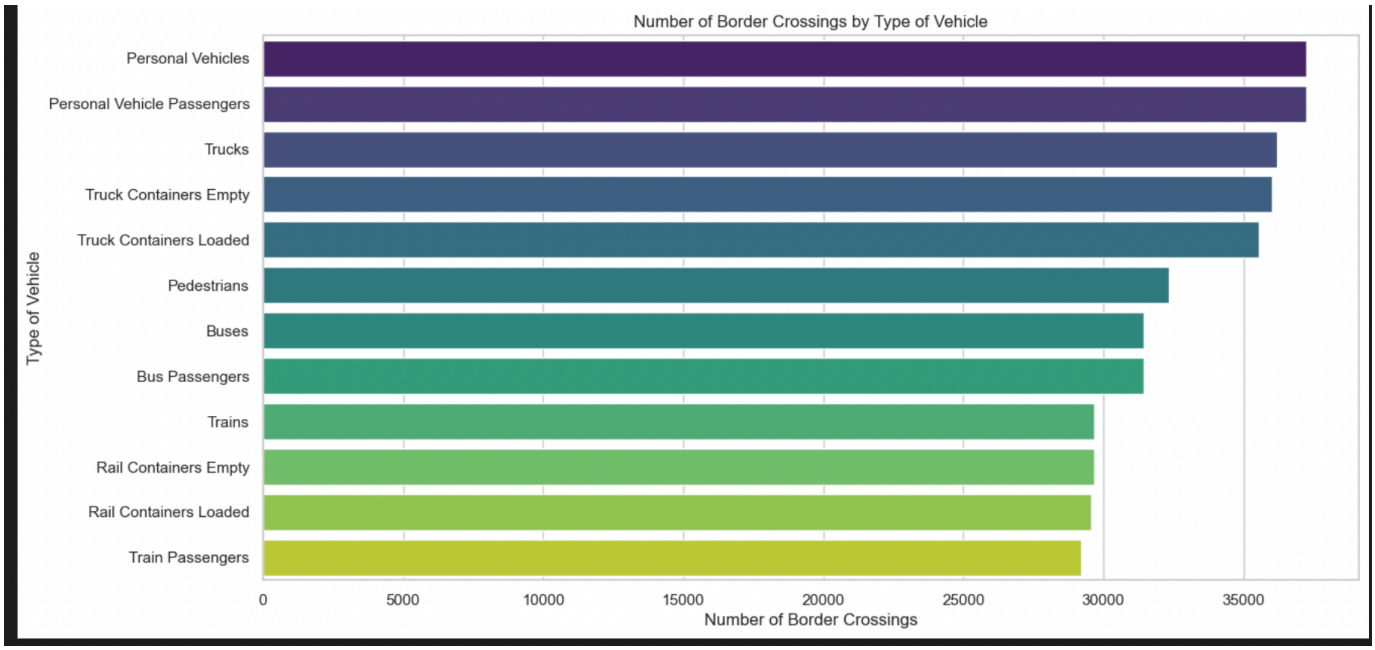
Results
Angie Vasquez
DS 3001

Prediction Question: Can seasonal patterns (among other relevant factors) be used to predict monthly border crossing volumes at major US entry points?

Visual 1: Distribution of Border Crossing by Vehicle



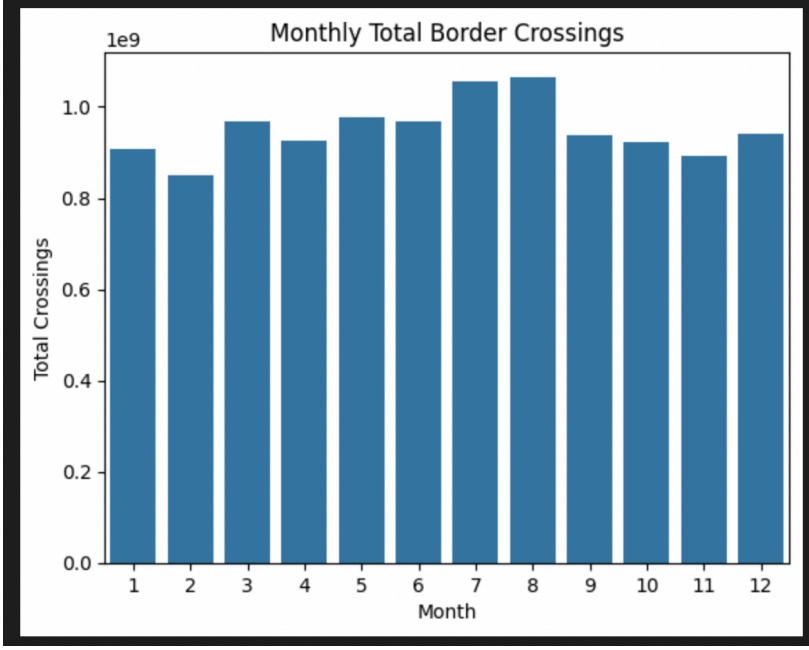
This visual provides an insightful breakdown of the dominant modes of cross-border traffic. Personal vehicles, followed by personal vehicle passengers, are the highest in volume, demonstrating the significant role individuals and families play in the cross-border movement. This could reflect common travel, such as tourism, family visits, or commuting, which has an impact on overall traffic patterns. The substantial presence of trucks in teh data, both loaded and empty, also demonstrates the importance of commercial trade and logistics across borders, as there is reliance on efficient transportation for goods and raw materials

The lower volume of rail containers, loaded and empty, and train passengers shows that there is a smaller proportion of cross-border traffic that is not as commonly transported by rail and other vehicle types. This could reflect infrastructure, cost-effectiveness, and usage patterns that favor personal vehicles and trucks for their flexibility in travel and higher capacity for rail as rail is for bulk and long-distance transportation.

Visual 2: Monthly Total Border Crossings

```
sns.barplot(x='Month', y='Value', data=monthly_counts)
plt.title('Monthly Total Border Crossings')
plt.xlabel('Month')
plt.ylabel('Total Crossings')
plt.show()
```

✓ 0.1s



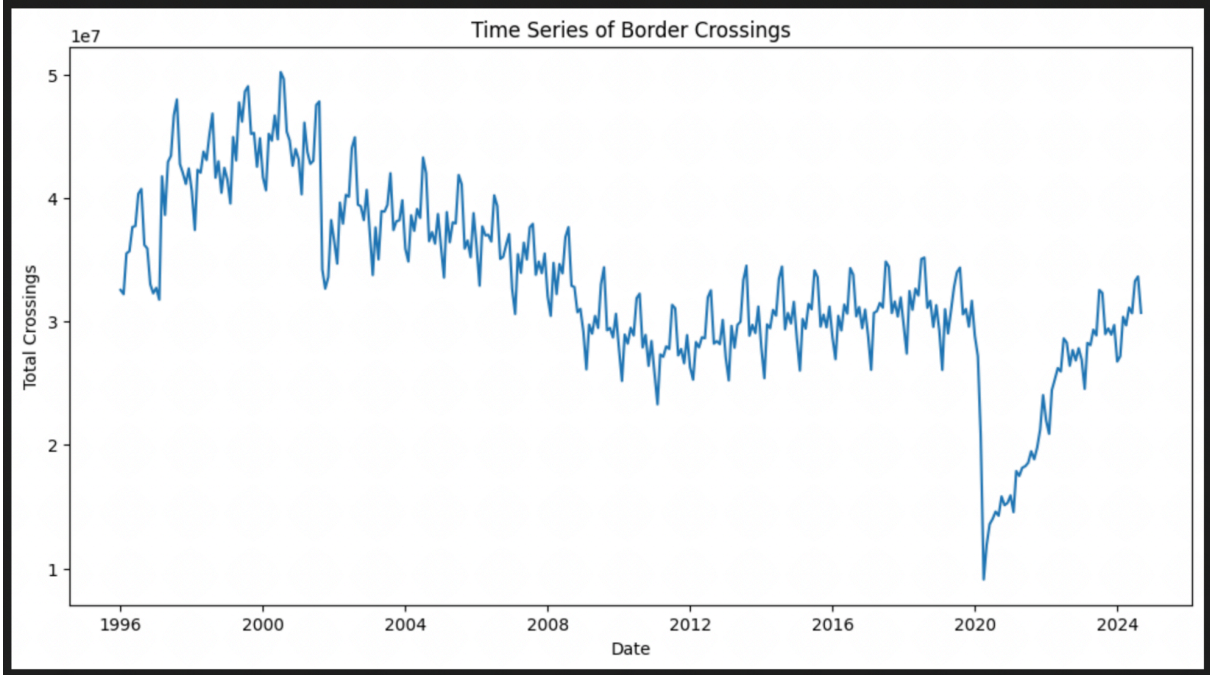
This shows a seasonal pattern coming into play in the volume of crossings. The months with the highest total crossings are June (6) and July (7). This corresponds to the summer season, a period that sees increased travel adn trade activity. This aligns with the expectation that warmer months produce higher border activity due to favorable weather conditions and some holiday seasons during this time.

Additionally, the lowest total crossings are in February (2) and November (11). This could be attributed to the winter weather conditions, which deter non-essential travel and impact the transportation of goods. Similarly, November reduced crossings reflect holiday slowdowns and before the end-of-the-year holiday surge, as well as possible impacts from unpredictable weather events

Visual 3: Time Series of Border Crossings

```
plt.figure(figsize=(12, 6))
sns.lineplot(data=time_series, x='Date', y='Value')
plt.title('Time Series of Border Crossings')
plt.xlabel('Date')
plt.ylabel('Total Crossings')
plt.show()
```

✓ 0.3s



This visual shows a trend from 1996-2002 where there is a period of relatively stable growth and consistent increase in cross-border traffic. However, the notable decline after 2002 suggests there was an impact from external factors, possible policy changes or economic shifts, as well as increased security measures.

The dramatic dip in 2020 aligns with the global outbreak of COVID-19, demonstrating the disruption caused by the pandemic that led to reduced cross-border activity due to lockdowns, travel restrictions, and economic uncertainty as well as supply shortages.

The subsequent upward trend post-2020 indicates a recovery period as restrictions eased and policies began adapting to new norms, pointing to potential seasonal and economic factors resuming.