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AI-Enriched Automation for Evaluating Health Risks from Air Pollution

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Background and Aims:

Traditional air quality indices, such as the EPA's Air Quality Index (AQI), provide generalized insights but fail to account for individual health vulnerabilities, activity levels, and exposure patterns. The increasing urbanization and adoption of digital health tools demand automated, real-time health risk assessments for personalized and community-level decision-making. This study presents BreatheSafetyIndex, an AI-powered, API-driven automation framework [1] that transforms underprepared air quality data into precise, actionable health risk evaluations.

Methods:

Instead of relying on predefined mathematical model, BreatheSafetyIndex integrates a flexible, self-improving AI agent [2] that dynamically processes environmental inputs (PM2.5, O_3, NO_x, SO_2, temperature, humidity). The system corrects data inconsistencies with ML and generation, and adapts risk models [3, 4] using real-world clinical research on air pollution's effects. Health impact weight/ expose factors [5,6,7] are continuously refined through ML and Bayes, incorporating the latest epidemiological findings. The API delivers customized short-term (hourly/daily) and long-term (cumulative) health risk scores, ensuring seamless integration into smart city platforms, weather services, sports and health applications.

Most Important Results:

The automation-driven approach significantly improves the up-to-date and applicability of health risk assessments:

- 30% reduction in data gaps and misclassified risk levels compared to static AQI-based models;
- Higher predictive validity (r = 0.91) for hospital admissions linked to cardiovascular and respiratory diseases in urban test; sites.
- Faster integration - API users in business, sports analytics, and urban planning report a 60% reduction in manual data processing and interpretation time.

Conclusion:

By shifting from static pollution indices to real-time, AI-enhanced automation, BreatheSafetyIndex enables scalable, customized health risk analytics that can be seamlessly embedded into diverse platforms. The findings highlight the importance of automated data harmonization, dynamic model adaptation, and flexible API-driven solutions in advancing public health strategies, smart city governance, health and sports applications.

Keywords: #AIAgent, #AirPollution, #HealthRiskAssessment, #API #UrbanCommunity

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