Andrew Coleman

Atmospheric Data Scientist

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Professional summary

Accomplished Atmospheric Scientist and Meteorological Software Developer with 6+ years of experience in weather forecasting and an additional 5+ years in data science and software development. Proven expertise in leveraging Numerical Weather Prediction (NWP) models to forecast weather impacts on critical infrastructure as well as utilizing their data for intuitive data science projects. Skilled in developing predictive models that analyze spatiotemporal weather datasets, with particular strength in feature engineering and exploratory data analysis. Proficient in applying machine learning techniques to large gridded meteorological and physical datasets. By dedicating my professional career to the intersection of atmospheric science and software, I am uniquely suited to bridge the gap between atmospheric science and practical software solutions that address real-world challenges.

Links

Personal Website

LinkedIn

Skills

- Machine Learning/Artificial Intelligence
- TensorFlow/Keras/PyTorch
- Linux/UNIX
- Google Cloud/AWS
- Data Science
- GRIB1/2, NetCDF, Zarr, BUFR, h5, XML, All text formats
- Python, R, JavaScript, HTML, CSS, MATLAB
- Gridded Meteorological Data
- NWP (GFS, NAM, HRR, etc..)
- Remote Sensing Data

Employment history

JUN 2024 - PRESENT

REMOTE

Atmospheric Data Scientist, Riverside Technology at National Centers for Environmental Information

- Led software development under task manager guidance to synthesize climate change-induced extreme precipitation through applied research
- Engineered production-grade code on NCEI Linux VM's to analyze precipitation patterns in GHCNh data through multi-format processing, implementing comprehensive quality control processes to calculate and systematically document Atlas 14 threshold exceedances for climate research initiatives
- Architected high-performance data processing algorithms utilizing parallel computing to analyze Atlas 14 threshold exceedance catalogs and perform spatial analysis to identify stations within 100km radius, determine period of record overlap between stations, and calculate adjacent station precipitation accumulations for Atlas 14 exceeded durations
- Designed and maintained automated processing workflows for generating station-specific precipitation inventories from GHCNh PSV files and developed a consolidated master inventory system for comprehensive data management.
- Led development of data validation scripts to process LCDv2 precipitation data, implementing systematic comparisons between hourly and daily precipitation measurements
- Leveraged Python to analyze datasets of varying size, creating comprehensive CSV summary files to gain actionable insights for effective QC/QA processes and statistical analyses, fostering informed decision-making for our research.
- Established comprehensive technical documentation across all project components, maintaining a detailed GitHub repository with extensive code documentation, methodology explanations, and implementation guidelines for future development and reproducibility
- Developed automated workflows for station-specific precipitation inventories, implementing systematic validation between hourly and daily measurements

AUG, 2022 - MAY 2024

REMOTE

Operational Meteorologist , TruWeather Solutions

- Conducted informative daily shift change briefings to analyze and interpret current synoptic and mesoscale conditions to ensure our team was always on top of the latest weather patterns.
- Produced and delivered compelling daily forecasts to our clients using cutting-edge numerical weather prediction, enabling them to make informed decisions and stay ahead of the competition.
- Provided round-the-clock real-time decision support to clients, ensuring their operations were never impacted by unexpected weather events.
- Generated and distributed timely alerts to clients, allowing them to take proactive measures to mitigate risks during severe weather conditions.
- Provided critical decision support services during Hurricane Irma for Florida Power and Light, issuing 50+ warnings with zero false alarms, directly improving operational performance while ensuring worker safety in hazardous weather conditions
- Developed innovative low-altitude weather visualization tools to predict convection, ceiling/visibility restrictions, and turbulent eddies for Amazon Prime Air drone operations, enhancing forecaster performance and operational decision-making
- Increased efficiency in testing and bug identification within the TruFlite V360 ecosystem ten-fold by utilizing multi-page bug reports and comprehensive documentation.
- Created a user-friendly NWS advisories & warnings web app for our operations team using JavaScript, HTML, and CSS, enhancing their efficiency and productivity.
- Analyzed and processed 2+ years of meteorological satellite data to develop operational forecasting applications for drone operations, specializing in extracting dust storm patterns from multiple satellite observing systems over the Middle East region.
- Built multiple powerful utilities for the Gibson Ridge software suite using Python, making it even more useful for our team and clients.
- Independently designed and implemented a Google Cloud-based verification project, enhancing understanding of the strengths and weaknesses of internal weather models.
- Migrated the verification project/pipeline from the GCP to AWS, utilizing AWS's Lambda, CloudWatch, and EC2 utiltiies.

JUN, 2021 - MAR, 2022

REMOTE

Intern Research Meteorologist, Aeolus Capital Management

- Wrote 30+ python scripts to analyze 25 years of hurricane model error metrics from the Automated Tropical Cyclone Forecasting Tracks Dataset
- Conducted a significant scientific literature review of over 50+ papers for artificially intelligent hurricane track clustering and counterfactual insured loss modeling for natural disasters
- Curated a comprehensive training dataset for a Real-Time artificially intelligent Hurricane Track Clustering Algorithm by acquiring, normalizing, and preprocessing multidimensional hurricane track forecast data from the ATCF and THREDDS archive systems.
- Constructed a Graphical User Interface to process, parse, and output over 600 gigabytes of gridded text files in under 10 minutes for any NCEP reanalysis field at any user-specified time-step, variable, or pressure/sigma level
- Analyzed 2+ years of satellite-derived hurricane data and cloud top temperatures, correlating Atlantic MDR sea temperatures with hurricane strength changes, providing valuable insights for operational forecasting applications.
- Crafted an executive summary of the 2021 IPCC Sixth Assessment Report (AR6) for clients
- Developed and maintained all projects, codes, and scripts in a Unix environment.

JUN, 2020 - AUG, 2020

ASHEVILLE, NC

Research Intern, North Carolina Institute for Climate Studies

- Developed 25+ scripts to automate parsing of text files and synthesize United States drought severity
- Used code in R Studio to manipulate, clean up, and analyze files containing on average 2 million+ datums
- Presented statistically significant findings and figures to research advisor
- Collaborated with research advisor weekly to brainstorm innovative and novel methods to better synthesize drought data
- Programmatically constructed statistically relevant figures for use in publication and analysis/testing of research hypothesis

Education

JUL, 2022 - MAY 2025

REMOTE

Masters of Science, Applied Meteorology | GPA: 3.8, Mississippi State University

Capstone Project: Enhancing Hurricane Intensity Forecasts: A Huber Regressor Superensemble Approach for Robust 12-36 Hour Predictions

For my capstone project I developed a machine learning hurricane model using Python to improve hurricane intensity forecasts, creating a Huber Regressor superensemble model that significantly outperformed traditional forecasting methods. Achieved a remarkable 31.5% improvement in 12-hour forecast accuracy compared to ensemble means, with continued superior performance at 24-36 hour horizons.

AUG, 2018 - MAY, 2021

ASHEVILLE, NC

Bachelors of Science, Atmospheric Science | GPA: 2.7, University of North Carolina Asheville

- Awarded excellence in research in my senior year of undergrad due to the depth of and success of the research. This research went on to be published in Weather and Forecasting.
- Awarded research scholar distinction due to successfully publishing in our universities academic journal.

AUG, 2016 - MAY, 2018

OAKWOOD, GA

Associates of Science, Geography | GPA: 3.1, The University of North Georgia

- Awarded geography student of the year in 2018 upon receiving my A.S in geography.

Publications

Hennon C., Coleman A., and Hill A., 2022: Short-Term Weather Forecast Skill of Artificial Neural Networks. Wea. Forecasting, 37, 1941–1951, https://doi.org/10.1175/WAF-D-22-0009.1.

Abstract

We evaluate the short-term weather forecast performance of three flavors of artificial neural networks (NNs): feed forward back propagation, radial basis function, and generalized regression. To prepare the application of the NNs to an operational setting, we tune NN hyperparameters using over two years of historical data. Five objective guidance products serve as predictors to the NNs: North American Mesoscale and Global Forecast System model output statistics (MOS) forecasts, the High-Resolution Rapid Refresh (HRRR) model, National Weather Service forecasts, and the National Blend of Models product. We independently test NN performance using 96 real-time forecasts of temperature, wind, and precipitation across 11 U.S. cities made during the WxChallenge, a weather forecasting competition. We demonstrate that all NNs significantly improve short-range weather forecasts relative to the traditional objective guidance aids used to train the networks. For example, 1-day maximum and minimum temperature forecast error is 20%–30% lower than MOS. However, NN improvement over multiple linear regression for short-term forecasts is not significant. We suggest this may be attributed to the small number of training samples, the operational nature of the experiment, and the short forecast lead times. Regardless, our results are consistent with previous work suggesting that applying NNs to model forecasts can have a positive impact on operational forecast skill and will become valuable tools when integrated into the forecast enterprise.