Data Analysis Reports

1. Driver Violation Summary

Purpose

Rank drivers by violation frequency and severity to identify top performers, high-risk individuals, and training needs.

Key Contents

- **Total Violations**: Count of violations per driver, categorized by type (e.g., Over Speed, Seat Belt).
- **Violation Rate**: Violations per 100 km (violations ÷ distance × 100).
- **Speed Metrics**: Average and maximum speed per driver.
- **RAG Status**: Comparison of Red, Amber, Green ratings and scores.
- **Top 10 Risky Drivers**: List of drivers with the highest violation rates.

Data Sources

- **Driver Report**: Precomputed violation counts, distance traveled, max speed, RAG status.
- **Violation Data**: Driver UUID, violation type, and timestamp for detailed breakdowns.
- **Vehicle Data**: Speed and distance (diff.distanceMeter) linked via vehicle UUID and trip logs (assumed).

Example Output

Driver Name	Over Speed	Violation Rate (per 100 km)	Max Speed (km/h)	RAG	Recommendation
Veer Singh	15	0.3	88	Amber	Speed training
Rajanaeem Khan	0	0.0	85	Green	Maintain performance

2. Vehicle Usage and Violation Overview

Purpose

Assess vehicle performance, usage patterns, and maintenance needs based on telemetry and violation trends.

Key Contents

- **Total Distance**: Odometer or aggregated diff.distanceMeter per vehicle.
- **Average Speed**: Calculated as total distance ÷ total duration (from diff.durationMillis).
- **Violation Count**: Number and types of violations per vehicle.
- **Telemetry Trends**: Battery voltage, satellite count, or HDOP changes over time.
- **High-Risk Vehicles**: Vehicles with excessive violations or usage.

Data Sources

- **Vehicle Data**: Distance (odometer, diff.distanceMeter), speed, battery voltage, vehicle UUID.
- **Violation Data**: Vehicle UUID, violation type, and severity for cross-referencing.

Example Output

License	Distance (km)	Avg Speed (km/h)	Violations	Battery Voltage	Recommendation
1765HW	85,198	62	8	4.0V (↓)	Battery check
9492RK	10,000	55	2	4.2V	Routine maintenance

3. Violation Hotspot Map

Purpose

Identify geographic areas with frequent violations to optimize routes and enhance safety.

Key Contents

- **Heatmap**: Visualization of violation density by latitude and longitude.
- **Top Hotspots**: 5 locations with the highest violation counts.
- **Violation Breakdown**: Types (e.g., speeding) per hotspot.
- **Route Context**: Paths from vehicle data linked to violation points.

Data Sources

- **Violation Data**: Location (latitude, longitude), violation type.
- **Vehicle Data**: Historical location data for route tracing (via vehicle UUID).

Example Output

- **Hotspot**: (21.35, 57.09)
  - Violations: 25 (20 speeding, 5 others)
  - Insight: Possible speed limit change or road hazard.
  - Action: Reroute or install warnings.

(Visualized as an interactive heatmap with clickable points.)

4. Violation Trends Over Time

Purpose

Detect temporal patterns in violations to optimize scheduling and driver management.

Key Contents

- **Time Buckets**: Violations by hour, day, or week.
- **Peak Times**: Hours with the highest violation frequency.
- **Long-Term Trends**: Monthly or seasonal patterns.
- **Shift Comparison**: Violation rates across different shifts (if shift data exists).

Data Sources

- **Violation Data**: Event_time for timestamp grouping.
- **Driver Report**: Contextual driver activity (distance, violations).

Example Output

Time Period	Violations	Top Type	Insight	Action
08:00–09:00	12/day	Speeding	Morning rush peak	Adjust schedules
Feb 2025	150	Deceleration	Weather impact?	Investigate conditions

(Plotted as a time-series chart.)

5. Predictive Driver Risk Assessment

Purpose

Forecast drivers or vehicles at risk of future violations to enable proactive interventions.

Key Contents

- **Risk Score**: Probability of a violation in the next period (e.g., month).
- **Risk Factors**: High average speed, past violations, distance trends.
- **Alerts**: Drivers/vehicles exceeding risk thresholds.
- **Recommendations**: Training, monitoring, or vehicle adjustments.

Data Sources

- **Driver Report**: Historical violations, max speed, distance.
- **Vehicle Data**: Speed, distance, and telemetry trends.
- **Violation Data**: Frequency and severity as training labels.

Example Output

Driver Name	Risk Score	Key Factors	Recommendation
Rajanaeem Khan	75%	Max speed 85 km/h	Monitor speed
Veer Singh	60%	15 past violations	Training session

(Generated using a simple ML model trained on historical data.)

Data Utilization Summary

Dataset	Fields Used	Reports Supported
Vehicle Data	Location, speed, distance, odometer, telemetry	2, 3, 4, 5
Violation Data	Event time, type, threshold, location, driver/vehicle UUID	1, 2, 3, 4, 5
Driver Report	Violations, distance, max speed, RAG	1, 5