psoas, L4 vertebrae, and background. Performance was evaluated using accuracy, Dice coefficient, and F1 score. RESULTS/ANTICIPATED RESULTS: Between our expert reviewer segmentations, we had significant inter-reader reliability with a Kappa greater than 0.8 and a mean standard deviation of the PLVI of 0.10mm^2. Preliminary VMLA testing on a subset of 70 patients yielded a validation accuracy of 88.5%, a Dice coefficient of 0.86, and an F1 score of 0.87 after 20 epochs. There was a moderate interclass correlation between PLVI and TSFI even though the TSFI lacks sensitivity. In fact, the PLVI is a more accurate predictor of frailty in trauma patients based on various outcome measures such as corrected length of stay. Our ongoing efforts are centered around improving the VMLA. DISCUSSION/SIGNIFICANCE OF IMPACT: Our VMLA outperforms the current clinical standard, TSFI. Integration of our VMLA into the clinical workflow has the potential to revolutionize geriatric trauma care by providing rapid, accurate, identification of high-risk frail patients.

19

Predicting daily PM2.5 in Mexico City: A hybrid spatiotemporal modeling approach†

Mike He[1], Ellen Ren[2], Iván Gutiérrez-Avila[3] and Itai Kloog[3]
[1]Icahn School of Medicine at Mount Sinai; [2]Bureau of Sustainability, New York City Department of Buildings, New York, NY and [3]Department of Environmental Medicine and Climate Science, Icahn School of Medicine at Mount Sinai, New York, NY

OBJECTIVES/GOALS: In recent years, there has been growing interest in the development of air pollution prediction models, particularly in low- and middle-income countries that are disproportionately impacted by the effects of air pollution. Recent methodological advancements, particularly in machine learning, provide novel opportunities for modeling efforts. METHODS/STUDY POPULATION: We estimate daily ground-level fine particulate matter (PM2.5) concentrations in the Mexico City Metropolitan Area at 1-km2 grids from 2005 to 2023 using a multistage approach. Spatial and temporal predictor variables include data from the moderate resolution imaging spectroradiometer (MODIS), Copernicus Atmosphere Monitoring Service (CAMS), and additional meteorological and land use variables. We employed machine-learning-based approaches (random forest and gradient boosting algorithms) to downscale satellite measurements and incorporate local sources, then utilized a generalized additive model (GAM) to geographically weight predictions from the initial models. Model performance was evaluated using 10-fold cross-validation. RESULTS/ANTICIPATED RESULTS: On average, the random forest, gradient boosting, and GAM models explained 75, 82, and 83% of variations measured in PM2.5 concentrations. PM2.5 levels were generally higher in densely populated urban centers and lower in suburban and rural areas. Important predictors of ground-level PM2.5 included wind (both u and v components), 2-meter mean air temperature, elevation, and the normalized difference vegetation index (NDVI). DISCUSSION/SIGNIFICANCE OF IMPACT: Using novel machine learning-based approaches, we developed robust models with fine-scale spatial (1-km2) and temporal (daily) variations of PM2.5 in Mexico City from 2005 to 2023. The predicted PM2.5 concentrations can further advance public health research on air pollution in Mexico City and beyond.

20

Decoding auto-immunity: Uncovering pre-onset infectious disease patterns of idiopathic inflammatory myopathies

Tayler Fearn, Ram Gouripeddi, Pablo J Maldonado-Catala, Dorota Lebiedz-Odrobina, Naomi Schlesinger and Julio Facelli
University of Utah

OBJECTIVES/GOALS: Idiopathic inflammatory myopathies (IIMs) are autoimmune diseases influenced by genetic and environmental factors. This study aims to explore infection patterns preceding IIM onset by applying temporal data mining and machine learning to deidentified patient records and corroborate results from molecular analysis. METHODS/STUDY POPULATION: The dataset used in this work was extracted from TriNetX with a focus on patients who have IIM. Risks for developing the outcomes were assessed using case–control cohorts. For each participant, information was extracted about diagnosis code, date of infection, and study visit in which the infection was reported. This data were then temporally encoded and used to generate sequence files for each of the outcomes. Unsupervised temporal machine learning was then preformed on these files to detect frequent subsequences of infections. Python library scikit-learn was used to perform the unsupervised machine learning with k-means clustering. RESULTS/ANTICIPATED RESULTS: The results of this study identify infections associated with the onset of IIM by analyzing temporal infection patterns. Frequent sequences of infections uncovered, with specific patterns linked to different cohorts, offer insights into the etiology of IIM. Common and cohort-specific infection sequences will help validate existing research and provide new avenues for exploring the disease mechanisms. The findings will highlight significant infection patterns, which will inform our understanding of IIM onset across various patient populations. DISCUSSION/SIGNIFICANCE OF IMPACT: The results will provide key insights into pre-symptomatic infection sequences related to IIM onset, enhancing understanding of its etiology and pathogenesis. These findings may aid in developing more precise screening methods for early detection and confirm previous results from analyzing immune signatures of infections in IIM.

21

Optimizing AI-physician collaboration for enhanced diagnostic accuracy: A case study on acute respiratory distress syndrome detection using chest X-ray imaging†

Negar Farzaneh, Sardar Ansari, Elizabeth Lee, Kevin R. Ward and Michael W. Sjoding
University of Michigan

OBJECTIVES/GOALS: The objective of this study is to explore strategies for AI-physician collaboration in diagnosing acute respiratory distress syndrome (ARDS) using chest X-rays. By comparing the diagnostic accuracy of different AI deployment methods, the study aims to identify optimal strategies that leverage both AI and physician expertise to improve outcomes. METHODS/STUDY POPULATION: The study analyzed 414 frontal chest X-rays from 115 patients hospitalized between August 15 and October 2, 2017, at the University of Michigan. Each X-ray was reviewed by six physicians for ARDS presence and diagnostic confidence. We developed a

https://doi.org/10.1017/cts.2024.710 Published online by Cambridge University Press