

SafetyFirst: Milestone 2

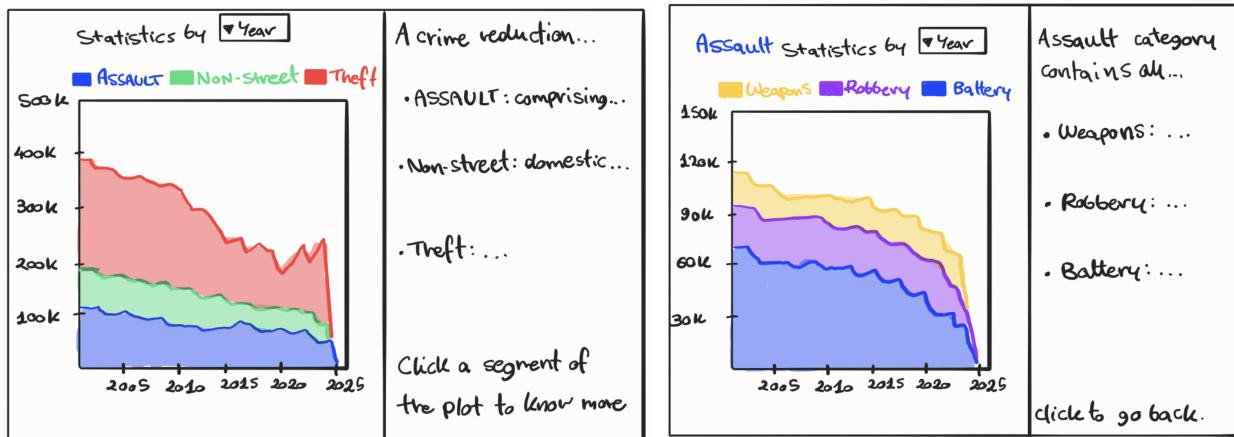
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*SafetyFirst*¹ is an interactive web application that provides **safety insights for urban travelers** by leveraging historical crime data. Using interactive maps and dynamic visualizations, it raises awareness of high-risk areas in Chicago and provides personalized safe travel routes. Our target users are mainly *university students* (especially exchange students) and *tourists*. The website comprises two parallel **Data-Stories**, which guide users to learn about the most common crimes in the metropolis, and a **SafeRoute Tool** that computes safe paths to help people travel through the city securely.

Homepage. The website introductory section prompts users to indicate whether they are university students or tourists. This selection directs users to their respective data stories, although they also have the option to move directly to the SafeRoute tool.

Data-Story: statistics charts. The first visualization in the data stories features a dual-column layout (fig. 1a). On the left is a stacked statistical plot illustrating the frequency of various crime types, while the right column presents a textual description that explains the different categories. Users can toggle between visualizing crime trends over years and over time-of-day. Moreover, upon clicking any crime category, the plot updates and displays crime subcategories in the same format and updated descriptions (see fig. 1b).



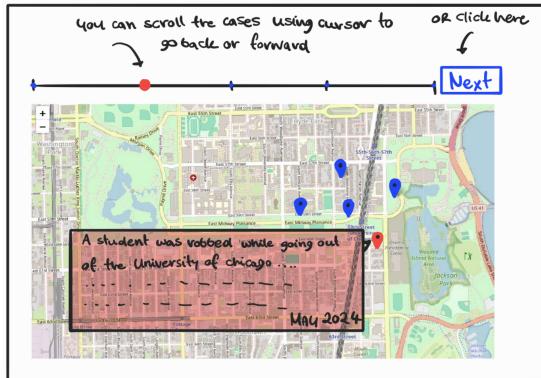
(a) Stacked plot for **primary categories**.

(b) Stacked plot for **secondary categories**.

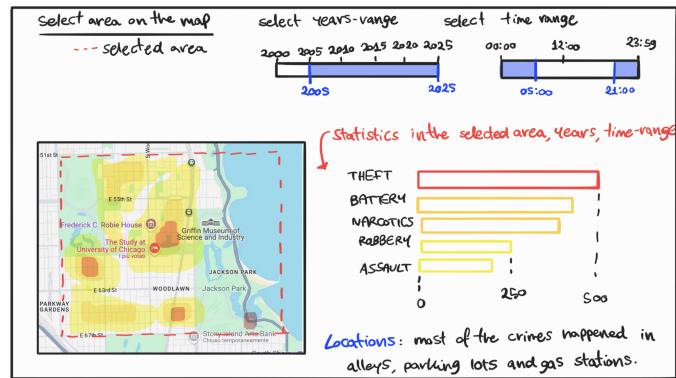
Data-Story: Showcases. Next, newspaper articles are showcased (fig. 2a). Depending on the user's choice, the crime victims in the articles will be students or tourists. This section highlights crime locations, with possibly some accompanying images and a brief summary of the incident as reported in the news.

Data-Story: Interactive Crime Map. The user is presented with a density map of crimes over a specified period (see fig. 2b). Users can interact with the map by selecting a rectangle-shaped area, choosing a year and time range. The tool highlights zones with higher crime density and displays a complementary plot showing crime type frequencies along with a brief summary of typical crime locations (e.g., street, parking lot, bus stop,

¹Prototype link: <https://com-480-data-visualization.github.io/SafetyFirst/>



(a) Newspaper article showcases.



(b) Interactive crime density map.

alley, supermarket). An alternative interaction allows users to choose a type of crime from a selection box and view the density map for that specific category. This way, they can discover which neighborhoods are most affected by certain crimes — for example, where pickpocketing tends to occur most frequently.

SafeRoute Tool. It allows to compute safe paths within the city (figure on the right). Users choose a starting point, destination, and preferred mode of travel (on foot, by car, or by bike). The tool retrieves routes suggested from Google Maps, calculates its “**risk score**” based on historical crime data, and then identifies a similar alternative route that reduces risk, avoiding crime hot-spots.



Tools and Technologies. We plan to build SafetyFirst using `React.js` 19 for its component-based architecture and efficient rendering, `Plotly.js` for interactive visualizations and the `Google Maps API` for geospatial route planning. More, `React-Leaflet` offers an alternative mapping approach, while `Three.js` enables potential 3D visualizations of crime hotspots. Simpler charts can be generated with `Recharts`, and the UI styled with `TailwindCSS`, with animations provided by `Framer Motion`.

The following course lectures are especially crucial to SafetyFirst: `Maps` [4] to guide our map visualizations; `Design` [2] and `Dos And Donts` [3] shape our UI for an intuitive user experience; `Interactions` [1] informs our interactive elements; and `Storytelling` [5] to keep users engaged while raising awareness about urban safety.

Extra Features Ideas.

1. Add immersive animations while showcasing newspaper articles, so to keep users engaged and to leave a lasting impression on them.
2. Extend SafeRoute to display contextual descriptions and statistical summaries of crime hot-spots along the paths suggested by Google Maps, with alerts for recent incidents.
3. Extend SafeRoute by integrating a Large Language Model API to provide descriptions of crime patterns in hot-spots, summarizing data and searching for news on the web.

References

- [1] Dr. Kirell Benzi. Interactions, views. https://moodle.epfl.ch/pluginfile.php/2321913/mod_resource/content/0/5_1_Interaction.pdf, 2025.
- [2] Ph.D. Kirell Benzi. Design for data viz. https://moodle.epfl.ch/pluginfile.php/2344910/mod_resource/content/0/7_1_Designing_viz.pdf, 2025.
- [3] Ph.D. Kirell Benzi. Do's and don'ts. https://moodle.epfl.ch/pluginfile.php/2344911/mod_resource/content/0/7_2_Do_and_dont_viz.pdf, 2025.
- [4] Ph.D. Kirell Benzi. Maps. https://moodle.epfl.ch/pluginfile.php/2389261/mod_resource/content/0/8_1_Maps.pdf, 2025.
- [5] Ph.D. Kirell Benzi. Storytelling. https://moodle.epfl.ch/pluginfile.php/2537365/mod_resource/content/0/12_1_Storytelling.pdf, 2025.