An intelligent algorithm to recommend percent vegetation cover (ARVC) for PM$_{2.5}$ reduction

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Abstract

Nowadays, increasing particulate matter (PM) remains a challenge for environmental and humanity health and increases death statistics. Case studies and experimental observations demonstrated that vegetation coverage and type of plants affect PM and air quality. Condensation of PM$_{2.5}$ has an impressive effect on deteriorating air quality. Increasing vegetation coverage has a significant impact on reducing PM$_{2.5}$. However, the requirement percent vegetation cover (PVC) is likewise a shadow for careful analysis to recommend the requirement percent and area of vegetation for different parts of the metropolitan. In this paper, we propose a four-phase intelligent algorithm for investigating PM$_{2.5}$ and critical situations to detect unhealthy air quality monitoring stations (AQMSs). Our algorithm makes a decision based on fuzzy and neural network methods and recommends the percent density and area of vegetation. Our analysis of the weather condition is event-driven, considering rainfall as an event to examine the situation of each AQMS before and after rainfall. The experiments demonstrate reducing PM$_{2.5}$ > 150 to PM$_{2.5}$ < 50 using recommending PVC of approximately 20–74%. We achieved these results by periodically estimating and evaluating weather conditions in the autumn and winter as two critical seasons of the year.