**🚦 Project Proposal: Exploring Ottawa Traffic Accidents – Group\_5**

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**Project Topic**

Our project aims to uncover patterns in road accidents in Ottawa, Canada. By analyzing relationships between accident severity, location, time, environmental factors, and infrastructure, we will identify key factors contributing to accidents using advanced data visualization techniques.

**Objective**

To analyze traffic accident data from Open Ottawa, uncover patterns, and provide dynamic, interactive visualizations that empower policymakers and citizens to make informed decisions to improve road safety.

**Scope**

* **Analyze**: Accident trends by time, location, severity, and environmental factors.
* **Develop**: Interactive maps and charts to highlight high-risk areas.
* **Facilitate**: User-driven interaction to explore filtered data dynamically.

**Data Handling**

* **Database**: Store accident data in PostgreSQL or SQLite for scalability and structured querying.
* **Preparation**: Clean and preprocess data using Pandas or Python to ensure quality.

**Proposed Visualizations**

1. **🗺️ Heatmap**:
   * Visualize accident hotspots using latitude and longitude.
   * Tools: Folium for interactive maps or Matplotlib for static heatmaps.
2. **📉 Line Chart**:
   * Track accident trends over time, such as monthly changes in frequency.
   * Tools: Plotly or Seaborn for dynamic, visually appealing charts.
3. **📦 Box Plot**:
   * Compare accident severity across different factors like weather, road surface, or time of day.
   * Tools: Altair for clean, statistical visuals or Matplotlib for detailed plots.
4. **⏳ Time-Series Graph**:
   * Analyze accident patterns over sequential time periods, e.g., hourly or seasonal trends.
   * Tools: Plotly or hvPlot for interactivity.
5. **📊 Histogram**:
   * Show frequency distributions for numeric data, such as the number of vehicles involved or accident severity.
   * Tools: Pandas plotting or Seaborn for polished visuals.

**Technical Features**

* **Flask Backend**: API routes to serve filtered data and dynamically generated visualizations.
* **User Interaction**: HTML menus and dropdowns for filtering data, enabling exploration by time or severity.

**End Use of Outcomes**

1. **Police & Traffic Enforcement**:
   * Target enforcement in high-risk areas and accident hotspots.
   * Adjust patrol schedules to align with accident trends.
   * Install speed cameras and enhanced traffic control mechanisms.
2. **Urban Planners & Local Councils**:
   * Redesign dangerous intersections and improve road infrastructure.
   * Plan safer pedestrian crossings, bike lanes, and public transit zones.
   * Address disparities between accident rates in urban vs. rural areas.
3. **Emergency Services**:
   * Optimize emergency response routes and resource allocation for accident-prone areas.
   * Train personnel on factors leading to severe accidents for targeted readiness.
4. **Educational Campaigns**:
   * Design public awareness campaigns focusing on safe driving practices during high-risk times or conditions (e.g., winter, rush hours).
   * Collaborate with schools and community organizations for outreach programs.
5. **Data for Research and Innovation**:
   * Use the insights for academic research on traffic management and road safety.
   * Support innovations like autonomous vehicle testing or smart city traffic systems.
6. **Businesses and Logistics**:
   * Optimize delivery routes and schedules to avoid accident-prone zones.
   * Partner with urban planners for safer logistics operations.

**References**

* **Open Ottawa Initiative – City Traffic Accident Data**  
  2020 Tabular Transportation Collision Data. Retrieved from [Open Ottawa](https://open.ottawa.ca/datasets/transportation-collision-data)
* **Meteostat – The Weather's Record Keeper**  
  Historical weather and climate data for Ottawa (CA), including temperature, precipitation, and more for 2020*.*  
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