

# Aggravated Assault Trends Dashboard: Progress Report

Team 09

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**Abstract:** This progress report summarizes our development of a data storytelling dashboard that visualizes aggravated assault trends in the United States from 2010 to 2023. Using D3.js, we are building a modular web app that presents interactive visualizations within a Martini-Glass narrative framework. This report provides a checkpoint on our implementation status, design changes, challenges encountered, evaluation strategies, and planned next steps.

**1. Motivations:** Our goal is to create a storytelling-driven dashboard that enables users to explore aggravated assault trends across time, geography, and demographic dimensions. The dashboard follows a Martini Glass narrative structure: it begins with guided scenes and transitions into an exploratory section. Users include public safety analysts, researchers, journalists, and policymakers. The tool supports informed, data-driven decisions by making complex datasets accessible and interactive.

## 2. Driving Application and Dataset(s)

- The application is a modular, client-side interactive dashboard built using **HTML, CSS, and D3.js**, designed to visualize **aggravated assault trends in the United States from 2010 to 2023**.
- It is structured around four core scenes, following a **Martini Glass storytelling structure**, where users are first guided through key insights before being allowed to explore on their own.
- The system enables both **temporal (year-wise)** and **geographical (state/region-wise)** exploration, powered by cleaned and harmonized CSV datasets.

### Dashboard Scenes:

- **Scene 1: Line Chart – National Trends (2010–2023)**
  - Displays the yearly number of aggravated assault offenses and offender counts nationwide, **highlighting key inflection points such as the post-2014 rise and pandemic-era spike**.
  - Users can hover or filter to view data for specific years and observe trends in **juvenile vs. adult arrests** or **offender sex**.
- **Scene 2: Parallel Coordinates Plot –Multivariate State Comparison (2010-2023):** This plot displays a multivariate comparison of states 2010-2023 using the following axes:
  - **Weapon Severity (1-5), Average Victim Age, Male Victim%, Arrest Rate %, categorized by weapon type: Firearm, Knife, Blunt Object, Personal Weapon, Other.**
  - Each colored line represents a specific weapon type's data across all states. The goal is to view how each weapon type's stats relate to the state-level averages.
  - Users can compare patterns across weapon types for each state, identify which weapons have higher arrest rates, and see the relationship between average victim age and arrest rates. The plot allows users to visualize how certain weapons tend to have a higher arrest rate in the US. It also shows how victim characteristics play a role in the incident.
- **Scene 3: Sankey Diagram – Weapon → Victim Gender → Arrest Outcome**

- Visualizes flow patterns of assaults using **three hierarchical dimensions**: type of weapon used (e.g., firearm, knife, blunt object), **victim gender**, and **arrest outcome** (arrested vs. not arrested).
- Allows users to explore questions like: “Are male victims more likely to be assaulted with a firearm?” or “What percentage of knife-based assaults lead to arrests?”
- **Scene 4: Explore Mode – Interactive Filtering and Comparison**
  - Empowers users to filter the dataset by year range, state(s), region, weapon type, victim gender, and offender sex.
  - All visualizations dynamically update based on these filters, enabling custom data exploration, **for example, tracking female victim trends in firearm assaults in the Midwest from 2018–2023.**

#### Dataset Details:

- The data comes from publicly available sources such as the **FBI Crime Data Explorer**, incorporating both **UCR and NIBRS-based reporting** formats.
- Files include: *offender\_sex\_trends.csv*, *weapon\_type\_trends.csv*, *state\_aggregates.csv*, and others derived from scraping or aggregating official databases.
- Data has been cleaned and validated to resolve issues like:
  - **Inconsistent date formats**
  - **Varying offense codes**
  - **Missing values** (handled via interpolation or exclusion)
  - Adjustments for the **UCR-to-NIBRS transition**, especially post-2020.
- **National figures show approximately 875,000 aggravated assault offenses reported during 2010–2023, with firearm use accounting for over 35% of them in recent years.**

### 3. Challenges to Address

- **Data Harmonization**: Unifying various CSV files across reporting formats (wide vs. long) and adapting to structural changes from UCR to NIBRS.
- **Visualization Responsiveness**: Making the dashboard mobile-friendly with responsive SVG elements and layouts.
- **Synchronization Across Modules**: Ensuring coordinated filtering and state sharing across multiple D3 components.
- **Handling Incomplete Data**: Resolving missing values and inconsistent codes to preserve analytical validity

### 4. Background and Related Work

Crime dashboards play a vital role in converting raw crime statistics into actionable public insight. Aggravated assault rates in the U.S. declined until the mid-2010s, but have since risen. For example:

- **In 2023, the national rate was 264.1 per 100,000 people—an 8% increase from 2019 (Statista, 2024).**
- **Firearm-related assaults have risen sharply since 2019.**
- **California saw a 25.3% rise in aggravated assaults from 2019 to 2022, with a 61.1% increase in gun-related cases (PPIC, 2024).**
- Prior platforms, such as Tableau and NCVS dashboards, offer foundational inspiration but often lack a narrative flow and fine-grained demographic breakdowns, which our dashboard aims to provide.

## 5. Method Current Design and Implementation (50%)

- **HTML & CSS:** Structured with four <section> blocks for each scene, using responsive CSS Grid for layout.
- **Modular D3:** Each scene (e.g., lineChart.js, sankeyDiagram.js) is implemented as a reusable D3 module and loaded through main.js.
- **Interactivity:** Dropdowns and sliders allow filtering by year, state, weapon type, and gender. Filter changes propagate across all views.
- **Data Management:**
  - CSVs are normalized (headers, date formats).
  - Missing data is handled by interpolation or exclusion.
  - Offense codes mapped for cross-year consistency.

## Changes and Design Decisions (10%)

- Switched from tracking *incident counts* to *offender counts* for clearer interpretation.
- Enhanced mobile responsiveness and accessibility.
- Added contextual legends, dynamic labels, and descriptive scene texts.
- Refactored code for modularity and easier debugging.
- Applied user feedback for simplifying filters and improving clarity.

## 6. Evaluation Plan (15%) We will evaluate the dashboard based on both performance and usability:

- **Performance:**
  - Load time for each scene.
  - Responsiveness of interactions (e.g., filter delay).
- **User Testing:**  
Informal trials with analysts and students.
  - Metrics: time to complete tasks, satisfaction surveys, and interpretation accuracy.
- **Success Criteria:**
  - Clear storytelling that answers users' key questions.
  - Consistent and accurate filtering across all scenes.
  - Intuitive design with minimal guidance required.

## 7. Preliminary Results (10%) Our early visualizations reveal the following:

- **Aggravated assaults increased significantly post-2018.**
- **Adult offenders represent the majority of arrests.**
- **We anticipate regional and gender-based patterns in state comparisons and Sankey flows.**

**Figure 1: Line Chart: National Aggravated Assault Trends (2010–2023) (Offender Count vs Year)**

Scene 1: National Trends

Display the annual trend of aggravated assault incidents across the United States via a line chart.

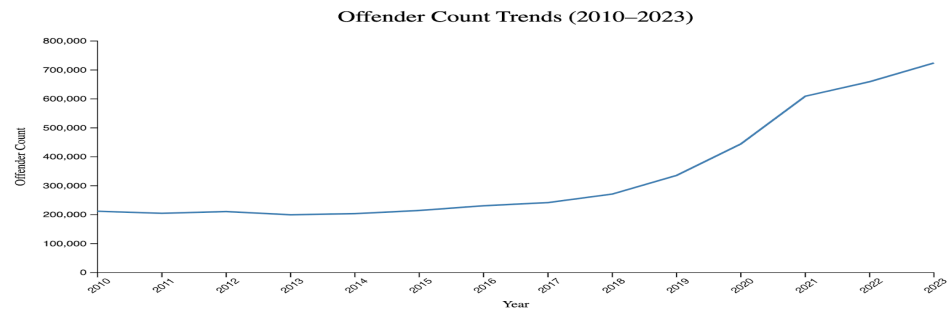
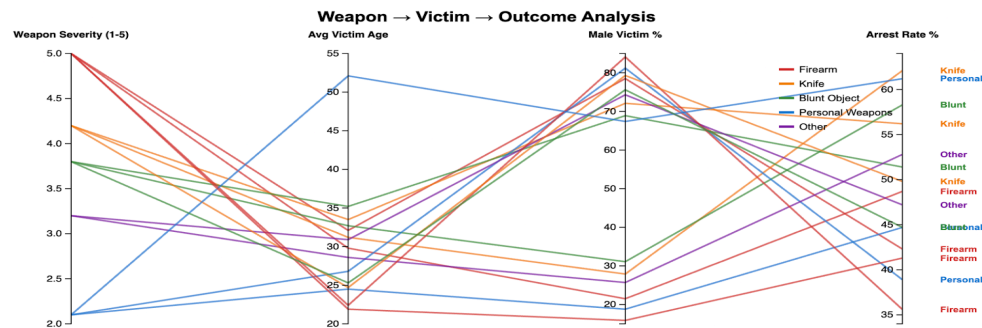


Figure 2: Parallel Coordinate Plot- Multivariate State Comparison(2010-2023)



(Code Structure is completed, data is still under processing)

Plan of Activities (5%) Table 1: Project Timeline

Task	Visulas/Chart	Responsible	Start Date-EndDate	Status
Scene 1	Line Chart	Noboru Tokimi	May 22–24	Complete
Scene 2	Parallel Coordinate	Xuyang Chen	May 25–27	Nearly Complete
Scene 3	Sankey Diagram	Jaya Singh	May 27–29	Nearly Complete
Scene 4	Explore Mode	Team	May 29–June 2	Ongoing
Evaluation & Testing	—	Jaya Singh	May 30–June 2	Upcoming
Final Polish	—	Jaya Singh	May 31–June 2	Upcoming

**9. Team Effort Division** All team members (Noboru Tokimi, Jaya Singh, Jacie) have contributed similar levels of effort in design, data cleaning, development, and evaluation. Specific components were assigned based on individual strengths (e.g., Sankey diagram, parallel coordination, line chart, visual styling).

## References

*Crime analysis dashboards in Tableau.* (2021, March 15). Andrew Wheeler.

<https://andrewpwheeler.com/2021/03/15/crime-analysis-dashboards-in-tableau/>

*CSS: Cascading Style Sheets | MDN.* (2025, May 23). MDN Web Docs.

<https://developer.mozilla.org/en-US/docs/Web/CSS>

Cturcotte (2025, February 12). *Homepage - Council on Criminal Justice.* My WordPress.

<https://counciloncj.org/>

*D3 by Observable | The JavaScript library for bespoke data visualization.* (n.d.). <https://d3js.org/>

*JavaScript | MDN.* (2025, April 3). MDN Web Docs.

<https://developer.mozilla.org/en-US/docs/Web/JavaScript>

*NCVS Dashboard.* (n.d.). <https://ncvs.bjs.ojp.gov/Home>