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DEVELOPMENT OF A KNOWLEDGE BASED SYSTEM FOR ANALYZING PARTICULATE MATTER AIR POLLUTION EFFECTS ON HUMAN HEALTH

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Abstract

Analyzing and reducing the possible effects of air pollution on human health became important issues for improving the quality of life in urban areas. Particulate matters (PM) are air pollutants with a potential important impact on human health of vulnerable people (e.g., children, elderly) and non-vulnerable people as well. The level of PM air pollution is mainly influenced by the PM concentration and parameters such as meteorological conditions and synergic effects of other air pollutants. The effects on human health are dependent on the PM air pollution level (PM concentration), the exposure time, inhaled dose and chemical constituents carried by PM. In this paper, we focus on fine particles, PM_{2.5} (i.e., particles with the diameter equal or less than 2.5 μm). Taking into account the variety of factors that determine the level of PM_{2.5} air pollution, and following the CommonKADS methodology specific to knowledge based approaches, we have developed a knowledge based system, PM2.5-KBS-1, with heuristic rules that perform the analysis of common air quality index (CAQI) for PM_{2.5} (according to the European Union Air Quality Standard) in an urban area and analyzes the possible effects of the PM_{2.5} concentration exceedances on human health for vulnerable and non-vulnerable people. The system was tested with success for various scenarios of air pollution in the Ploiesti city, in the neighborhood of some stations from the Romanian National Air Quality Monitoring Network, providing decision support knowledge for human health protection during PM air pollution episodes. It is one of the main sub-components of a complex cyberinfrastructure for air pollution monitoring and forecasting developed within the Rokidair project. The system can be extended with new rules and applied to other cities as well.

Key words: air pollution, effects on human health, knowledge based approach, particulate matter

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