StormCast LSTM

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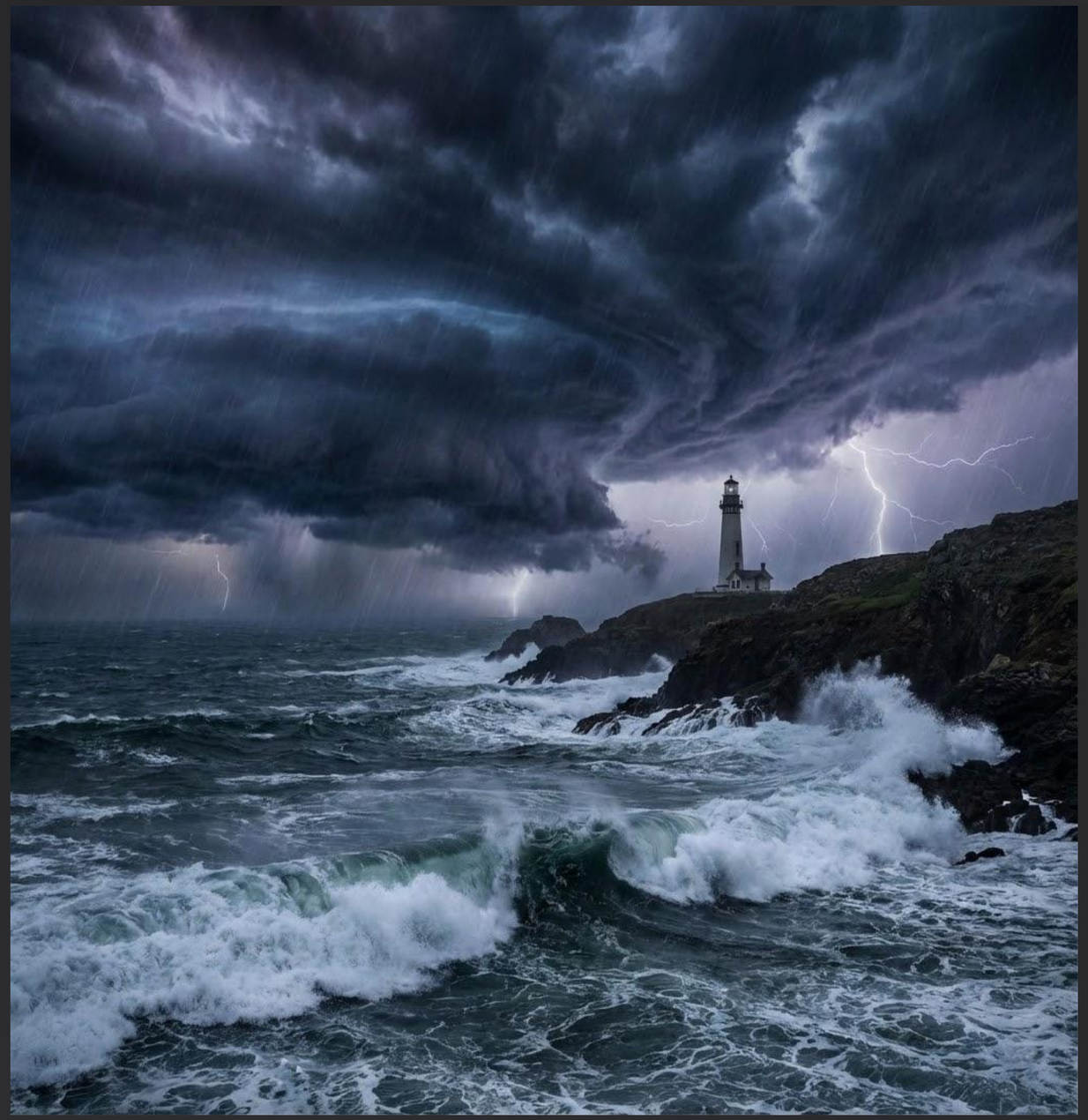

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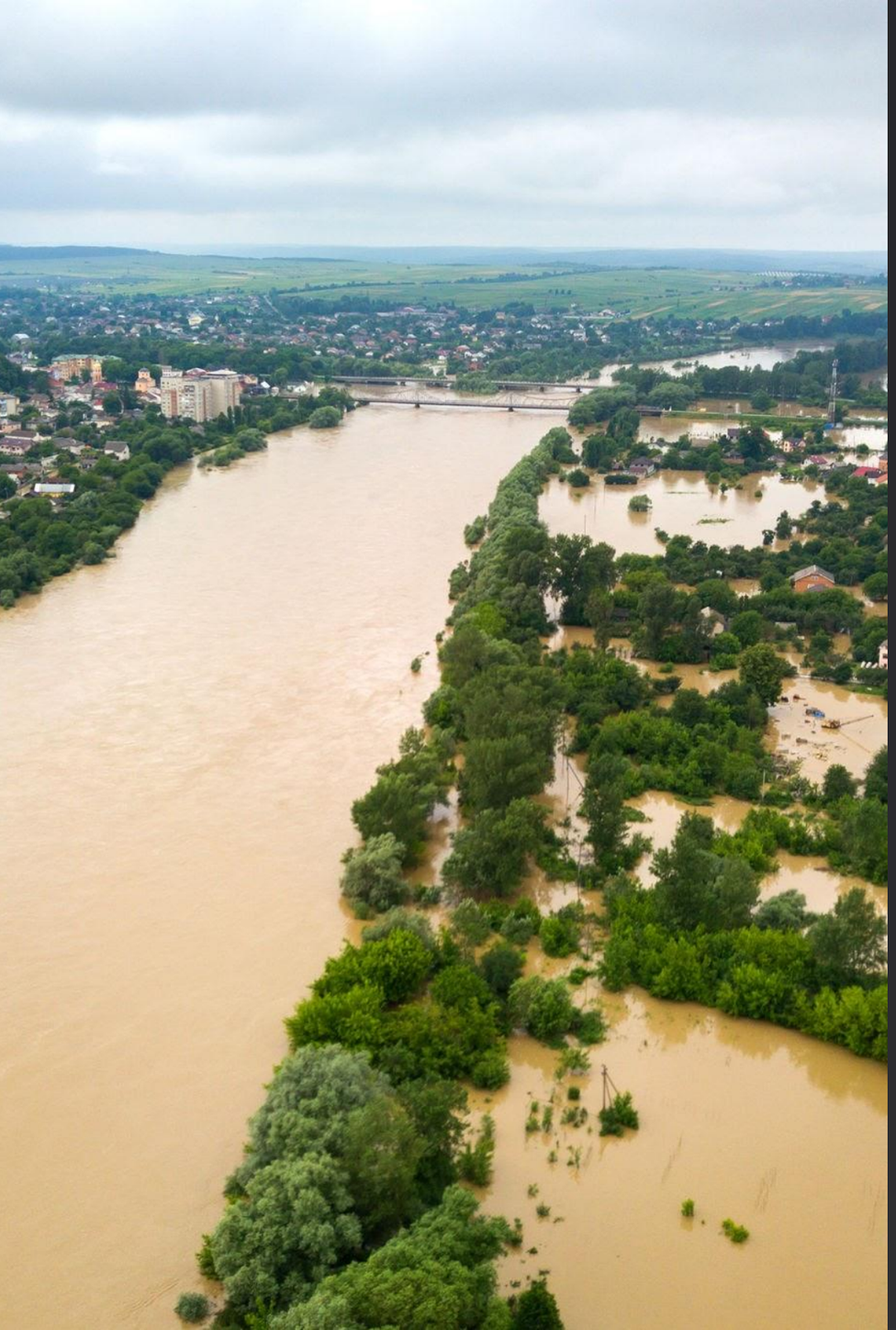


Introduction

Goal

Provide accurate predictions of Severe weather events, critical for flash flood warnings and disaster preparedness

What does it use to predict?

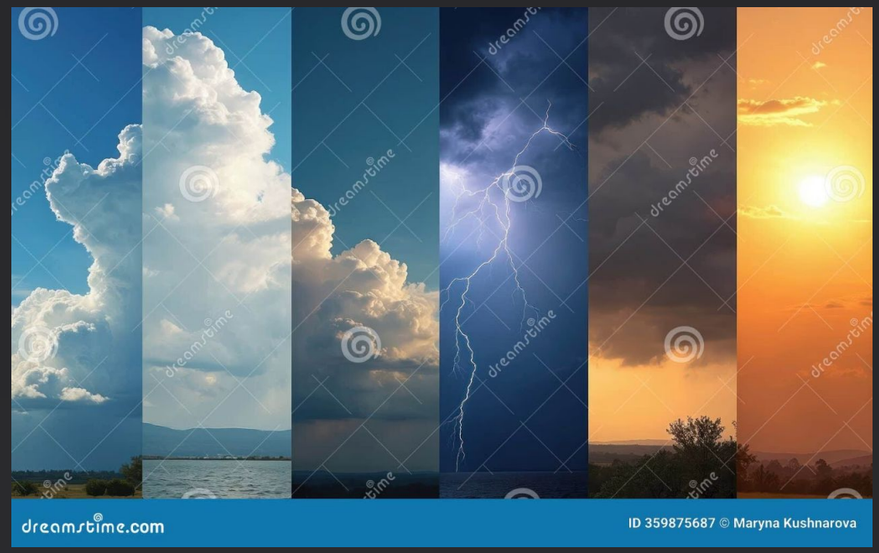
- Rainfall amount
- Storm intensity
- Historical atmospheric data.

Saving Lives & Billions

Timely alerts are crucial. They save lives, prevent injuries, and significantly reduce billions in damages every year.

Methodology

- **Dataset**: USA Rainfall Prediction Dataset (2024-2025) (Kaggle) (Temperature, Humidity, Pressure, Wind Speed of Major Cities).
- **Filtering**: Isolated specific geographic locations to maintain temporal consistency.
- **Sequence Generation**: Implemented a Sliding Window technique.
- **Input**: 14-day history (Lookback).
- **Target**: Day 15 rainfall amount (Regression) or Rain/No-Rain status (Classification).
- **Train/Test Split**: Time-based splitting (first 80% for training, last 20% for testing) to prevent "data leakage" from the future.



Architecture Overview

Model

Long Short-Term Memory (LSTM) Network.

Core Components

Input Layer

LSTM Layer 1 - Extracts temporal patterns

Dropout (20%) - Prevent memorization

LSTM Layer 2 - Condenses to summary

Output

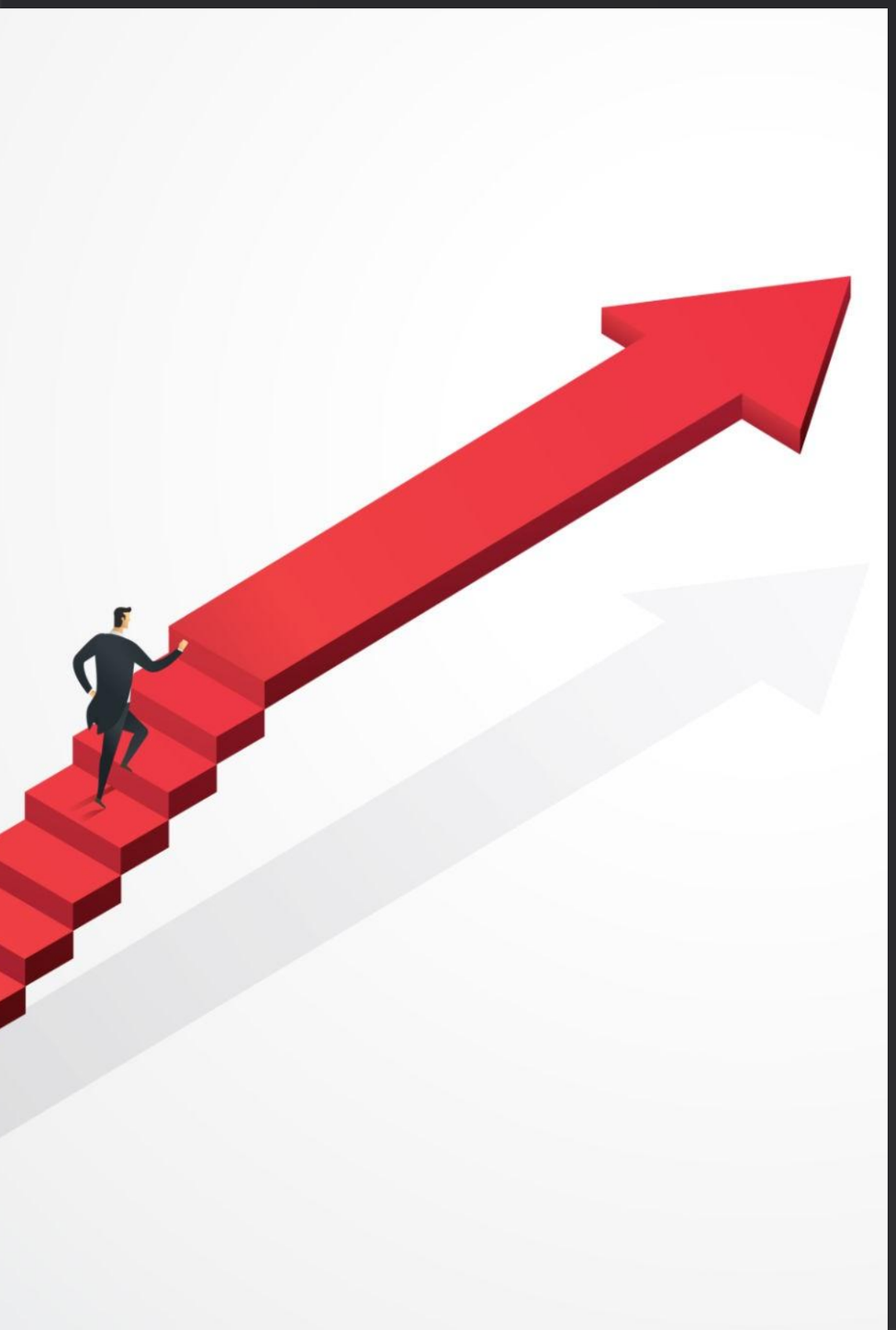
Regression - Predict continuous rainfall amount

Classification - Predict the probability of storm

Emergency Services Integration

We will have ideas on how to implement this in the future so people will be able to be alerted of a severe weather upcoming.

Demo



Future Improvements & Innovations

Dataset

We did use a csv from Kaggle and in order to get an accurate description we could transition to PostgreSQL. (Severe Weather Data from NOAA)

Frontend

Our Project so far doesn't have any frontend so showing our data from the machine learning to a user-friendly format to the public.

Multilingual & Accessibility

Develop comprehensive multilingual support and robust accessibility features, ensuring broader reach and inclusivity for all users.

Alerts

We feel as the average person would more than likely just not download the application, so entrusting to local, state, and even national leaders to alert their public about upcoming severe weather.

Together, Building a Safer Tomorrow

Severe weather is inherently unpredictable, but our collective response doesn't have to be. With advanced technology, we can transform uncertainty into informed action.

Little changes to what we have done could in fact be the next best lifesaver. It is amazing what learning models and AI can do to help us.