The Underlying Code: Developing an AI-Biosensor to Translate Lichen Bio-Indication of Atmospheric Pollution

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Air pollution is a growing threat, and conventional air quality monitors are expensive, sparsely distributed, often failing to capture micro-level pollution variation and local "hot spots" that impact human health and biodiversity. By downloading TensorFlow, NumPy, Pillow, and OpenCV the biosensor was able to load and clean the images used for training and help it learn and decide the biosensor's final verdict. Once adding the codes for the biosensor, it can help train the model, load the images, and help identify the image type, becoming the main component when creating the biosensor. Therefore, a real-time urban air quality monitoring system can be researched by combining natural lichen sensitivity with software and AI technology, thus being responsible for measuring pollutants and environmental factors. These AI algorithms will learn to predict pollution levels and generate detailed pollution severity scales. With statistical metrics such as percentage of accuracy/training accuracy and percentage of error/validation loss, correlations between pollutant levels and lichen changes as well as comparing AI predictions, testing concordance with ecological assessment frameworks while ground truth labels represent a consensus interpretation of published lichen bioindicator characteristics rather than direct pollution measurements. The application of this AI tool extends to environmental agencies, urban planners, and ecological researchers, offering a scalable and noninvasive method to track pollution trends over time, while maximizing productivity and time management in real world deployment where traditional monitoring methods may be limited or costly.

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