Team Name: Crisis in Twitter

Project Title: Classifying Crisis-Related Tweets

Project Summary:
During times of crisis, valuable real-time data is produced on social media platforms such as X (formerly known as Twitter). Such data can be used for real-time detection of emerging crises and analyzing public sentiment, which are critical for improving situational awareness and disaster mitigation.

Building upon recent work by Katalinić and Dunđer (2025), this project aims to reproduce and extend their **neural network–based sentiment analysis and anomaly detection** system for crisis-related tweets. The motivation is to explore how deep learning can detect unusual spikes or shifts in online discussions that may indicate developing emergencies. From a research perspective, this task is challenging due to the noisy, short, and highly dynamic nature of social media data, which requires models that can handle temporal patterns and contextual semantics.

Approach:
We will implement and extend the models described in Katalinić & Dunđer (2025) based on their methodology section. The project will focus primarily on the **anomaly detection** component, which the authors approached using **autoencoders** and an **LSTM with an attention mechanism**. We will start by reproducing their architecture and evaluation pipeline using publicly available crisis-related Twitter data. For the sentiment analysis module, we will employ a **pretrained BERT model** to extract sentiment labels, which will serve as input signals for the anomaly detection models. The core of our experimentation will involve tuning the architecture (number of layers, hidden dimensions, activation functions, and attention size).

Resources/Related Work:
There has been extensive previous work and the development of several datasets focused on crisis-related tweets. The CrisisNLP corpus (Imran et al., 2016) and CrisisBench (Alam et al., 2020) provided foundational benchmarks for humanitarian and crisis tweet classification, enabling researchers to systematically analyze and model crisis communication patterns on social media. Building on these resources, Yasin Kabir et al. (2019) introduced a deep learning–based framework for tweet classification and rescue scheduling, demonstrating how neural models could enhance the efficiency of disaster response and resource allocation. More recently, McDaniel et al. (2024) explored zero-shot classification of crisis tweets using instruction-finetuned large language models (LLMs), highlighting the potential of modern LLMs to generalize effectively without task-specific training data. The focal paper, Katalinić & Dunđer (2025), further advanced this line of research by systematically comparing traditional machine learning approaches with deep learning methods, showing that neural network models achieve superior performance in sentiment analysis and anomaly detection for crisis-related tweets.

[1] Twitter as a Lifeline: Human-annotated Twitter Corpora for NLP of Crisis-related Messages, Imran et al.

[2] Yasin Kabir et al. (2019). A Deep Learning Approach for Tweet Classification and Rescue Scheduling for Effective Disaster Management

[3] CrisisBench: Benchmarking Crisis-related Social Media Datasets for Humanitarian Information Processing, Alam et al.

[4] McDaniel et al. (2024). Zero-Shot Classification of Crisis Tweets Using Instruction-Finetuned Large Language Models

[5] Neural Network-Based Sentiment Analysis and Anomaly Detection in Crisis-Related Tweets, Katalinić et al.

Datasets:
Turkey and Syria Earthquake Tweets dataset:
https://www.kaggle.com/datasets/swaptr/turkey-earthquake-tweets

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