🚦 **Uber Traffic Congestion Data Visualization & Analysis Report**

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🗓️ **Date: July 2025**

📁 **Dataset: Dataset_integrated_Data**

📍 **Focus: Understanding temporal traffic patterns to identify congestion peaks and optimize flow at city junctions.**

📌 1. Objective

To analyze and visualize temporal traffic patterns—hourly, daily, and monthly—to uncover congestion hotspots, weekday-weekend variations, and seasonal impacts, helping inform smarter traffic planning strategies.

📈 2. Hourly Traffic Trends

A line plot visualizing hourly average traffic across all junctions revealed:

- **Traffic increases steadily from 6 AM**, peaking between **12 PM and 8 PM**.
- Post 9 PM, traffic begins to decline gradually and bottoms out between **2 AM and 5 AM**.
- This confirms that **midday to evening** hours are consistently congested and demand focused attention for traffic management.

📊 3. Junction-wise Traffic Distribution

A boxplot comparing vehicle count distributions across different junctions showed:

- **Junction 3 consistently experiences the highest congestion**, with median and upper quartile values much higher than the rest.
- **Junction 2 has the lowest traffic** distribution, suggesting it's either less central or more efficiently managed.
- Junctions 1 and 4 fall in between, but **Junction 4 also shows higher variability**, indicating inconsistent congestion.

➡️ **Implication:** Junction 3 is the prime candidate for congestion mitigation interventions like rerouting, signal tuning, or infrastructure upgrades.

🗓️ 4. Weekday vs Weekend Patterns

The line chart comparing weekday and weekend traffic shows:

- **Weekdays have consistently higher vehicle counts** than weekends across all hours.
- **Weekday peaks occur from 10 AM to 8 PM**, while weekends have more spread-out and less pronounced traffic.
- Morning and late-night hours are low for both, but weekends remain lower overall.

➡️ **Implication:** Focus traffic control measures during **weekday afternoons and evenings**, especially in commercial districts.

🗓️ 5. Monthly Traffic Heatmap

The heatmap of average hourly traffic by month highlights seasonal dynamics:

- **June, July, and August show the highest congestion**, particularly between **12 PM and 9 PM**.
- **Winter months (November, December)** show lower vehicle counts overall, likely due to holiday periods and cooler weather.
- Late-night hours (12 AM–6 AM) are consistently low throughout the year.

➡️ **Implication:** Implement **seasonal traffic awareness or campaigns** during peak summer months. Predictive planning can be adjusted based on this monthly trend.

🧠 Key Takeaways

- **Peak congestion hours**: 12 PM – 8 PM daily
- **Most congested junction**: Junction 3
- **Busiest months**: June to August
- **Weekdays see more traffic** than weekends by a large margin
- **Least active hours**: 12 AM – 6 AM

☑️ Recommendations

1. **Install smart signal controls at Junction 3**, tuned especially for weekday peak hours.

2. **Run predictive congestion alerts** between 12–8 PM, especially during summer.
3. **Introduce weekend traffic smoothing** through public transport promotions or dynamic routing to balance weekday-weekend traffic loads.

THANK YOU