

AI TOOLS

ARTIFICIAL INTELLIGENCE



National Weather Center
University of Oklahoma



Artificial intelligence and machine learning have enhanced weather prediction modeling at an incredibly rapid rate. Rather than relying on physics alone to predict severe weather conditions, AI learns from historical data to give forecasters a glimpse into what storms may form. AI data is a valuable tool that human forecasters use along with traditional weather models.

CIWRO researchers are on the forefront of AI advancements in the prediction of weather hazards. WoFSCast is trained to emulate the groundbreaking Warn-on-Forecast System

model, which combines radar, satellite, and on-the-ground observations. With WoFSCast, forecasts can be generated much faster with less computing power and provide insight on tornadoes, flash flooding and extreme winter weather.

CIWRO's broad array of projects incorporating machine learning support the mission of NOAA to capitalize on the capabilities of AI. Researchers at CIWRO also use AI to boost data quality. Birds, insects, and wind turbines are known for contaminating radar images. Multiple projects successfully utilize AI to filter these objects for weather forecasting.

DETERMINING PROBABILITY

The Tornado Probability algorithm (TORP) is a product that uses AI to quickly summarize radar data to determine the tornado potential of severe storms. Developed by CIWRO, this innovative algorithm works by generating complex wind rotation calculations. TORP is designed to assist forecasters in making timely and accurate tornado warning decisions. TORP tornado probabilities have been made available to National Weather Service forecasters in real time, and have been successfully used to influence warning decisions, letting forecasters easily pick out intensifying storms and gain confidence in their decision making.



24

AI-enhanced severe weather projects since 2021

8

AI products ready
or transitioned
since 2021

10

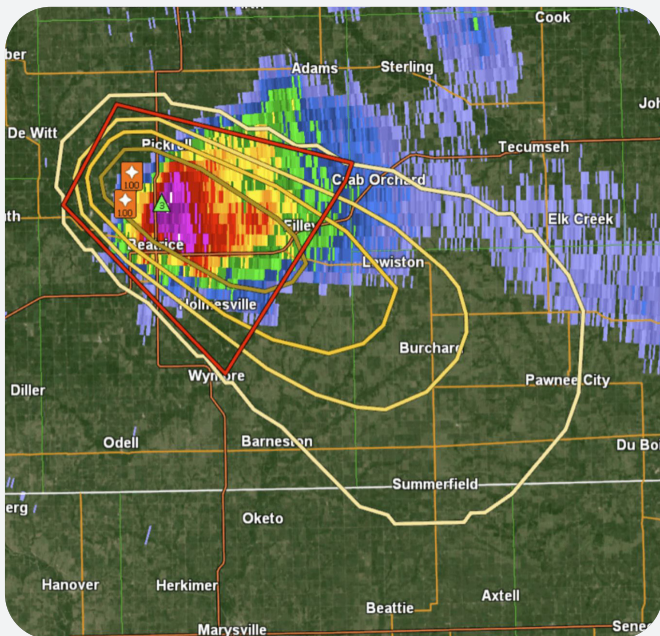
testbed
experiments
since 2021

91

conference
presentations
since 2021

17

undergraduate & graduate students mentored since 2021



DIMINISHING GUESSWORK

CIWRO researchers use machine learning to combine multiple prediction systems — such as the Warn on Forecast System, ProbSevere, and TORP — into a single severe weather likelihood product. Warn on Forecast System - Probabilistic Hazard Information (WoFS-PHI) updates every five minutes, meaning forecasters get rapid updates on severe weather threats like tornadoes, hail, wind and lightning. WoFS-PHI stands out. It offers forecasters probabilities that move with the storms.

In the radar image on the left, the distinct rounded yellow polygons indicate the likelihood that an area will receive severe weather. The darker the polygon, the greater percentage chance that area will be affected. Using the PHI information, a forecaster has issued a tornado warning in red.



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