

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.

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Keywords

- **Vegetation density**
- **Air quality monitoring station (AQMS)**
- **Percent vegetation cover (PVC) fuzzy system**

- **Recommender algorithm**
- **Neural network**