

Using artificial intelligence to better predict weather

Researchers create AI algorithm to detect cloud formations that lead to storms.

By **Pranjal Mehar** - July 2nd, 2019



Image: Pixabay

Meteorologists use shapes and movements of clouds in satellite images as indicators of noteworthy types of severe storms. However, as satellite image data are in progressively lower resolution, both spatially and temporally, meteorologists can't completely use their forecasts.

Now, a team of scientists at [Penn State](#), [AccuWeather](#), Inc., and the University of Valencia in Spain has developed a computer model that can help weather forecasters to predict the potential of severe storms all the more rapidly and precisely. The computer model is based on machine learning linear classifiers that identify rotational movements in satellite images that may have otherwise gone unnoticed.

During the study, scientists worked with Wistar and other AccuWeather meteorologists.

more than 50,000 historical U.S. weather satellite images. In them, experts identified and labeled the shape and motion of 'comma-shaped' clouds. These cloud patterns are associated with cyclone formations, which can lead to severe weather events including thunderstorms, high winds, and blizzards.

Then by using machine learning algorithms, scientists taught computers to automatically recognize and detect comma-shaped clouds in satellite images. The computers can help experts by pointing out in a real-time where, in an ocean of data, could they focus in order to detect the onset of severe weather.

Steve Wistar, a senior forensic meteorologist at AccuWeather, [said](#), "Having this eye toward potentially threatening formations could help him to make a better forecast."

"The very best forecasting incorporates as much data as possible. There's so much data because the atmosphere is infinitely complex. By using the models and the data we have, we're taking a snapshot of the most complete look of the atmosphere."

With 99% accuracy, the system effectively detected comma-shaped clouds at an average of 10 seconds per prediction. It was also able to predict 64 percent of severe weather events, outperforming other existing severe-weather detection methods.

Rachel Zheng, a doctoral student in the College of Information Sciences and Technology at Pennsylvania State University, [said](#), "Our method can capture most human-labeled, comma-shaped cloud formations. Our method can detect some comma-shaped clouds before they are fully formed, and it can do so sometimes earlier than human eye recognition."

Wistar [said](#), "The calling of our business is to save lives and protect property. The more advanced notice to people that would be affected by a storm, the better we're providing service. We're trying to get the best information out as early as possible."

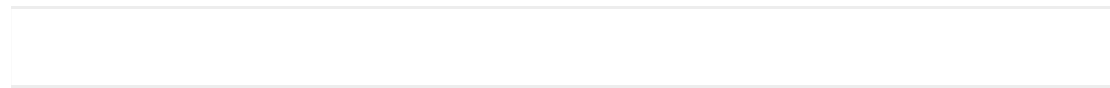
Wang [said](#), "We recognized when our collaboration began [with AccuWeather in 2015] that a significant challenge facing meteorologists and climatologists was in making sense of the ever-increasing and continually increasing amount of data generated by Earth observation satellite and ground-based sensor networks."

"It is essential to have computerized systems analyze and learn from the data so that we can provide a timely and proper interpretation of the data in time-sensitive applications such as weather forecasting."

“This research is an early attempt to show the feasibility of artificial intelligence-interpretation of weather-related visual information to the research community. integrate this approach with existing numerical weather-prediction models and o models will likely make the weather forecast more accurate and useful to people

In addition to Zheng, Wang and Wistar, the research team included Yukun Chen, student in the College of IST; Jianbo Ye, former doctoral student in the College c current applied scientist at Amazon Lab 126; Jia Li, professor of statistics in Peni College of Science; Jose Piedra-Fernandez, collaborating faculty member at the l Almería, and Michael Steinberg, senior vice president at AccuWeather, Inc.

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