Evolved Program Consensus Weather Forecasts
OTT ID #1239

TECHNOLOGY

Consensus forecasts, the simple average of a group of forecasts arrived at independently but through investigation of the same data, have long been known to be more accurate than individual forecasts. This method of averaging filters out the noise and focuses on the signal that exists in the data. Dr. Roebber has created a method that automates this process by generating algorithms that are as accurate or more skilled than those of individual experts. Using the weather data as input, algorithms evolve by a method called simulated evolution. Probabilistic forecasts, which give the probabilities of different weather events, are determined from the varying range of algorithms. Dr. Roebber also developed his new method to account for the spatial dimension of the data. The approach is based upon predator-prey ecosystem dynamics, in which the predators fill the role of regulators of the population that carries the forecast information. Steady population of a forecast solution carrier is produced, which drives progress towards improved forecast solutions.

This method was developed for and has been used successfully in Dr. Roebber's work in short-term forecasting. It may be used for any weather variable, such as temperature, precipitation, wave height, wind velocity, or severe storms. The evolution of the algorithms is mathematical in nature and has potential for use in long-term forecasting as well as for non-weather forecasting used in fields such as finance and econometrics.

Arranging to have a large group of forecasters available at the same time can be expensive and often impractical, particularly for short-term forecasting. An automated process which needs the supervision of only one trained forecaster brings down the cost and makes short-term forecasts accessible to a greater number of businesses and organizations. Changes in weather can have massive financial implications and businesses make better decisions when they are able to anticipate changes in weather. For example, they can predict customer behavior, optimize ad spending, or prevent disruptions in their supply chains. Combining projected profits and losses with probabilistic forecasts makes it possible for businesses to better manage their risks. Making preparations for a disruptive weather event is often expensive and companies are better positioned to take appropriate action when the probability of such an event is known. The computation time for the forecasts is very short; decisions can be made in real-time.
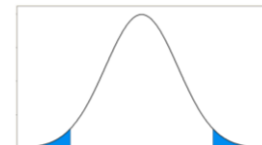
FEATURES/BENEFITS

Fast – Enables decisions to be made in real-time

Improved Accuracy – Forecasts are more accurate than industry benchmarks

Efficient – Easily manages large amounts of data

Less labor intensive – Requires the supervision of only one skilled forecaster

Reliable – Produces consistent results

Dr. Roebber's technology is especially adept at capturing the probabilities of weather events in the tails of the distribution.

USER-FRIENDLY WEBSITE

Dr. Roebber's eventual goal is to create a website that shows the predicted weather forecast for any location globally. This website will be user-friendly and convenient to use to get weather predictions fast. Businesses will be able to use this website to make better decisions affected by changes in weather.

INTELLECTUAL PROPERTY

This technology is a copyrighted work and is part of an active and ongoing research program. We are interested in companies who would like to team up to create a website that can be used globally. We are also interested in licensing the algorithms to weather forecast companies as well as seeking specific companies and industries in need of specialized forecasting. The technology is available for developmental research support and licensing under either exclusive or non-exclusive terms.

MARKETS

The economic applications of weather prediction are diverse and widespread. Retail stores use weather forecasts to stock their shelves in preparation for heat waves and cold snaps. Logistics companies need to know when the fog at the airport will clear to be able to deliver orders on time. Weather prediction is becoming increasingly relevant with the move toward weather-dependent energy sources such as wind and solar power. Temperature is also the primary driver for energy use. A difference of a few degrees can significantly increase the stress on the power grid.

Some estimates state that about $3trillion of U.S. economy is made up of weather-sensitive companies. Therefore, the increasing volatility of the weather introduces more uncertainty to the economy. Accurate weather forecasts are more important than ever and make for better coordination and a smarter marketplace. Using data to make decisions is becoming the norm and research shows that top performing businesses typically have highly effective analytics systems in place. Commercial weather companies that assist with decision-making make up close to half of the $6 billion weather industry (MarketWatch, 2015).

INVENTOR

Dr. Paul Roebber, PhD - Distinguished Professor in the Atmospheric Science Group in the Department of Mathematical Sciences at the University of Wisconsin-Milwaukee. He is the founder and Initiative Administrator of Innovative Weather, a weather forecasting service that provides customized weather information to businesses in Wisconsin and beyond. Additionally, he is the Associate Dean for Academic Affairs at UWM's School of Freshwater Sciences. He received his PhD in Meteorology from McGill University in Montreal; his research interests include synoptic and mesoscale meteorology, climate dynamics, data analysis and numerical weather prediction

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Innovative Weather

Dr. Roebber is the Initiative Administrator of Innovative Weather (IW), a student centered weather service provider at the University of Wisconsin-Milwaukee. IW works to boost the competitiveness of its clients in Southeastern Wisconsin and beyond by integrating company data with weather data to create individualized models for each business. The models for each client are driven by meteorological forecasts produced by forecasters who are trained to understand the unique requirements of each company's operations. Innovative Weather is seeking new clients, particularly companies in Wisconsin, Ohio, Iowa and the Washington D.C. area.