How Seattle is building weather-predicting tech to spot heat waves

August 3 2022, by Renata Geraldo

Credit: CC0 Public Domain

Seattle weather was in the sunny 70s in mid-July when weather forecasters saw the heat wave that has driven 90-degree highs last week was on its way.

That's a change from decades past, when heat could hit or miss by surprise. Advances in technology and technique have turned weather into a booming piece of the tech sector with satellites, radars and developments in artificial intelligence.

Forecasters today can tell what the weather will be with more accuracy and longer lead times thanks to a much improved system of weather satellites and increasingly complex algorithms. The opportunity for artificial intelligence-driven advances and the growing intensity in catastrophic weather events due to climate change have drawn more innovators and entrepreneurs into weather forecasting, claiming they have access to more information than ever before.

The heat wave that hit the Pacific Northwest was predicted early through data from the satellites that measure the atmosphere over parts of the Pacific Ocean, said University of Washington state climatologist Nick Bond. The satellites gathered data on humidity, temperature and wind, and computers analyzed those conditions through complex equations that predicted that the heat would soon hit the region.

"It's really pretty remarkable what we can do in that way, from satellites that are way above the air looking down," Bond said.

The models are not easy to build. According to journalist Andrew Blum in his book "The Weather Machine," "Landing a spacecraft on Mars requires dealing with hundreds of mathematical variables. Making a global atmospheric model requires hundreds of thousands."

Bond said weather-prediction technology was able to accurately forecast the 2021 Pacific Northwest heat wave that lasted from the end of June to the beginning of July. The heat wave resulted in at least 100 heat-related deaths, according to the Washington State Department of Health.

Forecasting has always had a level of uncertainty. For example, it is difficult to predict rain because it can be spotty and hit different parts of the geographical grid forecasters analyze to tell the weather. And as extreme events such as thunderstorms and tornadoes become more intense because of climate change, forecasting becomes even more challenging, Bond said.

The challenge, he said, is forecasting early enough for people to prepare or evacuate.

While the National Weather Service has long been, and continues to be, the dominant player in U.S. forecasting, private-sector companies including Microsoft are pursuing technologies they believe can deliver more accurate, more prescient weather reports.

Last year, Microsoft entered into agreements with the U.S. Army Corps of Engineers and the U.K.'s national weather service to build technology that will help in modeling storms and other extreme weather.

Startups specializing in weather forecasting are also rushing into the space. Cambridge, Massachusetts-based Salient Predictions raised $5.3 million in seed funding. Salient claims its technology is more accurate than that offered by other companies and governments.

When Erik Moldstad founded Seattle-based Precision Forecasting in 2003, private weather forecasts were rare and hard to access. Moldstad's company emails them to a list of paying subscribers every morning. Now, he said, boutique forecasts and satellite images are everywhere and available to almost everyone.

"There was some internet information back then, but most information (forecast models, satellite imagery) was available only via a subscription," Moldstad said. He said the internet has made weather

forecasting more widely available.

Moldstad said he uses information from radars, weather stations and satellites to create the daily reports he sends to clients. The reports note the weather from the previous day, the current weather and the next day's forecast.

But new technologies aim to advance the lead times and accuracy of the existing models. Testifying in Congress last month, Brad Colman, director of weather strategy at Bayer, says that "there is some slowing of forecast skill improvement across all major global modeling efforts," as the technology is reaching its limits. Bayer has a subsidiary, The Climate Corporation, that focuses on crop development.

Colman said that a system that includes oceans, glaciers and land models would contribute to expanding forecasting skills, as the data would be available with longer lead times.

Artificial intelligence has been growing in the forecasting space for the past three years with promise to increase weather accuracy, said UW professor Dale Durran.

The computers that process datasets from satellites are limited in how much they can digest, and it can take a long time. AI would use more data from, for example, stressed crops, and process it more quickly as the machine learns from similar weather patterns that can be applied to the current weather, Durran said.

The technology is still in development and can't be used yet, he said, but it shows promise that forecasting can become more accurate. The lead time for forecasting, however, has a limitation that AI can't yet solve. Weather, Durran said, is just "too chaotic."

Still, [weather](#) forecasting has improved significantly since the times when people had to sit down and use equations, Bond said. The models used now were "only dreamed about decades ago."

©2022 The Seattle Times.
Distributed by Tribune Content Agency, LLC.

Citation: How Seattle is building weather-predicting tech to spot heat waves (2022, August 3) retrieved 23 June 2024 from https://phys.org/news/2022-08-seattle-weather-predicting-tech.html