ROAD ACCIDENT ANALYSIS REPORT

Submitted by : Daneal Abdullah,
Abdel hay Beji
Imad Chabi

1. Introduction: Dataset Selection & Pre-processing

Our project leveraged a publicly available road-accident dataset (UK). The decision to use this data stemmed from its rich structure: accident counts, casualty counts, severities, locations, dates, vehicle types, and environmental conditions. Pre-processing involved importing CSV tables into Power BI via Power Query. Steps included:

- Data type standardization (e.g., Date → Date, numeric fields → Whole/Decimal numbers).
- Handling missing values—casualty counts or location name blanks were replaced with "Unknown" or zero.
- Creating a Date table for time-intelligence and calendar slicing (YTD, YoY, monthly trends).
- Setting relationships between 'Accidents', 'Casualties', and 'Vehicles' tables.

These steps enabled reliable filtering and aggregation later in DAX and visual components.

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2. Design Decisions & Visualizations

Our dashboard follows a logical KPI → Trend → Detailed breakdown flow:

1. **Key Performance Indicators (KPIs)**:
   - **Total Accidents YTD** and **Total Casualties YTD**, including YoY % change.
   - **Casualties by Severity** (Fatal/Serious/Minor), also YTD with YoY.
     These were calculated using DAX:

   ```
   DAX
   CopyEdit
   CY_Casualties = TOTALYTD(SUM(Data[Number_of_Casualties]),
   'Calendar'[Date])
   YoY_Casualties = (CY_Casualties - PY_Casualties) / PY_Casualties
   ```

2. **Monthly Comparison Trend Chart**: A line chart displaying casualties for current vs. previous year, enabling seasonal insights and anomaly detection.

3. **Breakdowns by Category**:
   - **Vehicle Type** bar chart showing casualty totals for current year.

    o **Road Type** horizontal bar/slicer offering intuitive insight on road conditions or infrastructure.

4. **Geographic Mapping**: Map visual with accident counts and casualties per area, letting users hover/click to drill deeper into specific regions.

Interactive slicers (Year, Severity, Vehicle Type, Road Type) were placed prominently for dynamic filtering.

UI & UX decisions included consistent color usage—red/orange for severe metrics, blue/green for comparisons—and clean layouts: top KPIs, middle trend line, detailed breakdowns below, ensuring narrative flow.

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3. Collaboration, Roles & Challenges
Team workflow: Three members handled distinct tasks:

- **Daneal** managed dataset ingestion and transformation in Power Query.
- **Abdelhay** implemented DAX measures and calendar modeling.
- **Imad** focused on visual design and UI consistency.
- **Abdelhay** integrated interaction logic and helped polish report formatting.

We used Microsoft Teams for communication, shared a central Power BI file, and scheduled twice-weekly check-ins to align feature progress and design style.

Challenges encountered:

- **Data cleanliness**: Missing location names required custom "Unknown" categories and manual imputation.
- **Date intelligence**: Creating a calendar table and correctly implementing YTD and YoY DAX measures took several iterations to ensure accuracy.
- **Visual clutter**: Too many slicers initially compromised UX. We refined this by grouping filters via hierarchical selection and consolidating visuals.
- **Version control**: Merging work into one PBIX sometimes caused conflicts (e.g., duplicate tables). We mitigated this by assigning sections and merging changes only in final reviews.

These experiences taught us disciplined collaboration, the importance of data modeling best practices, and agile refinement based on periodic feedback.

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4. Reflection & Next Steps
Overall, the dashboard demonstrates strong analytical depth—KPIs spotlight core insights, trend charts reveal seasonality, and breakdowns offer segmentation. The collaborative workflow fostered accountability, though we identified room to strengthen version management.

Future improvements may include:

- Adding **automated data refresh pipelines** via Power BI Service.
- Incorporating additional datasets (weather, traffic volume).
- Exploring **predictive analytics**—e.g., forecasting casualties using DAX or Python integration.
- Seeking end-user testing to improve usability and accessibility.

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5. Conclusion
Our Power BI dashboard effectively integrates key metrics, temporal trends, and categorical analyses into an interactive report. It showcases not only technical skills in ETL, DAX, and visualization, but also demonstrates strong teamwork and iterative problem-solving. We're confident it meets the academic brief—covering dataset prep, design rationale, and collaborative reflection—and stands as a robust foundation for further enhancements.