

Tracking the Invisible Enemy: A Mission in Air Quality Forecasting



You are now on the frontlines of environmental data science...

Scenario: Imagine you have been selected to join the Data Dinosaurs- an elite environmental data science think tank that started right here at the University of Virginia- as a data science analyst. As you know, nitrogen dioxide (NO_2) is a key air pollutant with significant health and environmental consequences, particularly as a precursor to ground-level ozone and particulate matter. NO_2 levels in the U.S have declined over recent years due to regulatory efforts, but pollution differences across the country persist due to varying sources of emissions, geography, and population density. Understanding NO_2 trends in different regions is critical for shaping targeted environmental policies and public health initiatives. Your mission to analyze historical and projected trends will provide valuable insight into how these variables interact and offer a foundation for policymakers and scientists across the states working towards improving our air quality.

You will find yourself working with real Environmental Protection Agency (EPA) datasets and R forecasting tools to visualize air quality, detect trends, and evaluate regional vulnerability.

Mission: Your task is to explore how environmental, lifestyle, and economic factors contribute to variations in NO_2 levels. Specifically, you will analyze how the current and projected NO_2 concentration trends vary between Maine and Utah, two states with large disparities in air quality. You will then deliver a concise report summarizing your data preprocessing steps, the model-building process, and your key findings with actionable recommendations. This isn't just another classroom project, it's the real-world, and with your help we plan to make great advancements in air quality across the United States. We wish you the best of luck and may your work guide the field of environmental data science!

Your mission begins here: <https://github.com/nehadacherla/DS4002-CaseStudy>