Using Machine Learning to Analyze the Effects of Air Quality and Meteorological Exposures on Mortality

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Introduction: Air pollution has been linked to many adverse health outcomes and corresponding mortality rates. Climate is also thought to influence both air quality and mortality rates. However, the relationship between air quality, meteorological variables, and health outcomes is poorly understood. Machine learning can be used to analyze the complex relationships between these variables, providing knowledge of how mortality is influenced by environmental conditions.

Objective: We aim to use unsupervised temporal machine learning to analyze the relationship between air quality, environmental factors, and mortality data.

Methods: Air quality data from the National Aeronautics and Space Administration (NASA) and meteorological data on wind, temperature, pressure, and humidity from the Environmental Protection Agency (EPA) will be used to understand mortality data.

We will cluster joint longitudinal trajectories of meteorologic and climate data using k-means for joint longitudinal data (kml3d). Joint clusters of meteorologic and climate trajectories will be identified andcluster performance will be evaluated using the Calinski-Harabasz score. A chi-squared test for independence will be used to determine the statistical associations between cluster membership and all-cause mortality.

Results: We anticipate that kml3d will detect distinct clusters of air quality and climate data that are associated with mortality rates.

Conclusion: Our results may provide insight into the temporal relationship between air quality, climate, and all-cause mortality.