

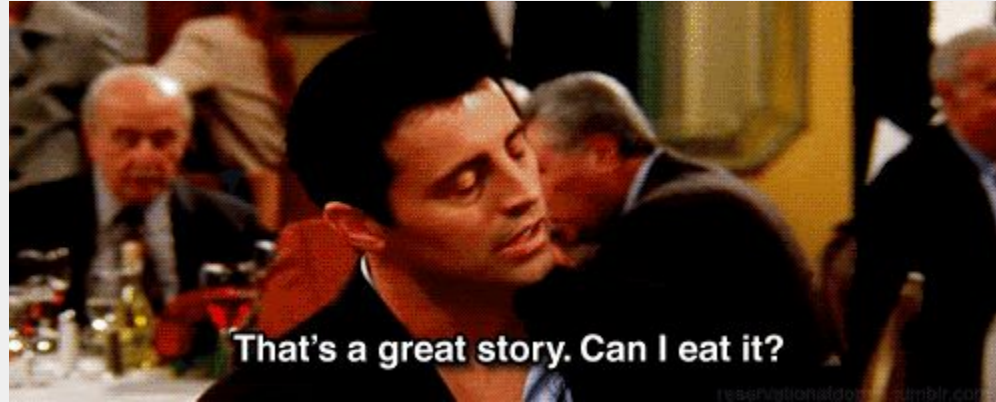
SUSTAINABLE DEVELOPMENT GOAL 2

TEAM
PIXEL
ZERO HUNGER

By Shubham Kumar Jain
Abhinav Jain
Rohit Shukla

{BIG PICTURE + MOTIVATION}

Imagine, you have gone to the work with an empty stomach and your boss asked you to work overnight without any break. You will soon feel fatigue and will lose focus. Hunger makes it difficult to work and pay attention.



The world produces enough to feed the entire population of 7 billion people.
Yet, **1 out of every 8** people on the planet goes to bed hungry each night.

{HOW IS IT RELATED TO SDGS}

SUSTAINABLE DEVELOPMENT GOAL 2

End hunger, achieve food security and improved nutrition and promote sustainable agriculture



Target 2.1 By 2030, end hunger and ensure access by all people regardless of their situation.

Target 2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets of stunting.

{ ABOUT THE DATASETS }

1. Food Balance Sheets

Compiled by FAO (Food & Agriculture Organization of United Nations)

Source:

<http://www.fao.org/faostat/en/#data/FBS>

Size: 2.8 GB

No. of Variables: 12

No. of Observations: 22973785

2. Earth Surface Temperature

Climate Change Earth Surface Temperature Data

Source:

<https://www.kaggle.com/berkeleyearth/climate-change-earth-surface-temperature-data>

Size: 600 MB

No. of Variables: 4

No. of Observations: 577463

3. Twitter Data

Twitter Streaming API

Source:

<https://developer.twitter.com/>

Size: 1.5 GB

No. of Variables: 5

No. of Variables: 10,00,000

4. Global Hunger Index

Calculated each year by the International Food Policy Research Institute (IFPRI).

Source:

<http://www.ifpri.org/topic/global-hunger-index>

Size: 25 KB

No. of Variables: 21

No. of Observations: 133

5. World Development Indicators

The primary World Bank collection of development indicators.

Source:

<https://data.worldbank.org/data-catalog/world-development-indicators>

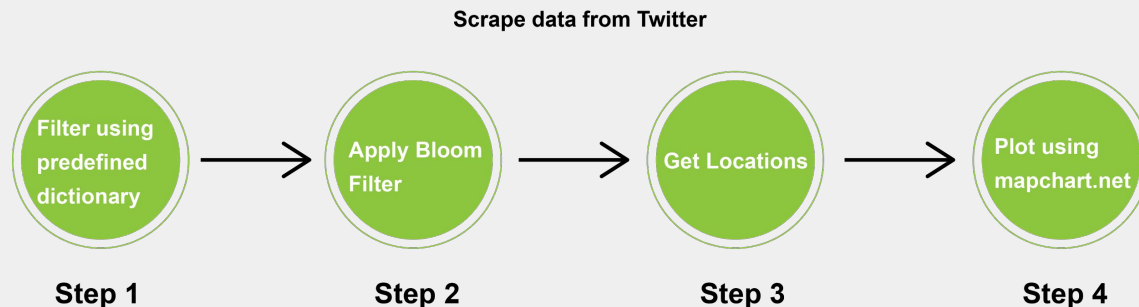
Size: 254 MB

No. of Variables: 59

No. of Observations: 409993

{METHODS USED}

1. Streaming Data (that we needed to stream from twitter)



2. Static Data (that we downloaded from the websites)

- Data cleaning and normalization -:
 - First, remove all rows with more than 25% missing values.
 - Second, fill in any other missing value using a logical formulae

For e.g.,

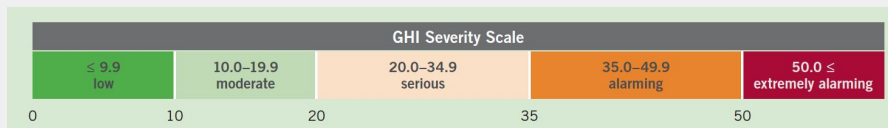
$$\begin{aligned} & \frac{1}{3} \times \text{Standardized PUN} \\ & + \frac{1}{6} \times \text{Standardized CWA} \\ & + \frac{1}{6} \times \text{Standardized CST} \\ & + \frac{1}{3} \times \text{Standardized CM} \\ \hline & = \text{GHI score} \end{aligned}$$

- **Transformation of data** - From Spark RDDs to tensors and further to Pandas DataFrames
- **Applying Ridge Regression using Tensor Flow and error estimation** - to predict trends for GHI and WDI for future. We also calculated Mean Absolute Error which came out to be:

$$MAE = \frac{1}{n} \sum_{i=1}^n |x_i - x| = 11.6924$$

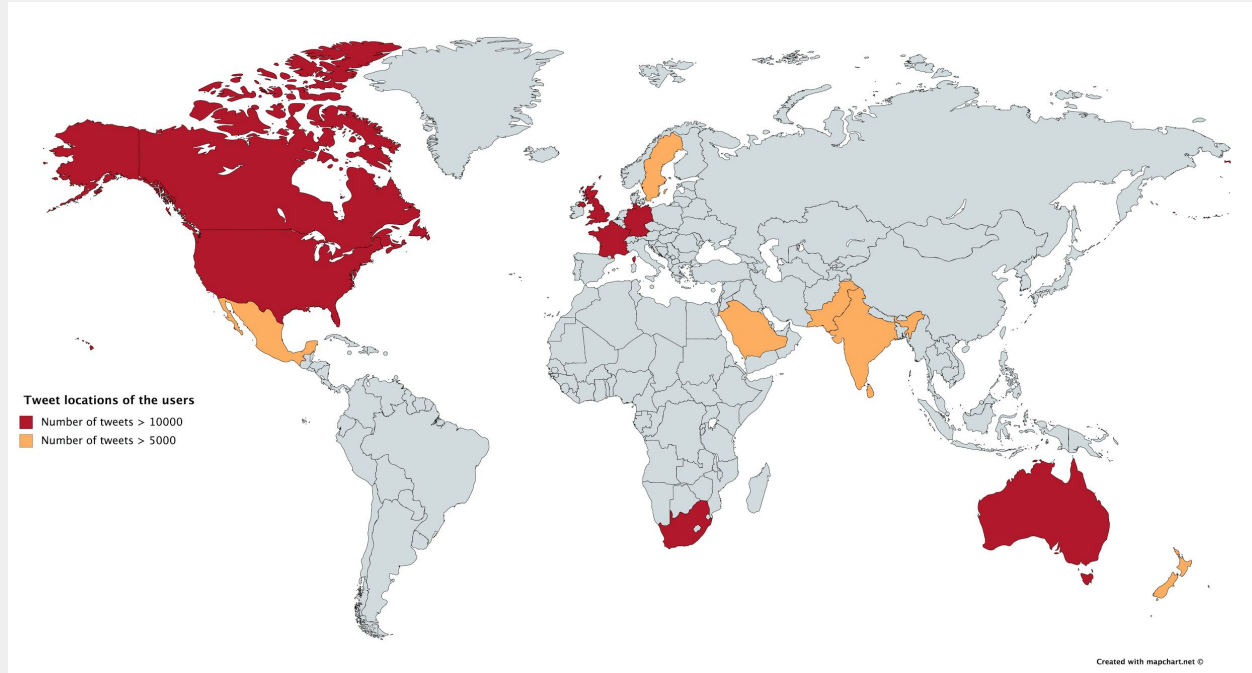
- **Visualization of the plots using choropleth maps**

Now, from the GHI report, we have the severity scale from which we can determine the extent of hunger in any given country given its index. We used this information to analyse and compare the current and predicted trends with the WDI trends.



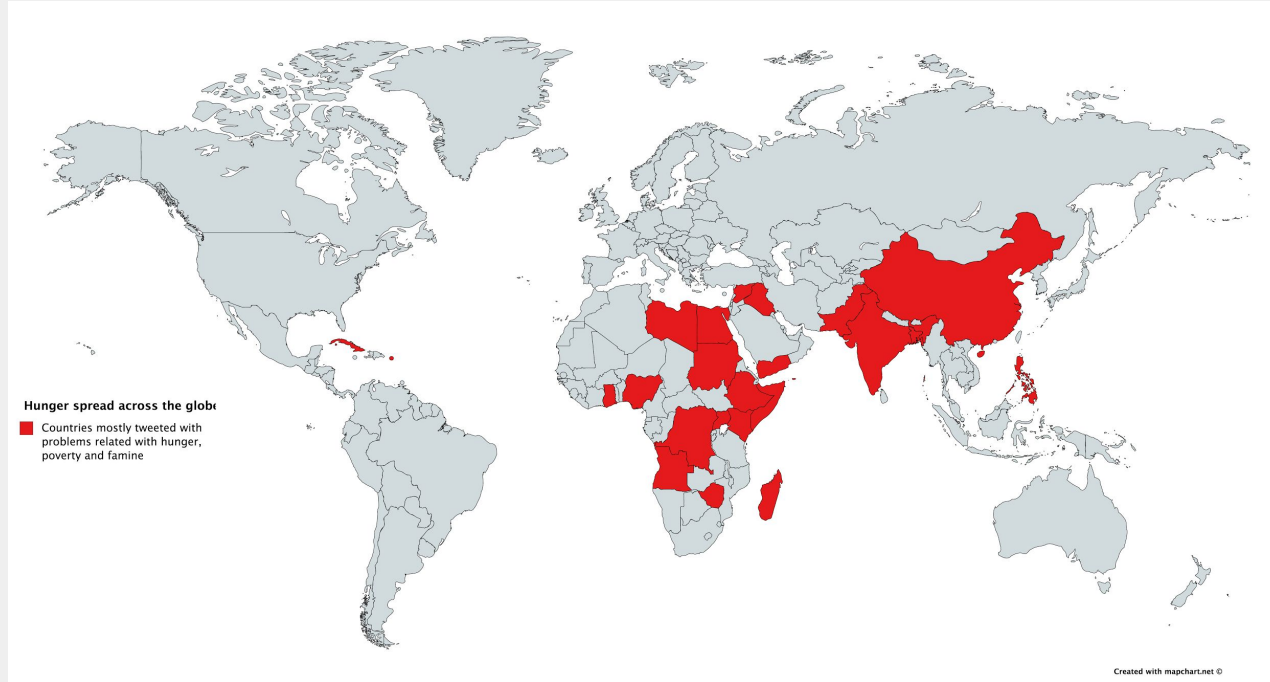
{ RESULTS / EVALUATION }

1. Twitter Data Analysis - (a) Tweet locations of users discussing world hunger*



(* in past 7 days and locations where English is a common language)

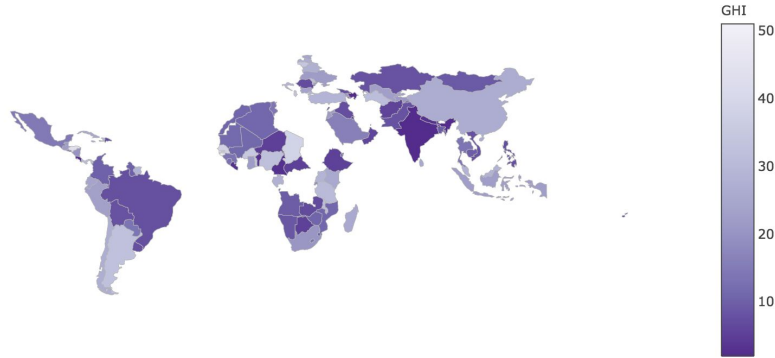
(b) Locations that are being discussed about in the tweets*



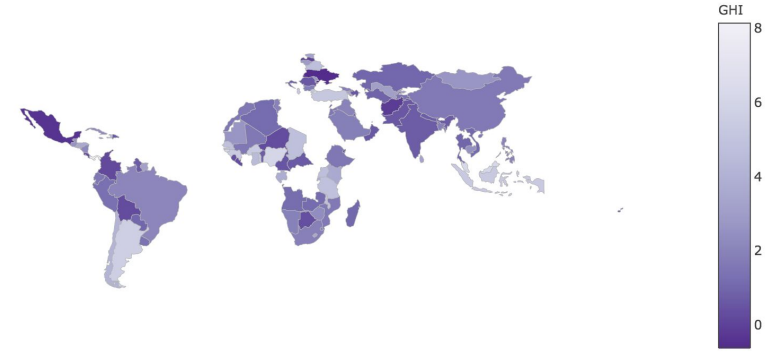
(* in past 7 days)

2. Plots for Global Hunger Index (GHI) and World Development Indicator (WDI) for 2015 and predictions for 2032

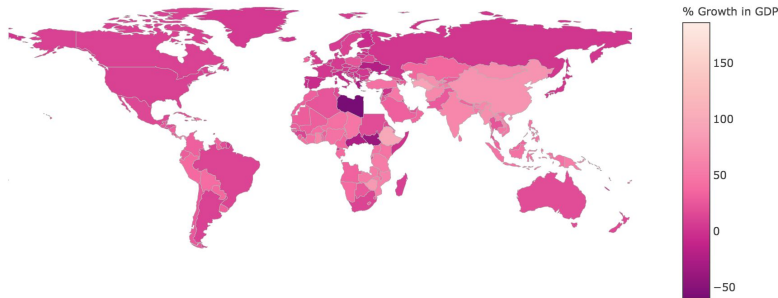
Global Hunger Index - 2015



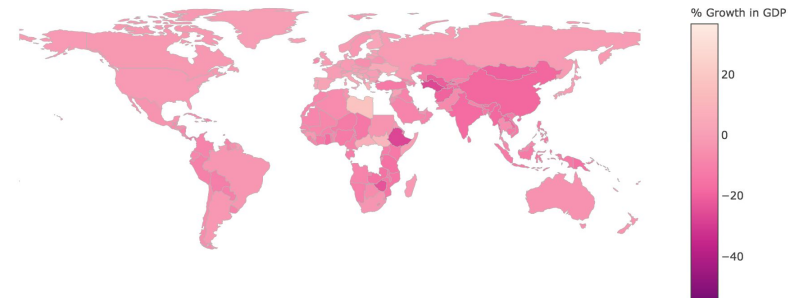
Global Hunger Index - 2032



World Development Indicator - 2015

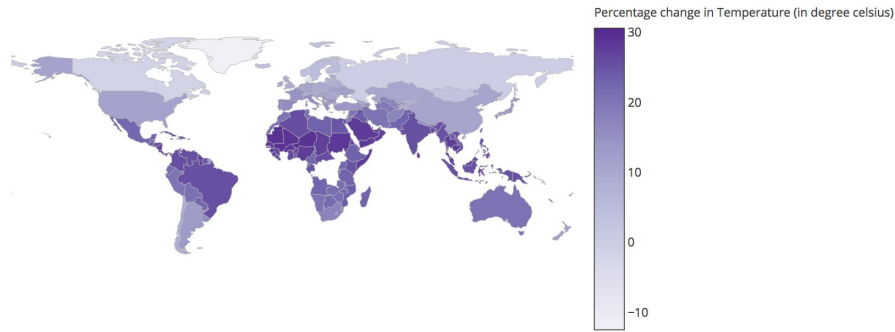


World Development Indicator - 2032

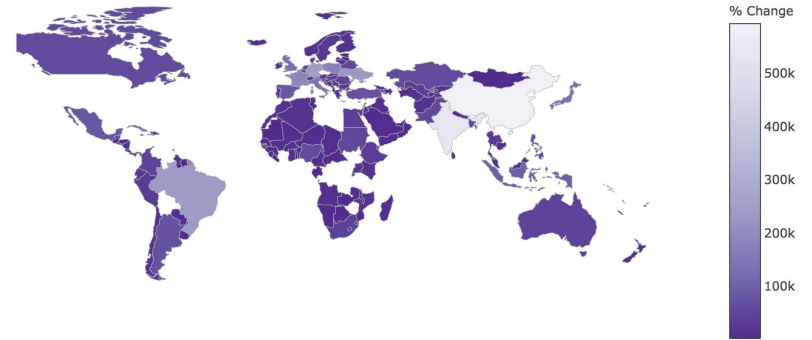


3. Plots for % Change in Global Surface Temperature and Domestic Food Supply for all countries

Change in Global Surface Temperature



Change in Domestic Supply

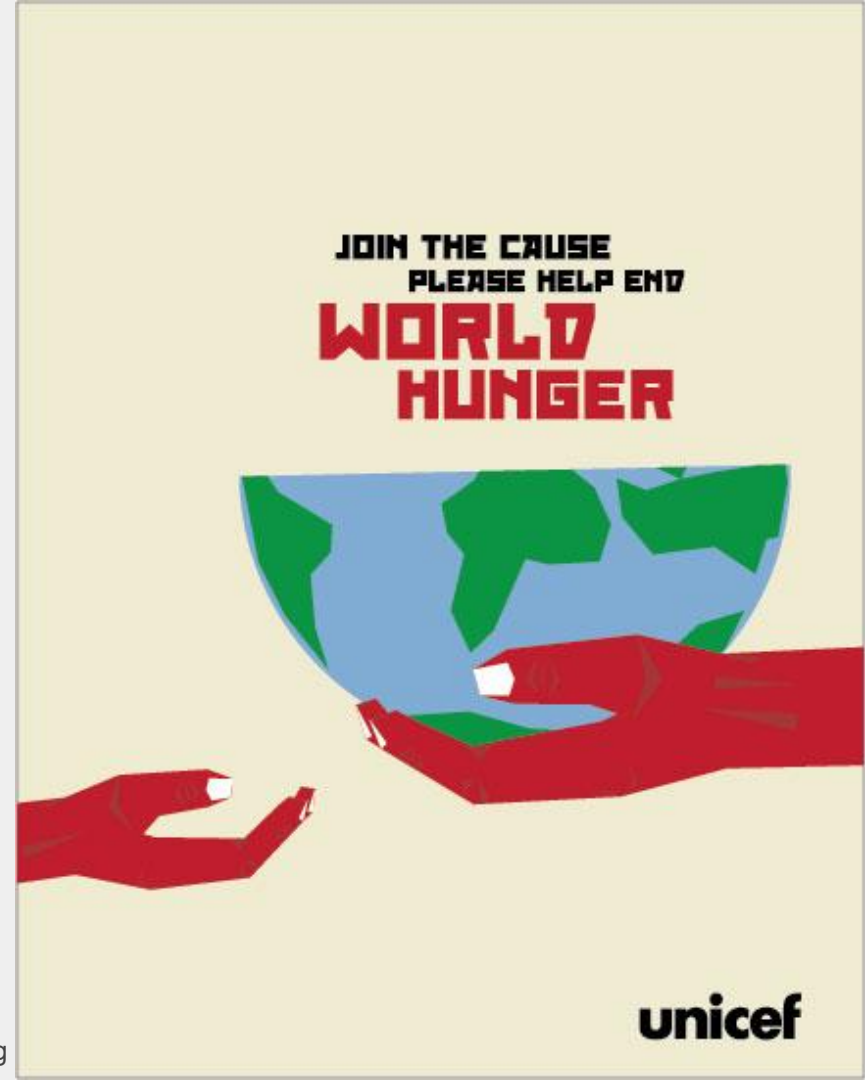


{DISCUSSION: WHAT CAN WE LEARN }

- Twitter analysis showed that most tweets related to hunger are made from **developed countries** such as USA, UK etc. indicating their **concern towards the problem.**
- Also, **hunger is currently more prevalent in African countries** like Yemen and Syria, which are facing social as well as political turmoils.
- We can see that growth in **GDP is correlated with the country's hunger population.** Yet, this correlation is not necessarily causation.
- There is also a **strong correlation between the climate change and the food production.**

{ CONCLUSION: OUR CONTRIBUTION }

- We addressed world hunger and talked about its prevalence.
- We looked at correlation of different factors that are linked with hunger.
- We have done our analysis using Big Data Techniques - Spark, streaming algorithms, social media text analysis, ridge regression, and distributed Tensor Flow.



{ REFERENCES }

- [1] <http://www.fao.org/faostat/en/#data/FBS>
- [2] <https://data.worldbank.org/data-catalog/world-developmentindicators>
- [3] <https://developer.twitter.com/>
- [4] <https://www.kaggle.com/berkeleyearth/climate-change-earth-surface-temperature-data>
- [5] <http://www.ifpri.org/topic/global-hunger-index>
- [6] <http://www.ifpri.org/publication/2017-global-hunger-indexinequalities-hunger>
- [7] <http://adilmoujahid.com/posts/2014/07/twitter-analytics/>
- [8] <http://www.geeksforgeeks.org/bloom-filters-introduction-andpython-implementation/>
- [9] <https://developer.twitter.com/en/docs/tutorials/consumingstreaming-data>
- [10] <https://spark.apache.org/docs/2.2.0/rdd-programmingguide.html>
- [11] <https://www.wfp.org/stories/what-causes-hunger>
- [12] <http://www.bread.org/what-causes-hunger>
- [13] <https://www.weforum.org/agenda/2015/09/4-ways-countriesare-successfully-fighting-hunger/>
- [14] <https://developer.twitter.com/en/docs/tweets/rules-andfiltering/guides/how-to-build-a-query>
- [15] <https://mapchart.net/>



THANK YOU :)