

# Understanding the Weather-Speed Violations Nexus

Exploring the Influence of Weather Conditions on Urban Speed Enforcement and Traffic Safety in Cologne

**Presented by: Ram Saran Kakumanu**

# Agenda

## Unveiling the Connection Between Weather and Speed Violations in Cologne: A Data-driven Investigation

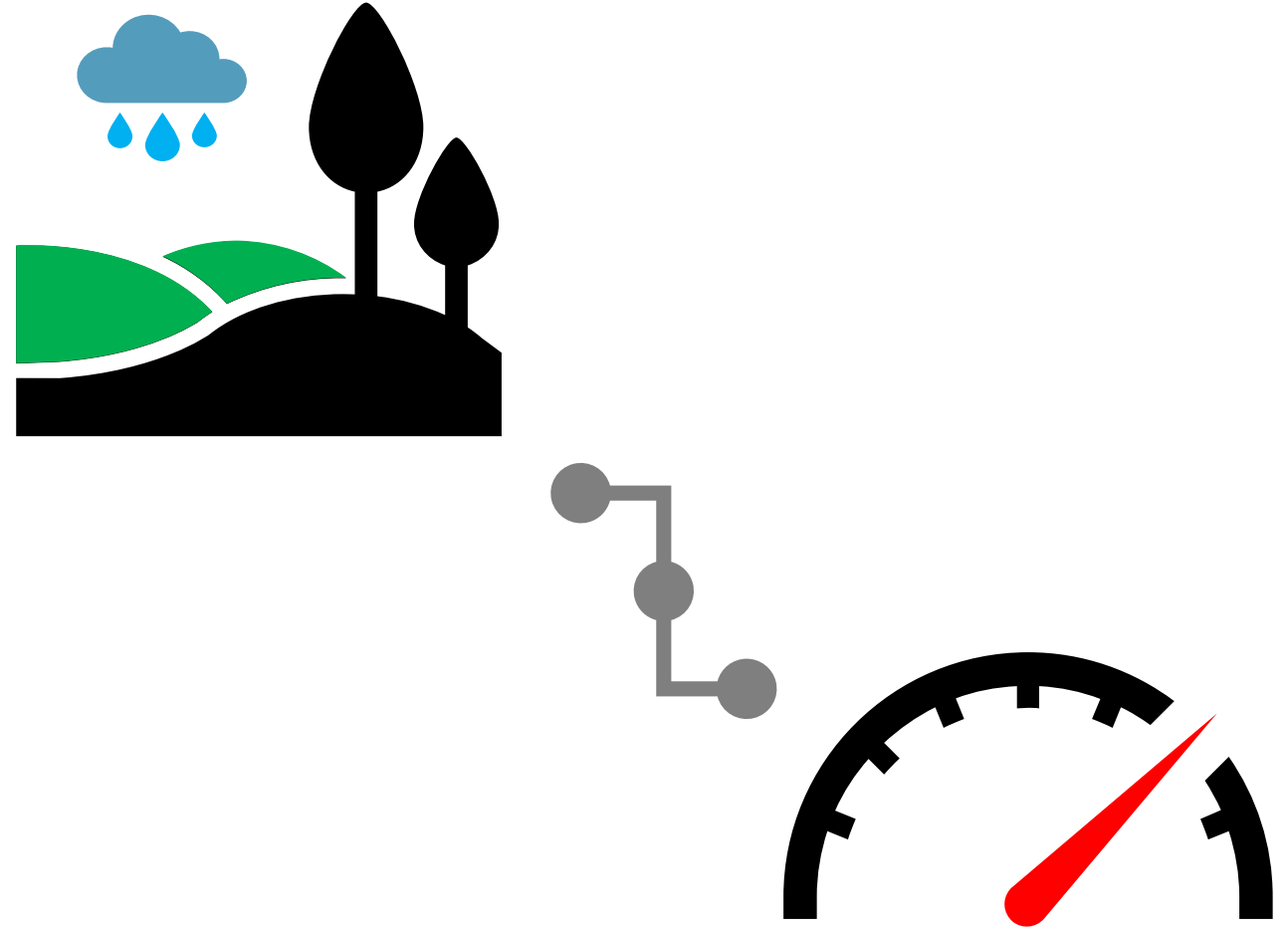
01 Problem Definition

02 Analysis Approach

03 Insights from Analysis

04 Visualizations from Analysis

05 Final Results and Recommendations



### Problem Definition

- Understand the relationship between weather conditions and urban speed violations in Cologne
- Gain insights into how weather factors may influence driving behaviors and contribute to speed-related incidents
- Datasets for Cologne:
  - Speeding Violation Incidents
  - Weather History

### Analysis Approach

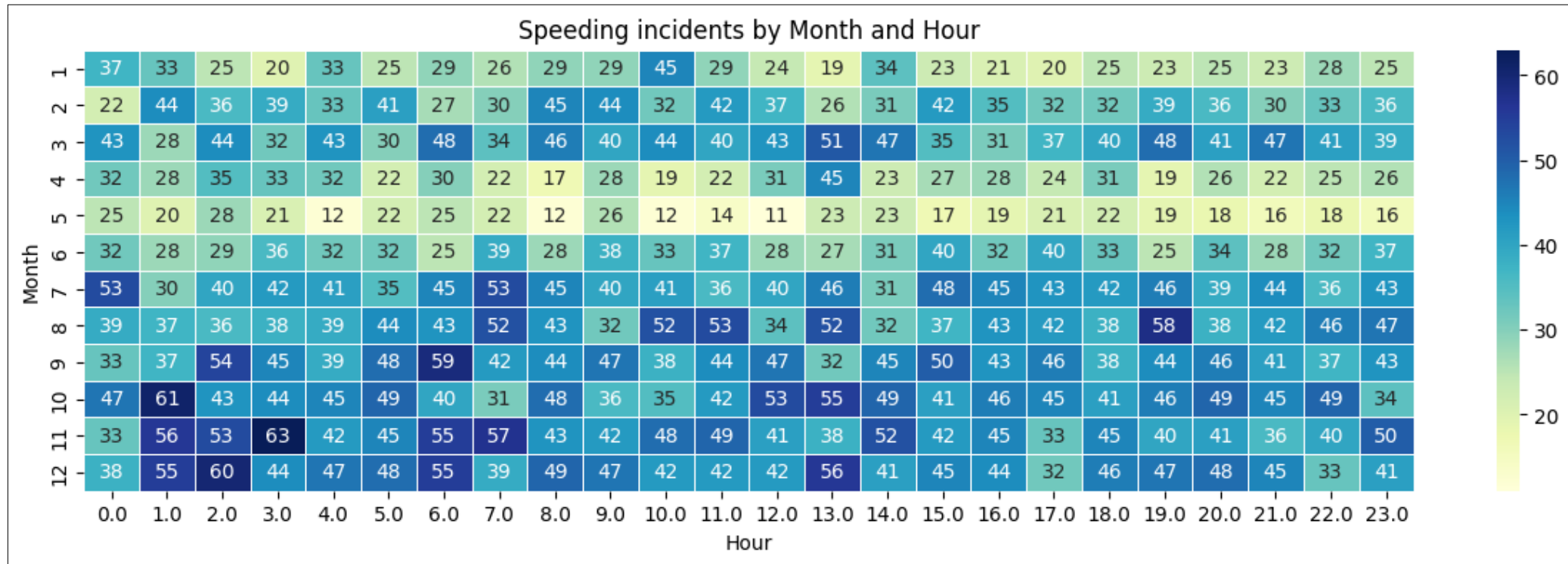
- Grouped Speed violations and weather history datasets calculating counts and average by hour by month
- Standardized data duration (2017 to 2021) for a fair comparison
- Utilized pivots, heat maps, and scatter plots for efficient data analysis and visualization
- Derived correlation factors to quantify the influence of weather on speeding violations

### Insights Identified

- Wind Speed vs. Speed Violations - No significant association found (Correlation: -0.06)
- Precipitation vs. Speed Violations: Slight tendency for more violations during higher average precipitation (Correlation: 0.15)
- Relative Humidity vs. Speed Violations: Slight tendency for more violations during higher average humidity (Correlation: 0.22)

# Monthly and Hourly Patterns of Reported Incidents

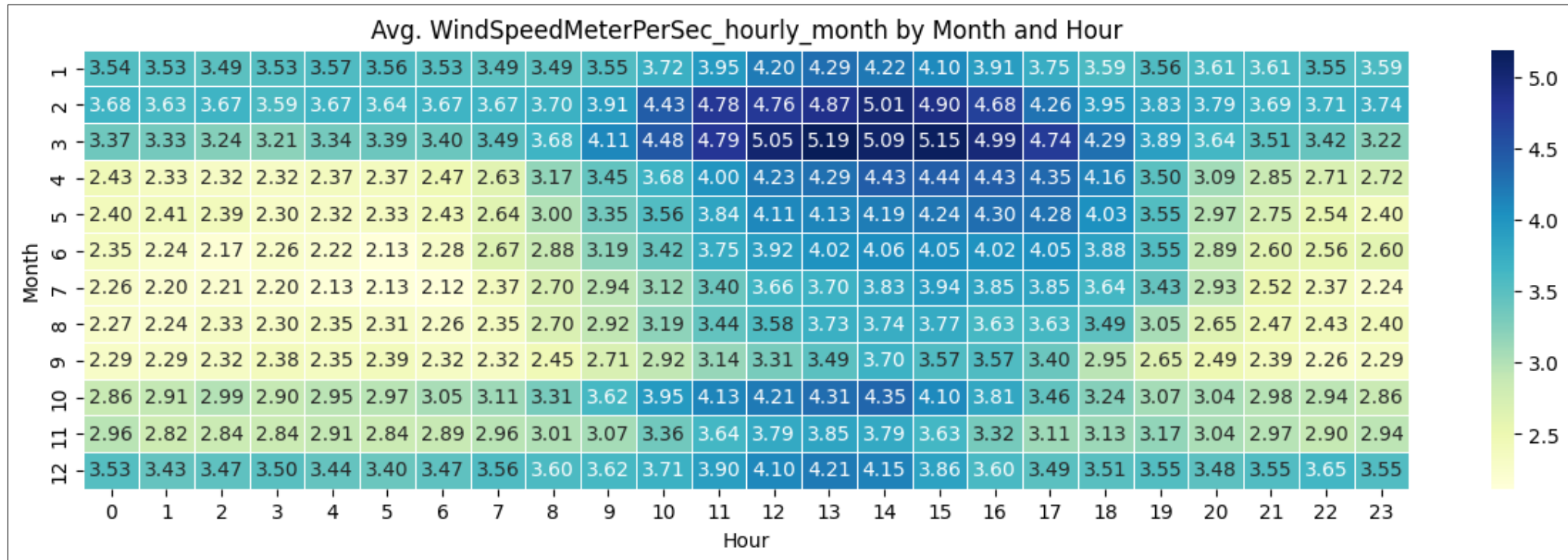
Examining Variations and Peak Hours for Incidents by Month and Hour



- Variations in incidents reported across different months, with specific hours showing higher or lower incident counts
- Consistently high number of incidents at hour 11 (11:00 AM) throughout the dataset
- Higher incidents in the early morning (hours 1 to 5) and evening hours (hours 18 to 21)
- Varying incident counts between months, with higher counts in months 3 (March) and 7 (July)

# Seasonal and Diurnal Variation of Wind Speed

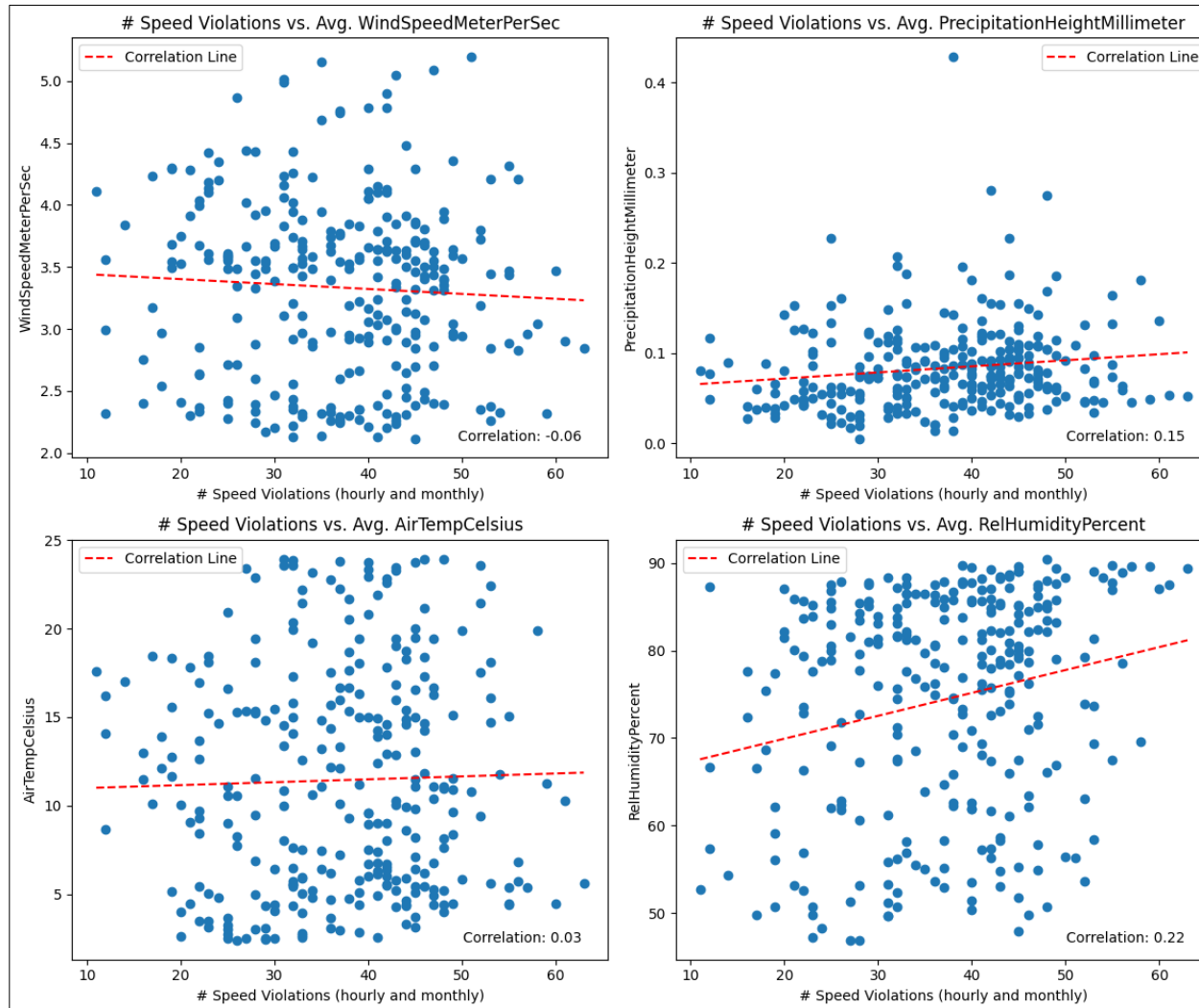
Analyzing the Patterns of Average Wind Speed by Hour and Month



- Higher wind speeds during winter (Dec-Feb) and lower wind speeds during summer (Jun-Aug)
- Wind speeds are lower in the early morning (2-6 AM) and peak during the afternoon and evening (2-8 PM)
- Winter months have earlier peak wind speeds, while summer months have delayed peaks in the late afternoon or early evening
- Months 2, 3, and 4 experience relatively higher wind speeds, especially in the afternoon

# Final Results and Recommendations

## Monitoring and Enforcement



### Results:

- Weak correlations between speed violations and weather conditions suggest a minimal influence
- Other factors beyond weather are likely more significant in contributing to speed-related incidents

### Recommendations (Nevertheless):

- Provide weather-specific reminders to drivers during adverse weather conditions
- Launch public awareness campaigns on responsible driving and the **potential** impact of weather on road safety



---

# Thank You

