

What the weather is going to be like: artificial intelligence for weather forecasting

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FBK's Elena Tomasi tells Wired Next Fest about the science behind climate studies

Weather forecasts affect our daily lives: whether we are going on a trip or simply figuring out what to wear, we all check weather forecasts. That is why it is important and interesting to better understand the science and research behind the weather.

This is what **Elena Tomasi**, a researcher with the FBK Center for Digital Industry's **Data Science for Industry and Physics DSIP** Unit, spoke about in the talk **"What the weather is going to be like"** during the ongoing Wired Next Fest in Rovereto, along with science popularizer **Gianfranco Saffiotti** aka "The Ignorant Weatherman."

More accurate weather models and smart warning systems are capable of improving the resilience of lands and productive activities. To do this we need to apply artificial intelligence models and big data.

The focus of Elena Tomasi's work is the **development of artificial intelligence models in the service of climate weather modeling**, in the context of the [National Research Center in High Performance Computing, Big Data and Quantum Computing](#).

"There is a huge revolution going on right now in the world of weather forecasting thanks to the advent of artificial intelligence in this field in recent years: last year it was shown that there are models based only on data that can provide forecasts with worldwide coverage with a range of up to 25 kilometers faster and more accurately than traditional models," Elena Tomasi recounted.

This new technology for weather forecasting has been adopted thanks to the availability of observations of our planet, i.e. data from satellites and radars, combined with all the knowledge coming from atmosphere physics modeling: on top of these two areas combined, the last element that was missing were sufficiently powerful processors that would allow the development of these models, and now, thanks to artificial intelligence, it is possible to have computation power and

speed that until a couple of years ago were impossible to achieve.

These approaches aim both to improve the spatial and temporal resolution of forecasts and to extend them in time, and one field of application of this type of environmental modeling is pre-warning systems.

Another area of Elena Tomasi's research concerns the development of **digital twins** of the earth, and during the talk she explained why they are important and useful: *"to study a problem, we humans have always tried first to recreate it on a smaller scale and test it on a model. Obviously, for the earth it is not possible to make a real model, but we can make a digital one using the knowledge we have about the evolution of oceans, land and the atmosphere. By combining this information through artificial intelligence, we can make a model on which we can make simulations of how the earth system as a whole will evolve: what happens if we continue to increase carbon dioxide emissions at the current rate? What happens instead if we manage to lower them?"*

Elena Tomasi and science popularizer Gianfranco Saffiotti aka "the ignorant weatherman" shared an important vision: artificial intelligence applied to this field has been instrumental in achieving new goals that were once considered impossible, now they are working to improve them even further thanks to the realization of **the earth's digital twin**, but all this new knowledge must reach the end user in a usable way, especially policy makers who are in charge of establishing strategies to combat climate change.

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