

Revolutionizing Air Quality Management

AI-Driven Solutions for Protecting Vulnerable Communities

The Use of AI for Computational Efficient Predictions of Air Quality to Design Effective Policy for Vulnerable Communities

A new project funded by the Gillings Gift aims to develop DeepCTM to predict air quality in real time without extensive computational resources or environmental engineering expertise. Previous efforts have shown the benefits of accurate air quality predictions, but not how to make these tools widely accessible. This project will leverage AI technology to create DeepCTM, enabling public health officials to optimize resource allocation and mitigate the adverse effects of poor air quality on vulnerable populations. By integrating high-tech solutions with public health strategies, the project seeks to improve community health outcomes and enhance air quality management both locally and globally.

Aim One: Expansion of AI Prototype DeepCTM

Aim 1 focuses on enhancing DeepCTM, a machine-learning AI model developed by the team to predict air quality in real time without requiring extensive computational resources. While the current prototype of DeepCTM can predict general air pollution levels, such as ozone and PM2.5, it lacks the detailed accuracy needed for community-specific assessments. This aim is dedicated to refining DeepCTM to provide more precise predictions at finer spatial scales, enabling effective community-level air quality policies.

Aim Two: Application of DeepCTM

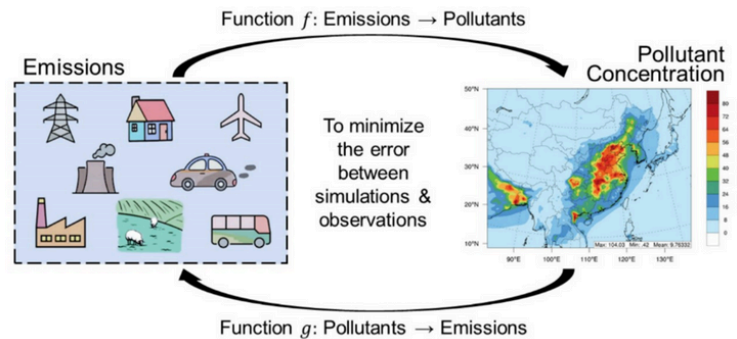
Aim 2 focuses on applying the refined DeepCTM model from Aim 1 to support clean energy transitions focused on controls on natural gas power plants, and on oil and gas production. Collaborating with the Environmental Defense Fund (EDF), George Mason University (GMU), and local community partners, the team will use this accessible model to evaluate the health benefits and potential costs of clean energy. EDF is helping advocates and local leaders highlight the urgent need to address fossil fuel emissions. This aim will assist local regulators and advocates in making a detailed connection between air quality and health as residents and politicians discuss moving towards zero-emission power sources.

Leadership



PI: William Vizuete, PhD, is a professor in the Department of Environmental Sciences and Engineering at the UNC Gillings School of Global Public Health. His research centers on understanding how atmospheric changes influence the formation of ozone and particulate matter (PM) and their impact on human health. Dr. Vizuete aims to provide policymakers with the tools and methods needed to develop effective air quality control

strategies, improving public health outcomes and quality of life worldwide.



Goal

Develop and evaluate DeepCTM to enhance real-time air quality predictions and create a scalable model for optimizing public health resource allocation and mitigating the effects of poor air quality on vulnerable populations.

Partners

Tammy Thompson, PhD, Environmental Defense Fund; Bok Haeng Baek, PhD, George Mason University

Impact!

Harnessing generative AI for air pollution prediction can revolutionize public health for vulnerable communities. This initiative will enhance DeepCTM to provide real-time, precise air quality predictions. In collaboration with the EDF and GMU, this tool will aid policymakers and create a scalable model for equitable air quality management, improving community health outcomes.

