Turbulence Prediction using NEXRAD Weather Radar Data

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Background

Goal

- Detect **Clear Air Turbulence (CAT)** with a Machine Learning model
- Display turbulence predictions in an easily comprehensible manner

Why?

- CAT is dangerous for passengers
- CAT is costly for airlines to avoid
- Climate change is making CAT worse

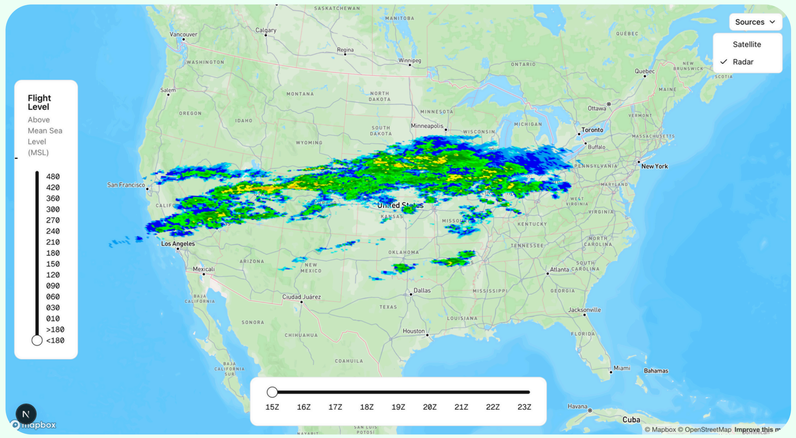
Sponsor

- WeatherExtreme Ltd, a world-wide leader in weather consulting, advising, and research

Target Consumers

- Pilots and air traffic controllers
- WeatherExtreme
- Interested Air Travelers
- Aviation enthusiasts

Design Interface



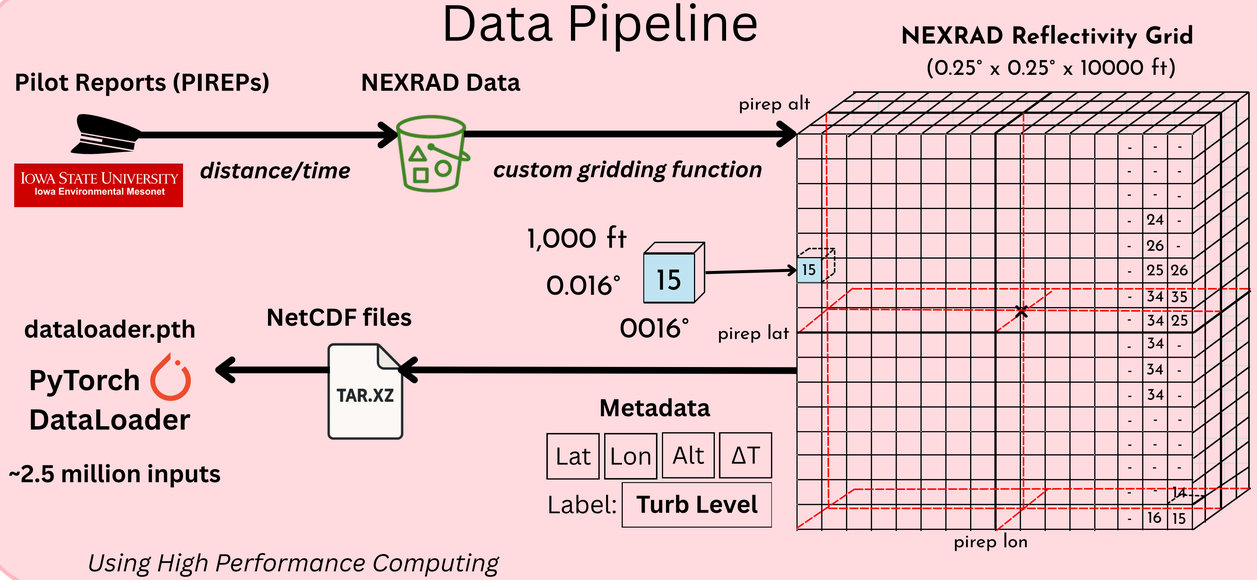
UI based on Aviation Weather Center

mapbox NEXT.JS

NEXRAD Level 2 Data

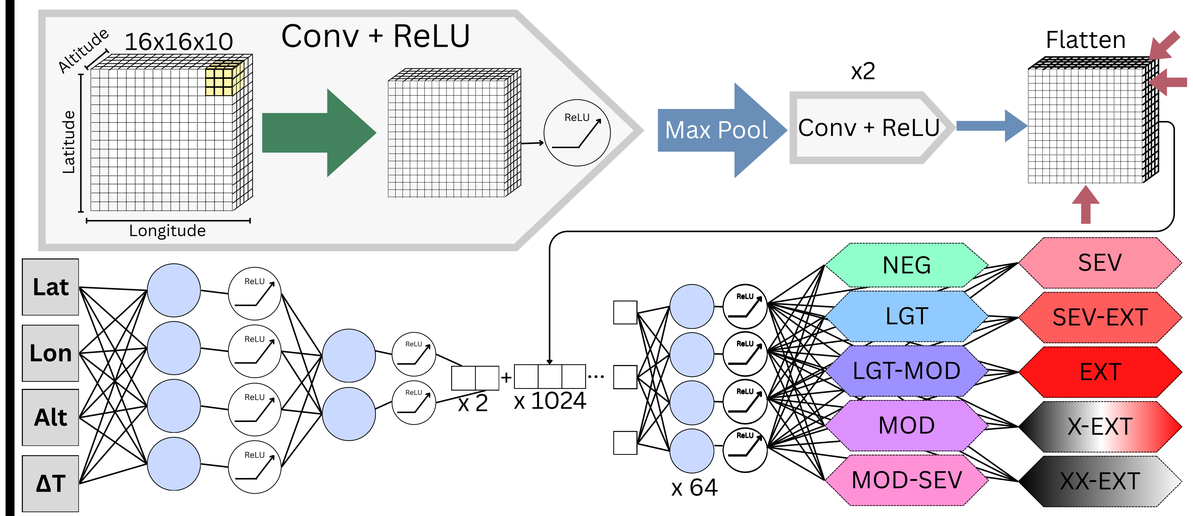
- **NEXRAD -** NEXt Generation Weather RADar System
  - 160 Doppler weather radars across the United States
- **Reflectivity (dBz) -** Indicates airborne particles (e.g., dust, rain, bats)

Data Pipeline

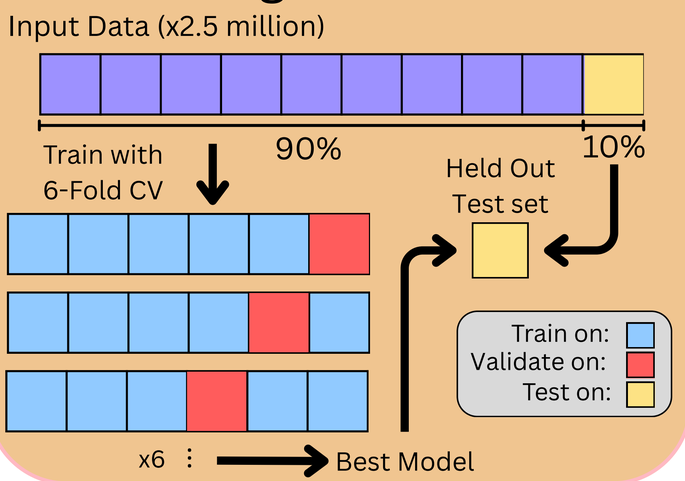


Using High Performance Computing

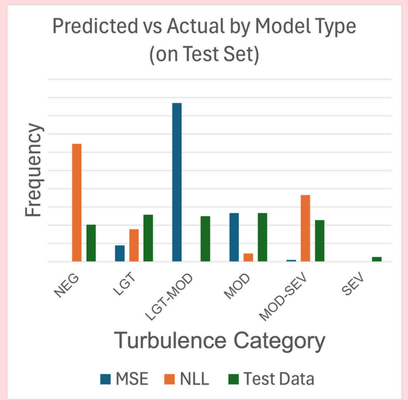
Model Design



Program Flow



Results



Future Work

- Integrate different data sources such as soundings and satellite data
- Upgrade model to be improve predictions in the future (up to 8 hours)
- Include spectrum width and other NEXRAD products as input to model
- Experiment with more complex model architectures

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