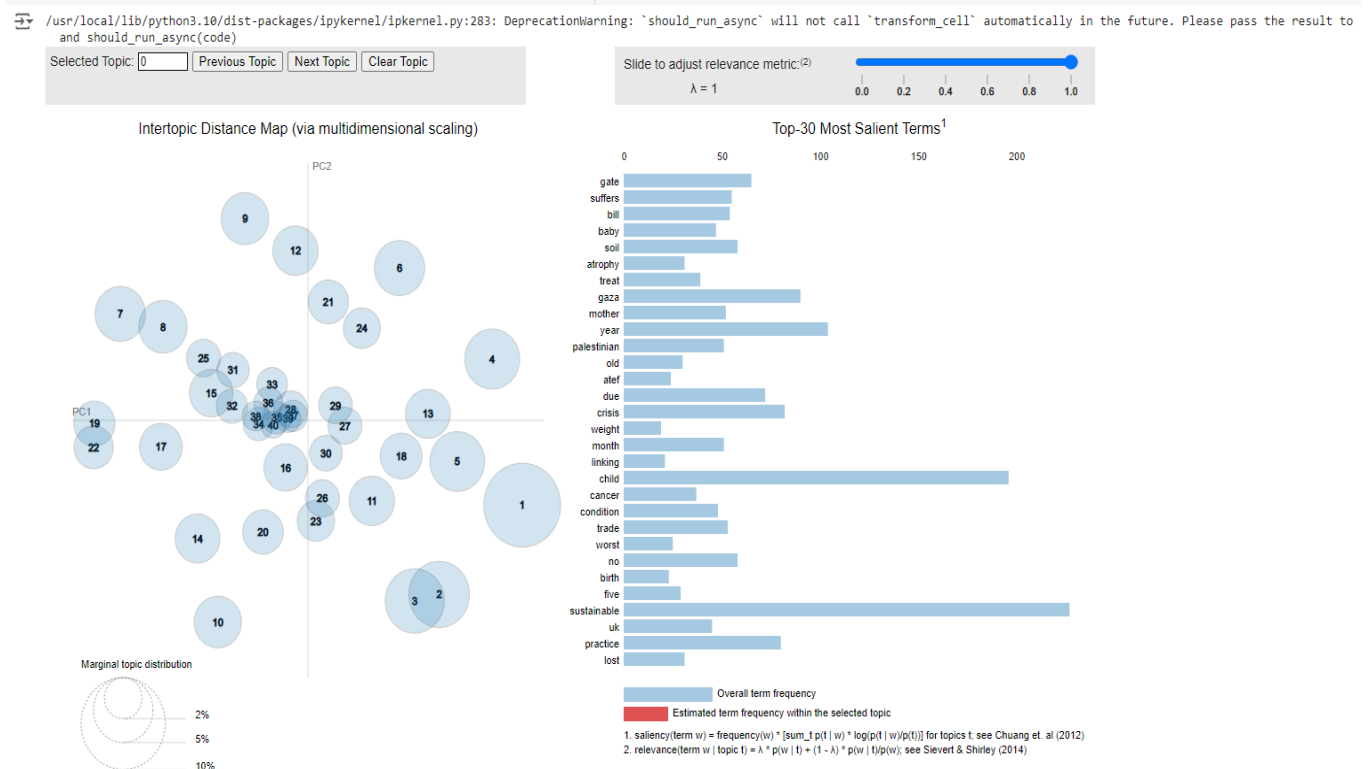
Insights:

- Dominant Topics: The LDA model's extracted themes point to food security and sustainable agriculture as the most often discussed subjects in the dataset. Often recurring terms like "food," "security," "hunger," "malnutrition," and "climate" show that these are fundamental issues for those debating Zero Hunger and sustainable development.
- Overlap in Topic: Some closely linked subjects are food security and sustainable agriculture as well as malnutrition and world hunger. This illustrates the linked character of both problems, where food insecurity directly leads to malnutrition and remedies for hunger usually depend on sustainable farming methods.
- Global Emphasis: One issue, with phrases like "global," "partnership," and "policy," which most likely relates to international cooperation to solve hunger, is strongly centered on worldwide alliances. This shows how urgently group efforts are needed to reach Sustainable Development Goal 2—zero hunger.

- Some subjects revolve around requests for government action and policy changes. This implies that many people are not just talking about the issue of hunger but actively supporting legislative reforms and ideas including worldwide collaboration.

Recommendations:

- Highlight policy-driven remedies. Governments should give global alliances top priority to address food security and poverty given the great emphasis on policy interventions and international cooperation. Governments may help to better solve food poverty by attending international meetings and matching their policies with world initiatives.
- Invest in Sustainable Agriculture: The overwhelming majority of issues connected to sustainable agriculture highlights the necessity of governments to support farming methods with tolerance against climate change. Policies should focus on encouraging environmentally friendly farming techniques and helping producers to implement sustainable practices.
- Malnutrition should be given top attention as it is another important issue from the topic modelling. NGOs should concentrate on creating initiatives meant to enhance nutrition, especially in areas facing extreme food shortage. Targeted dietary changes could greatly lower appetite.
- Examining how various people and areas address world hunger helps academics to pinpoint the most urgent issues and customise remedies fit for local needs. This can guide more successful public involvement plans and policy recommendations.



Hugging Face Model

Technique Description:

Emotion detection is a Natural Language Processing (NLP) method used to find the emotional tone of a given text. Hugging Face's pre-trained algorithms allow us to categorize tweets or textual material into emotional categories by means of analysis. This clarifies the overall attitude or emotional resonance around a subject. The “mrm8488/t5-base-finetuned-emotion” model I used divides books into six emotional groups: joy, sadness, rage, fear, surprise, and love.

Input:

- Text Data: The dataset comprises tweets initially lemmatized and cleaned into a more orderly shape. The cleaned text input for an emotional analysis is found in the column text_lemmatized.
- Hugging Face Model: Every tweet is categorized by the six predetermined emotional classifications.

Outcome (Visualizations):

- I have visualized the emotional distribution of the whole dataset after using the emotion classification algorithm. The outcome reveals how the data reflects the many emotions.
- Most tweets show happiness, most likely connected to festivals or activities honoring the Zero Hunger campaign.
Tweets expressing grief or worry usually focus on poverty, starvation, or malnutrition.
- Fear reflects concern about subjects such food security, climate change, and their future influence.
- Anger shows tweets complaining about policies, circumstances, or occurrences compromising food security and famine.
- The dataset contained hardly surprise and love. With anger lagging behind, the most often occurring emotion in the tweets is joy, followed by sorrow and fear, seen on the bar chart above.

Insights:

- Joy rules the dataset, which would suggest that campaigns or debates on Zero Hunger and associated projects are essentially favorable, emphasizing successes, development, or effective interventions.
- The emotional impact of subjects like poverty, food shortage, and hunger are sadness and fear. People show sympathy and worry for the situation of people battling hunger.
- The great volume of tweets expressing happiness shows that good message appeals. While governments should keep supporting effective campaigns and projects, they should also help to alleviate grief and dread by offering greater assistance and security in areas suffering with poverty and hunger.

Recommendations:

- Success stories and triumphs in the battle against hunger should be highlighted using positive feelings. Maintaining public involvement and support requires constant attention on good narrative.
- The great volume of tweets expressing happiness shows that good message appeals. While governments should keep supporting effective campaigns, they should also help to alleviate grief and anxiety by offering greater respite and security in areas suffering with hunger and poverty.
- Regarding Nonprofits and Social Campaigners, joy in tweets reveals how successful advertising may spark constructive dialogue. More can be done to translate unpleasant emotions like sadness and fear into practical help.

