Twitter-COMMs:
Detecting Climate, COVID, and Military Multimodal Misinformation

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The image was taken in New Orleans during the 2013 Super Bowl (Source, AP News Fact Check).

This photo shows a street parade in Switzerland before the COVID-19 pandemic (Source, AP News Fact Check).

This video footage taken from a video game (Source, Snopes Fact Check).
Overview

1. We present **Twitter-COMMs**: a large-scale dataset of 884k *multimodal* tweets.
2. We select topics that are commonly targeted by misinformation: Climate Change, COVID-19, and Military.
1. We train on this dataset to detect *out-of-context social media images*. 
Dataset Collection

Key ingredients for data collection

- We collected using the Twitter API
- To maintain topical relevance we used keywords and news organizations
- For military vehicles we curated a dataset of vehicle and aircraft names and images, and trained an image classifier to filter to only images of military vehicles/aircraft
Dataset Collection

Climate Change

Did you miss the @NPA2014_2020 #SMARTrenew #EUGreenWeek event! The Role of Geothermal Energy in the Net Zero Transition? Catch up with the session recording: https://youtube.com/watch?v=X4pSMN-Uh4w #climateaction #climatet Change #cleanenergy #energytransition #renewables #renewableenergy

Military Vehicles

Leopard-2A5s of the 2nd Battalion, 1st Warsaw Armoured Brigade of the Polish Army during the evaluation training. #PolishArmy #Leopard2

COVID-19

Second-biggest single-day spike takes Covid19 cases in India to over 1.1 lakh. Read more: https://hindustantimes.com/india-news/second-biggest-single-day-spike-takes-covid-19-cases-in-india-to-over-1-1-lakh/story-eDqlpY7L9DVgxOuZyFc0aP.html

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**THE VIRUS THREAT IN INDIA**

| Name of State / UT          | Total Confirmed cases | Discharged/ Migrated | Death |
|----------------------------|-----------------------|----------------------|-------|
| ANDAMAN & NICOBAR ISLANDS  | 33                    | 33                   | 0     |
| ANDHRA PRADESH             | 2602                  | 1640                 | 53    |
| ARUNACHAL PRADESH          | 1                     | 1                    | 0     |
| ASSAM                      | 170                   | 48                   | 1     |
| BIHAR                      | 1674                  | 571                  | 10    |
| CHANDIGARH                 | 202                   | 57                   | 3     |
| CHHATTISGARH               | 115                   | 59                   | 0     |
| DADRA AND NAGAR HAVELI     | 1                     | 0                    | 0     |
| DELHI                      | 11085                 | 1465                 | 127   |
## Dataset Statistics

|                  | Pristine | Falsified - Random | Falsified - Hard |
|------------------|----------|--------------------|------------------|
| Climate Change   | 25%      |                    |                  |
| COVID-19         | 63%      | 25%                | 75%              |
| Military         | 12%      |                    |                  |
| Total            |          | 2,468,592          |                  |
COVID test fee fixed at $50 for all ECOWAS nationals, says FG | TheCable #COVID19

Approach

Radford et. al., Learning Transferable Visual Models from Natural Language Supervision, Arxiv 2021.
Experiments

Probability of Detection, High Precision Regime

![Bar chart showing PD@0.1FAR for Dev (Machine-Curated) and hTwitter (Human-Curated) with comparisons to Zero Shot CLIP and Ours.]
Experiments
Dev Accuracy, Tweet Topic

Climate Change
- Cross-Cluster: electric vehicles, recycling
- Within-Cluster: ocean, flooding

The graph shows the accuracy at EER for different topics:
- Climate Change
- COVID-19
- Military

The accuracy is indicated by the heights of the bars, with cross-cluster, within-cluster, and average accuracy displayed for each topic.
Conclusion

- We present **Twitter-COMMs**, a multimodal dataset of tweets discussing Climate Change, COVID-19, and Military.
- We demonstrate its efficacy on an *unseen evaluation set* of out-of-context images where we only know the high-level topics.
- We analyze how specific topics and subtopics affect detection difficulty.
Thank you!

https://github.com/GiscardBiamby/Twitter-COMMs
https://arxiv.org/abs/2112.08594