Illuminating Police Brutality in the United States

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1 Introduction

Police brutality has long been a fundamental problem in American society, but only relatively recently have technological advancements such as social media and phone cameras illuminated the complexities of such an issue. While many Americans understand and recognize police brutality as a serious issue, their understanding could be deepened beyond news headlines and social media discourse. Thus, the authors sought to answer - why is police brutality a serious problem, beyond the fact that many people get killed?

The authors sought to harness the power of visualizations, situated upon a map of the United States, to deepen understanding of such a multifaceted and present issue – the project was conducted during Derek Chauvin's murder trial, in which he was convicted of the murder of George Floyd on April 20, 2021. The project delves into a tour of the various layers of police brutality in the United States, from how it disproportionately affects people of color to how difficult accountability is to achieve. The authors also wanted to recognize how deeply this issue is tied to data, or lack thereof; this project was not only about using visualizations to illustrate various data-driven points about police brutality but also about recognizing both the power and the limitations of data and its visualizations.

2 Related Work

2.1 Journalism

Reporting on police brutality is driven by the work of newsrooms, especially the work of the New York Times, Vox, the Washington Post and more. Many of these newsrooms even maintain their own datasets – the Washington Post has been logging every fatal shooting by an on-duty police officer in the United States since 2015 [7], and the Guardian briefly maintained a similar database called The Counted during 2015 and 2016 [15]. Beyond data maintenance, many of these newsrooms regularly report on issues surrounding police brutality, such as emerging legislation, revisiting of different layers of the issue, and more. However, not every death or advancement on police brutality gets reported, and repeated exposure to media violence contributes heavily to emotional desensitization [13].

2.2 Activism

Active areas of accountability occur through the efforts of various research collaboratives and nonprofits. Mapping Police Violence, a research collaborative focused on collecting data on police killings, maintains the most comprehensive dataset on fatal police encounter beginning from 2013 [6]. A more policy-driven activist approach is emobodied through Campaign Zero, a project of the non-profit organization WeTheProtestors [2]. Campaign Zero maintains ten different areas for policy solutions, from ending broken windows policing to navigating fair police union contracts.

2.3 Academia

Multiple areas of academia are focused on formally studying the issues of police brutality, such as the Harvard Political Review [16].

The authors were also deeply inspired by the work of Catherine D'Ignazio and Lauren Klein [11]; Data Feminism offered key insights on how the exploitation of data access and warping has been employed to maintain the state of police brutality. Their work illuminated the authors' understanding regarding the issues surrounding data collection in the realm of police violence; how do we study an issue if we have no data on it?

3 Methods

3.1 Data Transformation

In order to address the problems associated with policing in the United States, it was important to integrate a variety of data sources. Each visualization within the various chapters of the scroll-able story made use of a different set of data, each of which required a different approach. One of the earliest explorations uncovered a tool on the website of the National Conference of State Legislatures (NCSL), which allowed users to search a database of police reform bills which had been introduced in the past two years [5]. Unfortunately, the interface was cumbersome, and suffered from poor performance, which hampered efforts to explore the data. In order to get access to the full set of laws for exploratory analysis and potential use in the final product, a Python script making use of the Beautiful Soup HTML parsing library was developed. The results of several disjoint queries of the full data set were consumed by this program, and written to a single csv file, which could be examined in Tableau, and utilized in the final design.

When exploring the implications of the Department of Defense's loan program for surplus military equipment to domestic law enforcement agencies [3], the authors were able to obtain a Microsoft Excel workbook containing an itemized list of every piece of equipment transferred. To be used by D3 in the final visualization project, the more than fifty sheets needed to be combined into a single .csv file. Again a Python script was developed, this time using the pandas library to operate on the .xlsx file from the Massachusetts ACLU. To preempt performance issues, this script was eventually modified to further reduce this data, containing tens of thousands of lines, down to a time series of the cumulative value of items loaned through the 1033 program.

A pattern frequently used within the sub-visualizations involved transforming the shape of the data from a collection of rows to a hierarchical data structure better suited to particular D3 visualizations. In the case of the legislation data set, this transformation was performed solely using standard JavaScript, after the data was pulled into the website. For the militarization chapter, the data was processed in Python, before arriving on the website. Finally, the calendar view demonstrating the persistence of police killings over time makes use of D3's grouping function, which transforms flat data into a hierarchical structure. Pre-processing the data is necessary when performance is preferred over flexibility, as it reduces the size and resolution of the data before it arrives on the web browser. Pure JavaScript is easier for the user uninitiated in D3, though once a familiarity has been established, using functions like D3's group and rollup is likely the best blend of performance and flexibility.

Other usage of datasets, particularly those that were more expansive such as the Mapping Police Violence, also operated within standard data transformations, with the use of Javascript.

3.2 Narrative

The project is built on top of a map of the United States, with a nearly constant display of deaths from the Washington Post's Fatal Force dataset as red markers on corresponding coordinates. The map and map spanning is accomplished largely through the functionality of the Mapbox GL JS, a Javascript library that uses WebGL to render interactive maps from vector tiles and Mapbox styles. The map spans to different cities and zoom levels to provide more context to the case studies presented in the scrollytelling.

4 Results

The project focuses on a few main facets of police brutality and corresponding case studies, extending their impact through the use of visualizations. The main visualization is a map of the United States with a red marker at the location of every fatal police shooting since 2015. This map persists as the user scrolls through the sections and explores the sub-visualizations, occasionally zooming into and highlighting specific markers when case studies are presented. The authors decided on the persistent map to force the excessive number of deaths to be central to the experience.

The project starts with a zoomed in focus on a recent fatal shooting of thirteen year old Adam Toledo. It then pans to a broader picture of police brutality in the United States, highlighting missing data with connection to George Floyd's murder. There is a brief section detailing how police brutality has remained a consistent issue with connections to the later sections. This section is supported with a calendar heatmap illustrating the number of police deaths per day from January 1, 2021 up to April 21, 2021. The calendar heatmap provides impact by visualizing the fact that there have only been three days without a fatal police shooting since the beginning on the year.

The later sections of the project are detailed below and explore various factors and corresponding case studies of police brutality in the United States. Through the case studies, the authors hope to draw a connection with what their audience might be familiar with already.

4.1 Marginalized Communities

The first main section is centered around two donut charts, the first on the distribution of race and Hispanic origin in the general population and the other spanning across police deaths within the Mapping Police Violence dataset. Specifically, the two charts illustrate how Black and Hispanic communities make up significantly more of the fatal police shooting deaths than their composition within the overall United States population. Users can reveal more information with helpful tooltips situated over the donut charts.

4.1.1 Connection to Sickle Cell Trait

The authors extend the chapter of marginalized communities by connecting to a recent NYTimes article on how sickle cell trait, a genetic condition found more commonly in African-Americans, was employed to rule many fatal police shootings as natural causes [14]. Such an extension helps users realize the insidious implications of racism and how it is used not only to advance police brutality but also to protect it.

4.1.2 Connection Back to Adam Toledo

The authors also tie the case back to the killing of Adam Toledo, which was referenced early in the narrative of the project, largely because many have argued over the significance of his death as he was fleeing with a gun [10]. The inclusion and re-centering of his death illustrates how the intersection between racism and police brutality is part of a much larger picture of housing discrimination, poverty, disinvestment from communities, and efforts to curb gun violence.

4.2 Police Militarization

The next chapter of the scrolling view investigates the militarization of law enforcement agencies (LEAs) through a study of the Department of Defense's (DoD) 1033 program [1]. Named for a section of the 1997 National Defense Authorization Act, it permits the distribution of excess military equipment to domestic law enforcement agencies across the United States. The authors obtained a data set from the Massachusetts ACLU which tracks the items distributed from the DoD to domestic LEAs from 1990 to 2017 [3]. Columns include the name of the item, the agency which received them, the quantity loaned, dollar values, as well as the item's DoD DEMIL Code. DEMIL codes are a marker used by the DoD to indicate the requirements for disposal of military equipment. These codes can be used to rouggly categorize the kinds of equipment given to LEAs. After a brief introduction, the website presents a stacked area plot of the cumulative value of items loaned to LEAs from the early 1990s to 2017. The plot is interactive; users can brush along the time axis to zoom into particular years, and highlight different categories by hovering over the legend. It reveals the massive growth in value of loaned equipment occurring after the withdrawal of American forces from Iraq in 2011, driven mostly by items with DEMIL code "C", which include vehicles such as Armored Personnel Carriers, and helicopters. The plot is cumulative to account for the fact that the equipment loaned is cumulative (i.e. LEAs who received an armored truck in 2015 likely are still using it in 2021). It plots dollar values, rather than item quantities, to demonstrate the savings afforded to LEAs participating in the program. After all, without the program, LEAs, and the taxpayers who fund them, would have to make judgements as to the value of providing military vehicles to police. Plotting dollar values also makes the smaller number of high value items easier to spot in the data.

4.2.1 Connection to Breonna Taylor

The narrative then connects the militarization of police to the killing of Breonna Taylor during the execution of a no knock warrant on her home in March of 2020 [12]. It asserts a connection between the militarization of police, and their use of aggressive tactics against American citizens.

4.3 Police Reform Legislation

Next, users are presented with a stacked bar chart, with which they can explore how different states' legislatures have attempted, or perhaps not attempted to address the problem of police violence. The authors obtained this data from the National Conference of State Legislatures. It contained a list of bills introduced in each state and territory in the United States, as well various details describing their origins and statuses [5]. The data for the twenty states with the largest number of bills introduced are included, mainly due to display considerations. Stacking the bars by bill status illuminates not just the number of bills introduced in a state, but the rate at which they are passed. This allows users to reflect on the effectiveness of the different states' legislative approaches. For instance, a user might notice that in Minnesota, the site of George Floyd's murder at the hands of police, many bills were proposed, but have succumbed to a high failure rate. They might also question why New York has seen so many more bills than other states, and be inspired to investigate further.

4.4 Data Incompleteness

Towards the end of their exploration of various data sets describing the problem of police violence in the United States, users might be surprised to find out that missing data is a significant challenge facing reform efforts. Without comprehensive data on the way police use force in the course of their work, it is difficult to identify patterns of success and failure, and to establish meaningful comparisons between LEAs. The FBI recently began an initiative to track use

of force data for U.S. LEAs, but as of 2019, it sees only about a 40 % participation rate [4]. The bureau will only start releasing the use of force data when it reaches 80 % participation. In the meantime, it has released the list of departments which have joined, which can be combined with data on the total number of police departments in each state from the Bureau of Justice Statistics' 2008 Census of State and Local Law Enforcement Agencies to compute a rough participation rate for each state. These participation rates are displayed in a choropleth format on the main background map view of the United States. Large light areas demonstrate that much of the nation is not doing well to participate in the FBI's data collection initiative. Users can find their own state in the data, and might be persuaded to investigate if their local law enforcement is participating.

5 Discussion

The scrollytelling ends with a list of resources for the audience to broaden and deepen their knowledge of police brutality in the United States as well as ways they can contribute to change around this issue. As described in the introduction, the goal of the project was to build our users' depths of understanding around the problem of police violence. Our users, like nearly 80 % of Americans, believe that police violence is at least a moderately serious issue [9], but they may not see a path towards addressing it. With the help of this project, they are now capable of identifying specific factors driving police brutality, and equipped to advocate for change. Users can advocate for changing the terms of the DoD's section 1033, lobby their state representatives to make meaningful legislative change, or vote in law enforcement leaders who pledge to join the FBI's use of force data collection initiative.

An imagined use case for our project would be with an individual who has only witnessed police brutality in the news and comes from a place of relative privilege. The beginning of the project narrative should resonate with this user as it links to the names of police brutality deaths that have dominated a significant amount of social media and online discourse.

The project then works to guide the user through a series of causes and components of police brutality that make it so severe. The helpful references sprinkled throughout the specific cases brought up offer more resources for this user to explore, and the interactivity within the multiple visualizations offer another layer of information.

Finally, as discussed above, the closing offers further reading and opportunity to do more.

6 Future Work

Areas where this project could be refined and improved upon would largely be through the relationship between the background map and the more specific case study visualizations. In particular, the authors had hoped to offer more comparison with regards to police brutality in other democracies around the world, especially as the United States leads [8].

A general course for improving the project's ability to impact users lies in increasing the depth at which they are able to explore the many data sets made available. For example, as it stands users are unable to view individual bills proposed in state legislatures. If they were able to see which bills have failed, and how they failed, they would be better positioned to advocate for changes in their statehouses. Perhaps users would benefit also from exploring individual items loaned through the 1033 program, rather than taking the authors' word on what items fall under which category.

In a similar way, aggregating the data and making it possible for users to investigate individual LEAs could allow them to push for change in an even more targeted way. A user concerned about police violence could investigate their local police department, and push local leaders to make changes that move their communities towards a safer, more just future.

Finally, this visualization project was a tangle between the qualitative and the quantitative. In the future, we hope to add more fundamental chapters that we were actively working on throughout the duration of the assignment, such as police accountability metrics and unions. An unexpected significant effort the authors put in was towards the research and direction of this project – what facets of police brutality could we discuss within the constraints of the project? What facets are we still missing? Work in the future would thus iterate on these questions and provide for a more expansive examination into police brutality.

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