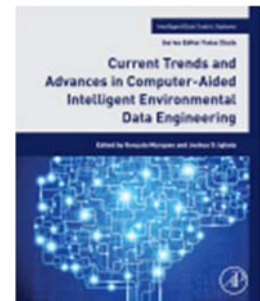


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Chapter 3 - Advances in data-centric intelligent systems for air quality monitoring, assessment, and control

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Abstract

Air pollution is currently an issue of great concern due to the increase in anthropogenic, economic, industrial, and social activities that release high concentrations of aerosols, NO_x, CO₂, and greenhouse gases into the environment. According to reports from the World Health Organization (2019), about 91% of the global population resides in areas affected by poor air quality, which results in poor health conditions, thus causing about 7 million deaths annually and the destruction of the ecosystem. Despite the myriad of proposals to curb these growing concerns caused by air pollutants, air pollution seems to know no bounds because their causatives in terms of the activities that lead to air pollution including manufacturing, incineration, combustion of coal etc. are necessary for human existence and sustenance. Strategic alteration of production patterns and the replacement of conventional heating systems have been proposed as air pollution control measures; however, due to the increased demands posed by basic necessities such as transportation, food, deforestation, and industrial processes, it has become necessary to use smart high-performance data-centric systems/artificial intelligence as air pollution forecasting tools that can examine the sources of these pollutants, predict their prevalence, determine their eventual consequences, as well as proffer informed

decisions for contingency actions. In this chapter, topics covered include “deep- and machine-learning applications in air quality modeling, air quality prediction, modeling of particle dispersion/filters, heating, ventilation, and air-conditioning systems, industrial air quality control systems concerning data-centric intelligent systems, as well as previous and recent developments and application of these systems in air quality monitoring, assessment, and pollution control.”

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