

ALLEGHENY COLLEGE
COMPUTER AND INFORMATION SCIENCE DEPARTMENT

Senior Thesis

Get in Jail Free Card Thesis

by

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Abstract

Wrongful Convictions has been an issue in the United States for many years. This project explores the issue of wrongful convictions in the United States and sheds light on different facts and statistics about it. This is done by the development an interactive website titled **Get In Jail Free Card** that visualizes real data. Built using Dash, Plotly, and Pandas, the site allows users to scroll through different sections, triggering graphs, quotes, and visuals tied to exonerees' stories. Each figure is grounded in verified datasets, including those from the National Registry of Exonerations and FBI crime statistics. The goal is to make complex legal data easier to access and more emotionally impactful, especially for people who may not be familiar with how wrongful convictions work. The platform is designed to be both informative and accessible, serving legal professionals, advocacy groups, and the general public. By visualizing systemic patterns and highlighting individual cases, this tool adds a human face to the data and encourages transparency, accountability, and reform in the justice system.

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1 Template description

This repository contains the starter materials for your thesis in Computer Science 600 and 610 in Fall 2022 and Spring 2023 academic term. The main directory of this repository contains the Markdown template for a project that is designed for use with GitHub Classroom. To learn more about the course in which these assignments were completed, please refer to the `README.md` file.

The template specifies various settings in the `config.yaml` file included in the repository. Change the appropriate values under the **Project-specific values** heading. Changing other values outside of that section may cause the project to fail to build. **Modify these values at your own risk.**

Author your thesis in the `thesis.md` document using appropriate Markdown hierarchy and syntax; GitHub Actions will automatically create a PDF from the `abstract.md` and `proposal.md` files. Consult the `README` of the proposal repository to learn how to properly build and release this PDFs.

1.1 Citations and references

Including references throughout requires a specific pseudo-Markdown tag, demonstrated in the following blockquote. (Inspect the `thesis.md` file to see the format.)

1.2 Labeling figures

To label a figure (i.e. an image), referencing the image using correct Markdown will automatically caption the figure:

```
! [Label] (images/IMAGE_NAME.png)
```

1.3 Labeling tables

To provide a label for a table, write a short caption for the table and prefix the caption with **Table:** as in the example below:

Table: A two-row table demonstrating tables

Row number	Description
1	Row 1
2	Row 2

1.4 Other template information

Two things specific to this template to also keep in mind:

1. It is your responsibility to remove this description section before building the PDF version you plan to defend.
2. References *will only appear if cited correctly* in the text

1.5 Note on LaTeX commands

Documents may include specific LaTeX commands *in Markdown*. To render these, surround the commands with markup denoting LaTeX. For example:

Checkmark character: `$\checkmark$`

Superscript character: `$^{\dag}$`

If using a special package not included in the template, add the desired LaTeX package or command/macro to the `header-includes` property in `config.yaml`.

Should this package not be included in the environment shipped with this template, you may also need to add the package to the GitHub Actions Workflow.

Direct any questions about issues to your first reader.

2 Introduction

As of December 5, 2024, the current exoneration count is 3,622, representing cases recorded by the National Registry of Exonerations between 1989 and 2024. This number is distributed among 1,928 Black individuals (53%), 1,149 White individuals (31%), 458 Hispanic individuals (12%), and 79 individuals classified as “Other” (2%)[22].

Wrongful convictions are a systemic issue that contribute to widespread skepticism of the criminal justice system. The racial disparities within these cases are especially alarming—Black individuals are disproportionately affected by wrongful convictions. They are more likely to be exonerated because they are more likely to be wrongfully convicted, and they are more likely to be wrongfully convicted because they are more likely to be convicted in the first place.

These disparities are evident in high-profile cases such as the Central Park Five, where five Black and Latino teenagers were coerced into false confessions and wrongly imprisoned for years before being exonerated. Cases like these highlight the urgent need for data-driven tools that can help analyze wrongful conviction patterns, expose systemic biases, and support legal advocacy efforts[8].

This study aims to shed light on wrongful convictions and the discrepancies among them. This study originally explored machine learning as a method for predicting wrongful convictions but shifted toward developing an interactive website that uses data visualization to analyze wrongful conviction statistics. While advances in machine learning have made it possible to build predictive models for wrongful convictions, challenges such as bias in training data and lack of transparency limit their effectiveness. This study instead focuses on developing an interactive website that uses data visualization tools to represent wrongful conviction statistics. By analyzing historical exoneration data, this platform will enable legal professionals, advocacy groups, and the public to explore patterns of bias, prosecutorial misconduct, and forensic errors in wrongful convictions. Through interactive dashboards and visual analytics, the goal is to increase transparency, inform policy discussions, and promote justice reform.

2.1 Definition of Terms

2.1.1 Data Visualization and Analysis Terms

Data Visualization – The graphical representation of data using visual elements such as charts, graphs, and dashboards to make complex information more accessible and understandable.

Interactive Website Platform – A digital tool accessible via a web browser that allows users to engage with data dynamically through interactive elements such as charts, graphs, and filters. It enables users to explore and analyze complex datasets without requiring specialized software or programming knowledge.

Bar Chart – A visualization that represents categorical data using rectangular bars, helping to compare different groups or track changes over time.

Data Filtering – The process of refining data visualizations by applying specific conditions or selecting particular subsets of data.

Exploratory Data Analysis (EDA) – The process of analyzing and summarizing datasets using statistical and visual methods to uncover patterns and insights.

Algorithmic Transparency – Ensuring that the decision-making process behind data visualizations or machine learning models is understandable and interpretable by users.

2.1.2 Tools and Technologies Used

Dash – A Python framework for building web applications with interactive data visualizations.

Plotly – A graphing library for Python used to create interactive, publication-quality visuals.

Pandas – A Python library used for data manipulation and analysis.

Data Cleaning – The process of removing or correcting inaccurate, incomplete, or irrelevant data from a dataset.

Data Transformation – The process of converting data into a format suitable for analysis or visualization.

Plotly Express – A high-level interface in Plotly that simplifies the creation of basic charts and graphs.

Graph Objects – A lower-level Plotly module that allows for detailed customization of data visualizations.

Dash Bootstrap Components – A set of pre-styled UI elements (like cards, modals, and navigation bars) based on the Bootstrap framework, designed for use in Dash apps.

Off-canvas Modal – A user interface component that slides in from the edge of the screen to display additional content without navigating away from the current page.

us (Python package) – A Python library used to work with U.S. state data, such as converting full state names into their two-letter abbreviations.

Choropleth Map – A map that uses differences in shading or color to indicate the values of a variable across geographic regions.

HTML (HyperText Markup Language) – The standard language used to create the structure of web pages.

CSS (Cascading Style Sheets) – A style sheet language used to describe the look and formatting of a web page written in HTML.

2.1.3 Machine Learning and Predictive Analytics Terms

Machine Learning (ML): A branch of artificial intelligence where algorithms learn from data to make predictions or detect patterns without explicit programming.

Predictive Analysis: The use of statistical models and algorithms to estimate the likelihood of future outcomes based on historical data.

Support Vector Machine (SVM): A supervised learning algorithm used for classification and regression tasks, often struggling with imbalanced datasets.

Model Accuracy: The percentage of correct predictions made by a machine learning model; often impacted by dataset quality and bias.

Algorithmic Bias: Systematic errors in machine learning models that reinforce existing biases due to flawed training data.

Class Imbalance: A situation in which one class is significantly overrepresented in a dataset, leading to poor predictive performance for the underrepresented class—one of the key challenges in wrongful conviction data analysis.

Data Scarcity: A challenge where insufficient or low-quality data makes it difficult to train an effective machine learning model—one of the main reasons for shifting toward a visualization-based approach.

2.1.4 Legal and Criminal Justice Terms

Wrongful Conviction: The conviction of a person for a crime they did not commit, often due to systemic failures such as faulty evidence or judicial errors.

Exoneration: The official clearing of a person’s name after being found wrongfully convicted, usually due to new evidence proving their innocence.

Prosecutorial Misconduct: Improper or illegal acts by prosecutors, such as withholding evidence, coercing witnesses, or presenting false testimony.

Eyewitness Misidentification: Mistakes made by witnesses in identifying a suspect, which is one of the leading causes of wrongful convictions.

False Confession: An admission of guilt for a crime a person did not commit, often due to coercion, intimidation, or psychological pressure.

Faulty Forensic Evidence: The misinterpretation, misuse, or outright fabrication of scientific evidence in criminal cases, leading to wrongful convictions.

Jailhouse Informants: Inmates who testify against defendants, often in exchange for reduced sentences or other incentives, making their testimony unreliable.

Bias and Discrimination: Prejudices based on race, gender, or socioeconomic status that influence legal decisions and contribute to wrongful convictions.

Plea Bargaining: A legal agreement in which a defendant pleads guilty to a lesser charge to avoid trial, sometimes leading to unjust convictions.

2.1.5 Ethical and Systemic Terms

Systemic Racism: Institutional policies and legal practices that produce and maintain racial inequalities within the justice system.

High-Profile Cases: Legal cases that receive widespread media attention due to their impact, the individuals involved, or the nature of the crime.

Data-Driven Decision-Making: The process of making legal or policy decisions based on empirical data analysis rather than personal judgment or anecdotal evidence.

Historical Bias: The presence of past discriminatory practices in legal data, which can affect how wrongful convictions are analyzed and understood.

Transparency in Criminal Justice Data: Ensuring that legal and exoneration data is openly available, accurately represented, and not misinterpreted through misleading visualizations.

Trauma-Informed: An approach that recognizes the emotional and psychological effects of trauma on individuals and communities.

2.2 Background of the Problem

Many systemic failures contribute to wrongful convictions, including eyewitness misidentification, false confessions, prosecutorial misconduct, faulty forensic evidence, and racial bias. These failures undermine public trust in the criminal justice system and disproportionately affect marginalized communities.

Eyewitness misidentification is the leading cause of wrongful convictions, occurring in nearly 69% of DNA-based exoneration cases[9]. Research suggests that false memory formation and suggestive lineup procedures significantly increase the risk of misidentification. As cognitive psychologist Elizabeth Loftus explains: “Eyewitness memory is highly malleable, and even subtle suggestions can distort a witness’s recollection of events.[16]”

Similarly, false confessions remain a major cause of wrongful convictions, particularly among juveniles and individuals with mental impairments. Coercive interrogation tactics often push innocent individuals into admitting to crimes they did not commit. The Central Park Five case illustrates this issue—five Black and Latino teenagers were interrogated for hours without legal counsel and ultimately coerced into giving false confessions. Research on false confessions found that:

“In 81% of documented false confession cases, police interrogations lasted more than six hours, increasing psychological pressure and the risk of false admissions.[1]”

Prosecutorial misconduct, including the suppression of exculpatory evidence and witness coercion, is present in nearly 43% of exoneration cases[22]. Studies show that Black exonerees are 50% more likely than white exonerees to have been victims of prosecutorial misconduct. The Equal Justice Initiative notes that:

“Bias in prosecutorial decision-making contributes to racial disparities at every stage of the criminal justice process, from charging to sentencing.[2]”

Beyond individual cases, wrongful convictions have far-reaching economic and social consequences. Families of the wrongfully convicted suffer financial strain, emotional distress, and permanent reputational damage. Exonerees frequently experience PTSD, depression, and difficulty reintegrating into society, even after being freed. [14] A wrongful conviction costs an average of \$6.1 million per individual, including lost wages, legal fees, and incarceration expenses[6]. Furthermore, the broader societal costs—eroded trust in law enforcement, reluctance to cooperate with police, and a damaged legal system—are incalculable.

Organizations like The Innocence Project have played a crucial role in exposing these systemic failures, advocating for policy reform, DNA testing, and fair trial practices. However, a significant gap remains in tools designed to analyze these cases systematically. Existing solutions often focus on individual case reviews, but a wider analysis of systemic trends is necessary to drive meaningful reform.

2.3 Statement of the Problem

Wrongful convictions have been a persistent challenge in the justice system. Documented cases date back to 1989, but undocumented cases reach as far back as the 1600s. These injustices highlight the systemic flaws in the justice system that continue to undermine fairness and objectivity.

There are several tools made in this field of criminal justice. Similarly to this one, existing tools aim to visualize and analyze wrongful convictions using publicly available data. For example, the National Registry of Exonerations (NRE) provides a searchable database and interactive map that allow users to explore exoneration cases by location and contributing factors. The Innocence Project’s “Our Impact: By the Numbers” presents key statistics and demographic trends related to wrongful convictions[10]. Additionally, academic projects like Shing-Yun Chiang’s “Exonerations in the U.S.” use data visualization to illustrate the timeline of wrongful convictions, from arrest to exoneration[5]. While these tools offer valuable insights, they are often limited in interactivity, data exploration, and user engagement.

To bridge this gap, there is a need for an interactive website data visualization tool that enhances accessibility, exploration, and engagement with wrongful conviction data. By integrating interactive graphs, comparative analytics, and filtering options, this tool can provide a clearer understanding of systemic failures and contributing factors, ultimately supporting efforts to reform the justice system and prevent future miscarriages of justice.

2.4 Purpose of the Study

The study aims to dissect the systemic biases that underlie wrongful convictions. With the hope that in the future, these biases will not occur during cases. These biases include eyewitness misidentification, prosecutorial misconduct, racial disparities, and faulty forensic evidence. Eyewitness misidentification accounts for 69% of DNA exoneration cases. This is a significant contributor to wrongful convictions. Cross-racial misidentifications disproportionately affect Black defendants[9]. Prosecutorial misconduct is present in 43% of exoneration cases. Similarly to eyewitness misidentification, this statistic is disproportionate to Black exonerees. Black exonerees are 50% more likely to face police misconduct compared to white exonerees. As shown, racial disparities remain a continuous issue. Black Americans are seven times more likely than white Americans to be falsely convicted of serious crimes [21]. Furthermore, faulty forensic evidence is misapplied in 53% of cases. This adds to the lack of trust and faith in the

criminal justice system. (National Institute of Standards and Technology)[13]. Bringing these systemic issues to light shows why the need for tools that identify biases is urgent and justified.

2.5 Research Questions

This study will be aimed around three research questions. These questions are: What patterns and systemic factors contribute to wrongful convictions, as revealed through data visualization? How can interactive data visualization tools improve public understanding and advocacy for wrongful convictions? What ethical considerations arise when using data visualization to represent real-life wrongful convictions and systemic biases in the justice system?

2.6 Significance of the Study

This study is significant because it addresses critical gaps in the justice system using statistics about wrongful convictions and exonerations. This is done by providing a data-driven, interactive platform. This project aims to increase accessibility to important data in regards to the criminal justice system. Too many people are uneducated about this matter and do not know the right place to find information on this subject. This is what this study is for. Furthermore, the tool will highlight systemic injustices. As previously stated, there are many systemic injustices that are swept under the rug by the government. This tool can be used to inform legal professionals, policymakers, and the public. By visualizing key trends in wrongful convictions, racial disparities, and crime statistics, this tool promotes transparency, accountability, and evidence-based decision-making in the justice system.

This interactive platform provides legal professionals, policymakers, researchers, and the general public with innovative visualizations of wrongful conviction data that are appealing to keep readers engaged and insightful to give users a complete understanding of what is going on in society today. Advocacy organizations such as The Innocence Project can leverage the platform to identify trends in prosecutorial misconduct, forensic errors, false confessions, and racial biases. By collecting and visualizing this information, the tool allows legal teams to strengthen appeals, guide sentencing reviews, and refine trial preparation strategies.

Beyond individual cases, this platform sheds light on larger systemic patterns. For example, policymakers can use insights generated from historical exoneration data to advocate for reforms such as improved forensic standards, mandatory recording of interrogations, increased oversight of prosecutorial conduct, and reevaluating plea bargaining processes. By showing complex statistics in a compelling way, making it accessible to the public, and visually interpretable, this platform enables a data-driven approach to criminal justice reform. Many existing criminal justice data visualization projects focus on crime rates, incarceration trends, and broad systemic issues. Unfortunately they often lack a direct connection to real-life wrongful conviction cases. They do not

have many personal accounts of these convictions. Rather just statistics and facts that may come off as unappealing. While these projects offer important insights into the justice system, they tend to group data at a high level, missing the individual human impact of wrongful convictions.

There are several examples of this on the internet. The Alchemy of Legal Data is a project that turns criminal justice data into digital art using AI[4]. This makes complex legal issues easier to understand emotionally. Exonerations in The U.S. by Shing-Yun Chiang is a project that looks at the NRE dataset to show how long it takes for people to be exonerated after their wrongful conviction[5]. The Innocence Project’s ‘Our Impact: By the Numbers’ is a website that presents wrongful conviction statistics, including racial disparities and common causes, to help push for legal reforms[12]. ‘Coming Clean’ by ACLU Massachusetts is a data-driven project that focuses on wrongful convictions caused by false forensic evidence[19]. They show the problems with how drug testing procedures are handled. While these projects provide useful information, they mostly focus on big-picture statistics and broad patterns without emphasizing the personal stories behind wrongful convictions.

This platform differs because it connects wrongful conviction data to real-life exonerees. Instead of just presenting numbers, it highlights individual people, their cases, and how they were exonerated. Furthermore the website tells a visual story. It makes you feel like you are in their shoes. It uses interactive storytelling to make data more engaging. This is done by mixing statistics with real cases. This tool bridges the gap between legal facts and human impact. It lets users explore the reasons behind wrongful convictions. An example of this website containing story telling elements is through the visuals. The website is scrolled based so the more you scroll the more you learn. After the first scroll you will see a little black boy pop up. Users will not know why the boy is there walking down the prison hallway background. As the users scroll and read through the information being shown they will see this boy turn into a teenager. From there they scroll and learn more information and once they get to the bottom they will see this boy turned teenager is now a man walking out of prison. This was done to symbolize that many wrongful convicts go into prison at such a young age. They have have their time and innocence stripped away from them. Thus leading to them going from boys to men behind bars. Unlike most platforms that just show case numbers, this project provides detailed broken down statistics and graphs that are supported with rich text and first hand testimonies. It makes information easy to access and understand. Many existing tools are designed for legal experts or researchers, but this platform is interactive, easy to use, and built for the general public. The long-term vision of this study is to contribute to ending wrongful convictions. By utilizing data visualization tools within an interactive website platform, this project has the potential to increase awareness and understanding of the injustices behind wrongful convictions to the general public. This will engage who have never thought about wrongful convictions.

Organizations such as The Innocence Project can integrate this tool into their advocacy strategies. They can link this tool to there website for people who are

interested in different facts and statistics. They can use its data visualizations to support cases. There are plenty of facts on this platform that shows examples of racial disparity. This tool will also highlight systemic patterns of injustice, It will strengthen appeals for the wrongfully convicted. Additionally, the platform’s insights can be shared with educational and training institutions to equip future legal professionals with a deeper understanding of systemic biases and wrongful conviction trends. This tool has the potential to be a game changer in the legal world if utilized as such.

Over time this project hopes to inspire broader innovations across the legal system and social justice space. This has hopes to be a revolutionary piece in the end to wrongful convictions. It’s not just about showing graphs or sharing statistics. It’s about making the truth more visible and harder to ignore. The goal is to shift how people interact with data on wrongful convictions and encourage engagement that focuses on accountability, fairness, and transparency. This tool can connect what we know to what still needs to change. By placing wrongful conviction data into a more interactive and accessible format, the platform opens space for honest conversations about systemic failure. It gives users from citizens to legal professionals a way to explore patterns that are often hidden in spreadsheets or academic reports. In doing so it invites reflection on how and why these injustices keep happening.

This resource also supports collaboration. Technology experts, legal advocates, educators, and policymakers can use it to find common ground and think about reform. It’s not meant to solve everything, but it helps people understand and ask better questions. That’s what gives it value. Many people are left out of conversations about justice because the data is hard to understand or access. This project challenges that. It shows that when information is clear and grounded in real stories, it can move people to care and take action. If used well, this tool can help push discussions forward in classrooms, courtrooms, and policy meetings. The hope is that it becomes part of a larger effort to make the legal system more just, more honest, and more focused on the people it affects.

2.7 Assumptions, Limitations, and Delimitations

This section will be broken up into two sections. Assumptions, Limitations, and Delimitations for the original machine learning tool and Assumptions, Limitations, and Delimitations for the interactive webase that is composed of data visualization tools.

2.8 Assumptions, Limitations, and Delimitations for Predictive Analysis Tool

Initially, this study was about building a predictive model for wrongful convictions. The plan was to use Support Vector Machine (SVM) classification on either appeal datasets, or find dataset with both wrongful and rightful convictions to detect patterns in wrongful convictions. The assumption was that

systemic patterns such as racial disparities, prosecutorial misconduct, and forensic errors would be seen in all the datasets. This would allow the model to classify wrongful convictions effectively. However, several challenges made this approach impractical.

One of the biggest roadblocks was the lack of accessible raw data. Wrongful conviction cases are highly sensitive, and much of the relevant legal data is either not publicly available or scattered across different systems. Even datasets that were accessible, such as the Monitoring of Federal Criminal Convictions and Sentences: Appeals Data (ICPSR 36978)[18], presented major issues.

2.8.1 Limitations That Prevented Implementation

There were several limitations that caused this project to not be done in the allotted. One major limitation was the severe class imbalance in the dataset. The data was heavily skewed toward affirmed convictions. Reversed and remanded cases were not as accounted for. As a result, the model leaned too heavily toward predicting the majority class. Even though it reached a seemingly high accuracy score of 85.26%, that number was misleading. The model wasn't able to properly identify patterns in wrongful convictions because the data wasn't balanced enough to train it effectively.

Furthermore, the lack of comprehensive data was an issue. Many of the case details that could influence wrongful conviction outcomes such as legal motions, appeal arguments, and broader contextual factors were able to be retrieved in the time allotted for this project. This was a project with a nine month deadline. People who did similar work to this took several years to collect the data for this work. Since there was not enough time to go to court houses and seek permission to view private datasets it made the project hard to continue at the moment. The closest study to be able to get data for this was "Social Science Research on Wrongful Convictions and Near Misses, 1980-2012 (ICPSR 34522)[7]." However, their method of data collection was not doable for the amount of time to complete this thesis. This includes, going to courthouses and requesting files alongside cross referencing an immense amount of data. Without access to this critical information, building a reliable and meaningful model will make this project.

Lastly, there were significant jurisdictional differences that created inconsistencies in the data. Legal procedures, conviction processes, and appeal strategies vary widely across states and court systems. These differences introduced additional variables that the model couldn't properly adjust for, limiting its ability to generalize findings or make accurate predictions.

2.8.2 Why This Model Was Abandoned

Despite the initial vision, it became clear that an SVM-based classification model was not able to be done due to these limitations. This type of work requires a team and more time which is not present at the moment. The imbalance in case outcomes made it very hard to train a model that could gen-

eralize to real-world wrongful conviction cases. It may be possible with more resources and time. Even with potential fixes—such as oversampling, synthetic data generation, or alternative machine learning models—the fundamental issue remained: without comprehensive, publicly available, and balanced data, the model would always be limited.

2.8.3 Delimitations & Next Steps

Given these barriers, the study shifted toward data visualization and analysis rather than predictive modeling. Instead of trying to predict wrongful convictions, the focus is now on illustrating patterns, racial disparities, and systemic flaws using interactive visualizations. Future research could revisit predictive approaches if better, more balanced datasets become available. For now, the priority is transparency and accessibility, ensuring that wrongful conviction data is presented in a way that informs the public, legal professionals, and policy-makers.

2.9 Assumptions, Limitations, and Delimitations for Interactive Website

The new study pivoted toward creating an interactive website data visualization platform. This new approach focuses on presenting data trends and insights rather than making predictions.

The assumptions, limitations, and delimitations of this website differ significantly from those of the predictive model. Instead of algorithmic concerns, this platform faces challenges related to data availability, user engagement, and interpretation.

2.10 Assumptions, Limitations, and Delimitations for Interactive Website

This study now focuses on building an interactive, website. The goal is to present clear trends about wrongful convictions using visuals. The platform helps people understand the data without needing deep legal knowledge or data science knowledge. However, there are still some assumptions, limitations, and delimitations to be addressed.

An assumption made while making this come to life is that the data needed for this project is available and reliable. That means sources like the National Registry of Exonerations and the FBI's Uniform Crime Reporting Program are expected to have enough data to build accurate figures. It also assumes that people will want to use the platform. Lastly, it is assumed that users will be educated and moved by the project. Legal professionals, policymakers, and everyday users are expected to engage with the platform and learn from what they see. It assumes that interactive graphs and visuals will help people understand racial disparities in the criminal justice system.

This project has its limits. Although this project is focused on advocacy and analysis it leans more towards advocacy. However the figures derive from data pulled from credible sources. It is likely that users who feel different about the criminal justice system may look at the data and create false narratives. There’s also a chance people could misunderstand what they’re looking at. Even if the data is accurate, people might still draw the wrong conclusions based on their own biases.

There are also some technical issues to think about. Internet accessibility can be a factor. If someone’s internet is slow or their browser doesn’t support certain features, they might have trouble using the site. Not everyone is used to interactive graphs or data tools, so some users might find it confusing at first. Furthermore, some legal cases involve private or sensitive information. Lastly, if the data about race is not handled carefully, it could end up reinforcing harmful ideas instead of helping fight them. Since the data for this only dates back to 1985 the time period this will cover will be from 1985-2025. The project focuses only on wrongful convictions in the United States.

2.11 Ethical Dilemmas

There are several ethical concerns that come with the creating an interactive website. One of the primary concerns is ensuring that data is represented accurately and responsibly. Wrongful conviction cases involve actual people, and misrepresenting statistics. This can be done unintentionally through visual design choices or through incomplete datasets. This may misconstrue public perception of the issue [? , ignazio_f._klein_2020]. Simplifying complex legal cases into charts and graphs may erase critical nuances of the legal system, while missing or underreported cases could lead to misleading conclusions. This can be apparent particularly when analyzing racial disparities and prosecutorial misconduct. Additionally, the visual design of the platform must be carefully considered to ensure it educates rather than exaggerating wrongful convictions for clicks and views.

Another ethical concern revolves around data privacy and sensitivity. Though this platform only uses publicly available datasets, ethical dilemmas still arise. Even though exonerees’ cases are public record, some may be opposed to their story being put in this platform [17]. Furthermore, presenting wrongful conviction data in a way that feels impersonal could risk dehumanizing those affected, rather than amplifying their voices. There is also the risk of misrepresenting legal events if datasets contain errors or incomplete details, which could have unintended consequences for ongoing advocacy efforts.

Beyond privacy concerns, there is also the issue of interpretation and bias. A visualization platform presents data. However, users may misinterpret the visualizations. Some may even see trends that do not actually exist. Confirmation bias is a major risk, as viewers may focus only on data that supports pre-existing beliefs, leading them to ignore other relevant factors. Additionally, racial breakdowns of wrongful convictions must be contextualized properly to prevent them from reinforcing harmful stereotypes rather than exposing systemic injustice [3].

Another challenge in making this platform ethically responsible is ensuring that it is accessible to all audiences. While the project aims to increase transparency, the digital divide remains a significant issue. There are people without reliable internet access. They may struggle to interact with the platform. It is also possible that legal jargon or complex data points may prevent users from fully understanding the significance of the information presented. Furthermore, accessibility must be considered for individuals with disabilities. Without inclusive design, the platform risks excluding the very people it is meant to inform.

To address these concerns, the platform must prioritize transparency, context, accessibility, and ethical responsibility. Transparency will be achieved by explaining data sources, methodology, and limitations to help users interpret the data correctly. Context is equally important, as educational resources should be provided alongside visualizations to ensure that trends are properly understood. Lastly, ethical responsibility must remain at the forefront by prioritizing the sensitive handling of wrongful conviction cases while ensuring that the focus remains on justice reform. If designed thoughtfully, this platform has the potential to be a powerful tool for awareness, advocacy, and meaningful change in the criminal justice system.

3 Related work

3.1 Introduction of Main Bodies of Work

This chapter focuses on three key areas essential to understanding wrongful convictions and the role of data visualization in criminal justice: the systemic issues contributing to wrongful convictions, the impact of data visualization and interactive websites in shaping public awareness and policy discussions, and the ethical considerations involved in presenting complex legal data. By synthesizing existing research, this chapter provides a foundation for the study, identifying critical gaps that this project aims to address. The section examines systemic flaws demonstrating how wrongful convictions emerge from institutional failures. It then explores how data visualization tools can bridge the gap between raw legal data and meaningful advocacy. This will make complex legal issues more accessible to a broader audience. Lastly, it addresses the ethical dilemmas inherent in visualizing sensitive legal data, emphasizing the responsibility of ensuring accuracy, transparency, and accessibility. These gaps highlight the importance of a platform that does more than present statistics—it must offer meaningful insights that drive awareness, advocacy, and informed decision-making.

3.2 Systemic Issues Leading to Wrongful Convictions

Systemic issues have caused many problems within the legal system. This was particular in the Central Park 5 case. A brief overview of the Central Park 5 case, in 1985 a group of 5 black teens, Kevin Richardson, 14, Raymond Santana, 14, Antron McCray, 15, Yusef Salaam, 15, and 16-year-old Korey Wise, were arrested for the the brutal assault and rape of Trisha Meili, a white woman. After being arrested and interrogated for hours they were convicted and tried as adults, despite the inaccuracies in their confessions. Everything about their interrogation was coerced. It was not until Matias Reyes confessed to the assault and DNA backed it up that the case was dropped. In this case, the systemic factors that caused this wrongful conviction were racial bias and discrimination, coerced confessions, inadequate legal representation, prosecutorial misconduct, and the dismissal of exculpatory forensic evidence.

The social and economic costs behind being wrongfully convicted especially in the public eye like this group of young men is unbearable. The youngest age in this group was 14. And the time served ranged from 7-13 years for all these men. This means all of these children came out of jail as men. They were stripped of their adolescent years that are key to how you shape the rest of your life. Certain social norms are now lacking because that time they should have spent socializing was being spent behind bars.

From an economic standpoint, incarceration expenses are very hefty. According to “Pain, Suffering and Jury Awards: A Study of the Cost of Wrongful Convictions” by Mark Cohen, “Wrongful convictions cause significant tangible and intangible harm to individuals and their families which can be monetized

using ex post jury awards. The average “cost” of a wrongful conviction is estimated to be \$6.1 million, or \$1,334 per day of incarceration.”. He then goes on to state, “Wrongfully convicting and incarcerating one individual is about as costly as the harm caused by a career criminal over their lifetime. [14]” Mark Cohen’s study sheds light on the profound economic impact of wrongful convictions. This figure covers not only the tangible costs, such as lost wages, legal fees, and incarceration expenses, but also the intangible damages, like psychological trauma and the lasting stigma faced by exonerees and their families. To expand on economic hardships from being wrongfully convicted, wrongful convicts miss out on potential earnings and growth in future careers. It is also extremely difficult to find job opportunities after being released. According to “Conviction, Imprisonment, and Lost Earnings How Involvement with the Criminal Justice System Deepens Inequality” By Terry-Ann Craigie, Ames Grawert, and Cameron Kimble With a foreword by Joseph E. Stiglitz by 2017 over 300 billion dollars was estimated to be lost in potential earnings by incarceration.

The social effects on being wrongfully convicted have just as harsh effects on exonerees. Wrongful convictions also damage the trust within communities. The American Bar Association states that these injustices erode public confidence in the criminal justice system, fostering skepticism towards law enforcement and judicial processes. This decline in trust can impede community cooperation with authorities, ultimately weakening the system’s effectiveness.

On a psychological level, those wrongfully convicted and their families face profound trauma. Psychology Today points out the emotional burden, which often manifests as depression, anxiety, and strained family dynamics [14]. Families are left to navigate the aftermath and support their loved ones through a situation that should never have happened.

The repercussions also affect the original victims of the crimes. The National Institute of Justice notes that victims may experience renewed trauma upon discovering that someone else was wrongfully convicted for the crime committed against them. Feelings of guilt and helplessness often arise, as they come to terms with the fact that the real perpetrator remains free, leading to doubts about the justice system.

Advocacy groups like The Innocence Project have been instrumental in bringing awareness to wrongful convictions and driving reforms in the criminal justice system. Founded in 1992, The Innocence Project uses DNA testing to exonerate those who have been wrongfully convicted while advocating for broader reforms to prevent these injustices from continuing. Through their efforts, over 300 individuals in the United States have been exonerated. The Innocence Project has not only used advancements in forensic science to achieve justice but has also shed light on the systemic issues that lead to these wrongful convictions. These issues include prosecutorial misconduct, false confessions, and racial bias, all of which remain critical problems in the justice system. Beyond their work in individual exonerations, The Innocence Project has reshaped how people perceive the criminal justice system. By telling the stories of exonerees and exposing the systemic failures behind their cases, they have fostered a greater

3.3 Applications of Data Visualization Tools in Criminal Justice

Data visualization has become a critical tool in criminal justice. Data visualization provides an accessible way to analyze wrongful convictions, racial disparities, and prosecutorial misconduct. Through interactive, website, these tools allow different types of people to view data and draw their own conclusions.

There are several existing projects that utilize data visualization techniques to explore wrongful convictions. The Exonerations in the United States Map, developed by the National Registry of Exonerations (NRE), presents a geographic breakdown of exoneration cases. This allows users to explore where wrongful convictions occur most frequently. Similarly, the Exonerations in the U.S. project by Shing-Yun Chiang visualizes the duration between conviction and exoneration, offering insights into the extended delays in finding justice for the wrongfully convicted. Although effective in highlighting the inefficiencies of the legal system, this project does not analyze other contributing factors such as racial disparities, forensic errors, or prosecutorial misconduct. *Get in Jail Free Card* utilizes the concepts of these projects in one to shed light on the injustices going on in the criminal justice system.

There are other projects that use innovative approaches to present legal data. The Alchemy of Legal Data transforms criminal justice datasets into AI-generated visual art, creating emotionally engaging representations of legal issues. While this method helps raise awareness, it lacks analytical depth and does not allow for direct user interaction with data. The Innocence Project’s “Our Impact: By the Numbers” offers a well-researched collection of statistics detailing racial disparities and common causes of wrongful convictions. However, as a static tool, it does not allow users to explore data in an interactive manner. Similarly, “Coming Clean” by ACLU Massachusetts focuses on wrongful convictions related to false forensic evidence. While this project successfully highlights forensic science failures, its scope is narrow, excluding broader systemic patterns in wrongful convictions. A commonality with these projects is that they have information but lack interactivity. *Get in Jail Free Card* utilizes both in one.

Despite their achievements, these projects continue to reveal significant gaps in how criminal justice data is visualized. Many parts of existing platforms remain static, are not case specific, or provide limited value when it comes to meaningful interactivity. The interactive website platform presented in this paper seeks to fill these gaps by providing a dynamic, people centered experience where individuals can explore wrongful conviction data in real time using visual analytics. Unlike earlier efforts, this website includes a wide range of features that are often missing in similar projects. It incorporates comparative racial analysis along with other important elements, all while emphasizing user interaction and accessibility. The goal of this tool is to make complex information easier to understand and more approachable for people from all backgrounds, encouraging broader interest in the conversation around systemic reform.

3.4 Ethical Considerations and Summary of Competitors

Data visualization offers a strong way of exposing systemic injustices. It also presents significant ethical challenges. One of the risks of visualizing wrongful conviction data is the risk of misrepresentation. If not carefully contextualized, statistical visualizations may oversimplify complex legal narratives, leading to misleading conclusions. As stated in the previous section, there are several limitations to the competitors of *Get In Jail Free Card*. These tools will have one solid piece then miss another piece. These limitations show the need for an interactive, user-driven platform that showcases multiple factors contributing to wrongful convictions. The proposed tool will integrate race, conviction trends, etc into a website platform. It will prioritize accessibility, transparency, and engagement, this platform will serve as a critical resource for legal professionals, researchers, and advocacy groups seeking data-driven justice reform.

4 Methods of approach

4.1 Overview

This chapter will outline the framework and methodology used to design *Get In Jail Free Card*. This website is an interactive, data-driven platform. It visualizes the realities of wrongful convictions. Furthermore, it breaks down statistics about wrongful convictions that the general public may not be familiar with. This chapter will be broken up into the technical approach while making Get In Jail Free Card, along with the ethical considerations that went into making this website. The technical approach includes tools, data processing, visualization strategies, and more, while the ethical considerations involve design choices around representation, sensitivity, and storytelling integrity.

4.2 System Design and Architecture

The *Get In Jail Free Card* interactive webbase was built in a way that keeps users engaged and informed. In order to achieve this, the website was designed to be a scroll-based storytelling platform that combines interactive data visualizations with real-life narratives. The overall structure of the site is meant to guide users through learning more about wrongful convictions. The more you scroll, the more you learn. The point of it being scroll-based is for users to gain context as they scroll—hence the pop-up firsthand quotes that appear the deeper they go into the experience of this website.

The interactive webbase is broken up into multiple sections: The Reality of Wrongful Convictions, Murder and Nonnegligent Manslaughter (1980–2020), Racial/Ethnic Breakdown of Exonerations (Murder 2019), Age Group Most Wrongfully Convicted, Racial/Ethnic Breakdown of Sexual Assault Exonerations, Geographic Distribution of Wrongful Convictions Per Capita, and Exonerations Over the Years. There are also pop-ups that include three firsthand accounts from exonerees, along with three videos sharing stories of people who were wrongfully convicted.

In these sections, different figures are shown using Plotly, with text explaining and supporting the visuals. The figures break down different areas that deal with wrongful conviction. These figures are used to visualize the racial discrepancy that occurs in the criminal justice system. The combination of visuals alongside modular storytelling allows users to absorb the information and keeps them stimulated throughout the experience.

4.3 Tools and Technologies Used

The development of *Get In Jail Free Card* relied on a variety of Python libraries and web development tools to simplify working with data and create a fully functional interactive website. Each technology played a specific role in supporting data processing, visualization, and user interaction. The key tools and technologies used include:

- **Dash (Plotly)** – Served as the main framework for building the interactive web application. Dash allowed the integration of data analysis with real-time visuals, eliminating the need for custom JavaScript.
- **Pandas** – Used for cleaning, transforming, and analyzing the dataset. It enabled efficient grouping by age, race, crime type, and geography.
- **Plotly Express & Graph Objects** – Used to generate all visualizations, both static and animated. Plotly Express supported quick and effective chart generation, while Graph Objects provided more detailed customization options.
- **Dash Bootstrap Components** – Offered pre-styled UI components such as cards and off-canvas modals, which were essential for presenting quotes and video testimonials.
- **Dash Core Components (dcc)** – Enabled scroll tracking, animation updates, and dynamic graph rendering. Elements like `dcc.Graph`, `dcc.Interval`, and `dcc.Store` were used to create interactive and responsive experiences.
- **Dash HTML Components (html)** – Provided structural elements like headers, paragraphs, containers, and images that shaped the layout and content flow of the site.
- **Dash Callbacks** – Allowed for real-time interactivity by linking scroll input with output actions such as triggering modals or updating data visualizations.
- **Client-Side Callbacks** – JavaScript-based scroll tracking was implemented through a client-side callback, enabling the site to respond to user navigation smoothly.
- **us (Python package)** – Used to convert full U.S. state names into their official two-letter postal abbreviations for geographic mapping.
- **Choropleth Mapping with Plotly** – Used `px.choropleth()` to visualize the geographic distribution of wrongful convictions across U.S. states.
- **HTML/CSS** – Applied for fine-tuning layout and styling to enhance readability and visual appeal across devices.

These tools worked in sync to create *Get In Jail Free Card* and enhance its overall functionality. They made it possible to incorporate live graphics that kept users engaged and made the platform as compelling as possible.

4.4 Visualization Approach

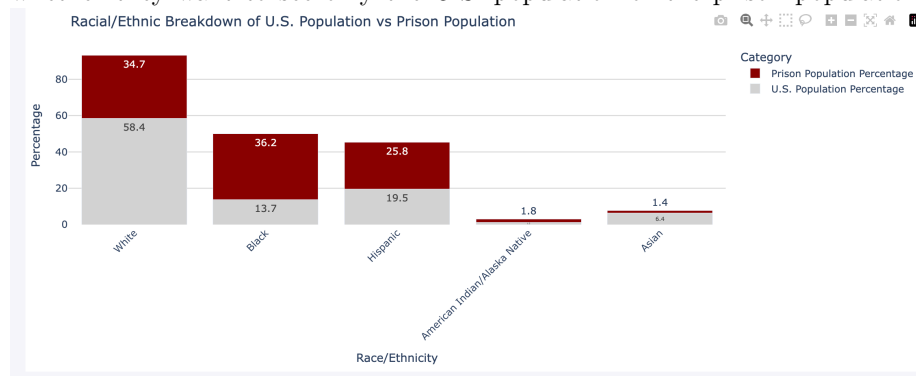
The *Get In Jail Free Card* platform uses scroll-based storytelling in order to use data in a way that is informative, emotional, and visually engaging. The visuals used on this platform contain but are not limited to animations, imagery, modals, and real-time transitions designed to guide the viewer through complex truths about wrongful convictions. The main goal is to be able to inform users while also keeping them engaged. The visuals and pop ups allow the webbase to do just that.

Each visual was designed with purpose, clarity, and user experience in mind.

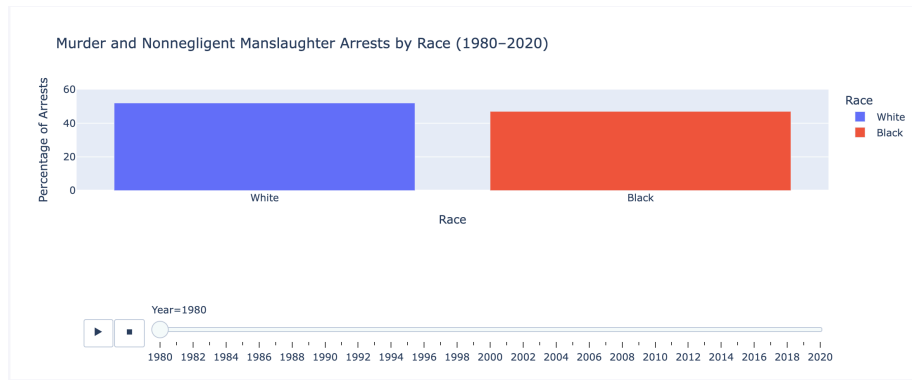
The following section describes the key visual features that make *Get In Jail Free Card*. Each section explains how they contribute to the storytelling of *Get In Jail Free Card*. This consists of all the graphs images and pop ups that make *Get In Jail Free Card*.

4.4.1 Graphs

Get In Jail Free Card consists of seven sections. Of these seven sections there are six figures that support text involving a topic and choropleth map that is there to support text as well. The first graph is a stacked bar chart that compares the U.S. population percentages by race and ethnicity with incarceration percentages also by race and ethnicity. The data to make this graph comes from the U.S. Census Bureau and The Bureau of Justice Statistics. The graph uses light gray bars represent the U.S. population share, while dark red bars represent incarceration rates. This stark contrast visually emphasizes the disproportionate incarceration of Black Americans. The graph also allows users to filter out whether they want to see only the U.S. population or the prison population.



An animated bar chart was created to visualize arrest data for murder and nonnegligent manslaughter across a forty-year period, spanning from 1980 to 2020. The chart breaks down arrests between black and white people. It uses normalized values to simulate the progression of racial disparities over time between both races. This approach allows for a clearer visual comparison, especially as the chart animates from year to year. The animation runs automatically and gives viewers a chance to observe how arrest patterns shift over time. As the bars rise and fall, trends in racial disparities become more noticeable, providing insight into how certain groups have been disproportionately affected. This format was chosen because it makes long-term patterns easier to recognize than a static chart or raw table of numbers. The design encourages users to focus on the pace and consistency of the changes, rather than just the totals. Ultimately, the goal was to show not just that disparities exist, but how they grow and persist across decades.

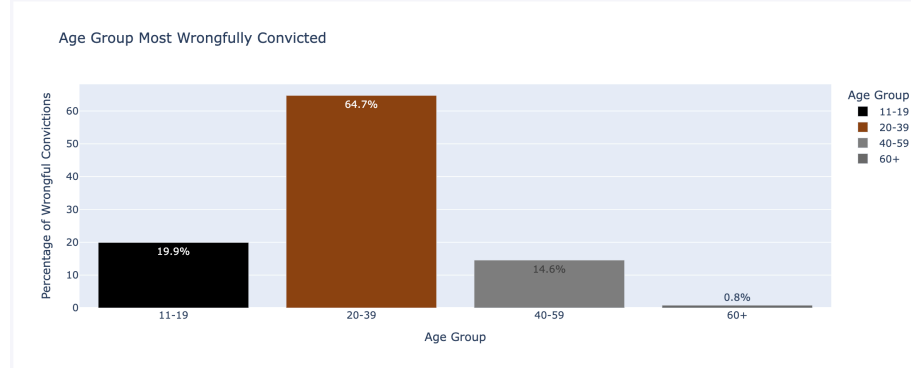


A comparative bar chart was created to visualize racial disparities in murder arrests and murder exonerations for the year 2019. The chart compares percentages across racial and ethnic groups, showing two values for each group: one bar for arrests (gray) and one for exonerations (red). This side by side structure allows users to easily compare how representation in arrests aligns or misaligns with representation in exonerations. For example, Black individuals made up 51.2 percent of murder arrests but 70.5 percent of murder exonerations, highlighting a sharp overrepresentation in wrongful convictions. In contrast, White individuals accounted for 45.8 percent of arrests but only 20.5 percent of exonerations. Other groups, such as Hispanic, Asian, and Native American populations, had smaller percentages but still showed differences worth noting. This method of comparison was chosen to help expose potential patterns of racial bias in murder related convictions and exonerations using a single, easy to read visualization.



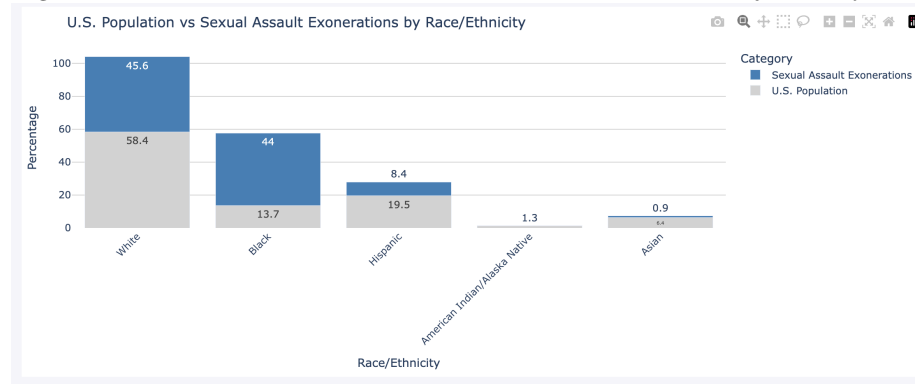
The next bar graph provides a detailed breakdown of wrongful conviction exonerees categorized by age groups. This visualization is based on data extracted from the comprehensive spreadsheet maintained by the National Registry of Exonerations, which lists all documented exonerees. The graph is designed to highlight the age disparities among exonerees, offering insights into how wrongful convictions impact individuals across different stages of life. The age group of 11-19 is represented in black, emphasizing the tragic reality

that even minors are not immune to the systemic failures of the justice system. This group often includes teenagers who are wrongfully convicted during their formative years, stripping them of their youth and opportunities for personal growth. The age group of 20-39, represented in brown, encompasses young adults who are often at the prime of their lives, facing wrongful convictions that disrupt their careers, education, and family lives. The age group of 40-59, shown in grey, represents middle-aged individuals who may have spent decades behind bars before being exonerated, highlighting the long-term consequences of these injustices. Finally, the age group of 60 and above, depicted in a darker grey, includes older exonerees who often face unique challenges reintegrating into society after spending a significant portion of their lives incarcerated. This graph not only visualizes the age distribution of exonerees but also serves as a stark reminder of the human cost of wrongful convictions. By categorizing exonerees into these age groups, the graph underscores the varying impacts of wrongful convictions on individuals at different life stages, from stolen childhoods to disrupted adulthoods and lost golden years. It invites viewers to reflect on the profound injustices faced by exonerees and the urgent need for systemic reforms to prevent such tragedies in the future.

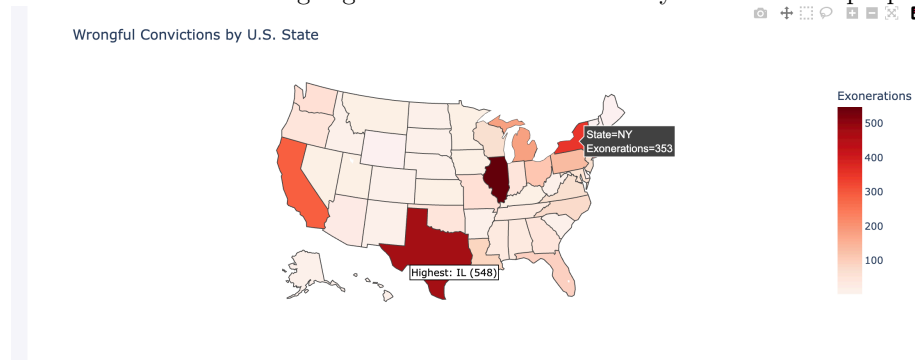


This next graph is a stacked bar chart that provides a detailed comparison between U.S. population percentages by race and the racial breakdown of individuals exonerated for sexual assault. The data for this visualization is derived from the Registry of Exonerations and the U.S. Census Bureau, highlighting the stark racial disparities in sexual assault exonerations. Initially, the graph was presented in a simpler format that excluded the comparison to the overall U.S. population by race, which misleadingly suggested that white individuals were exonerated at higher rates. However, this interpretation failed to account for the fact that white individuals make up a significantly larger proportion of the U.S. population compared to Black individuals, who constitute only 13.7 percent. By incorporating the U.S. population percentages into the visualization, the graph now provides a more accurate and nuanced representation of the data. The chart is divided into two key components: sexual assault exonerations, represented in blue, and the U.S. population percentages, represented in grey, allowing users to see the stark contrast between

the racial composition of the general population and those exonerated for sexual assault. For example, while white individuals may appear to have higher absolute numbers of exonerations, the adjusted comparison reveals that Black individuals are disproportionately represented among exonerees relative to their share of the population. This graph also includes interactive features that enhance user engagement and understanding, allowing users to filter the data to view either the U.S. population percentages or the sexual assault exoneration percentages independently. By presenting the data in this format, the graph invites viewers to reflect on the broader implications of these injustices and the urgent need for reforms to address racial bias in the criminal justice system.



The next visual used was a choropleth map that visualizes state by state exoneration counts across the U.S. This was used in order to steer away from the redundant bar graphs. This was done to keep users engaged with the website. Users would have a variety of visuals and graphs to interact with. The way the map works is simple. Users hover over a state and it shows how many exonerees are in said state. Something to consider is that the states with the highest exonerees contain these high amounts because they have more people. In order to prevent users from creating a false narrative, there will be text provided that talks about some states having higher exonerees because they contain more people.



The last graph displayed is a line graph that illustrates the total number

of exonerations per year from 1989 to 2024, strategically placed at the end of the platform to serve as a comprehensive summary of the data presented throughout the site. This graph provides a clear, chronological view of how exonerations have evolved over time, highlighting key trends and systemic patterns within the justice system. An annotation emphasizes the cumulative total of exonerations, offering users a sense of the broader impact of wrongful convictions over the years. Functioning as both a historical reference and a visual representation of systemic issues, the graph allows users to reflect on the progress—or lack thereof—made in addressing wrongful convictions. By hovering over any specific year, users can view the exact number of exonerees for that year, making the data both interactive and informative. This feature encourages users to engage with the timeline and explore how exoneration rates have fluctuated, potentially correlating these changes with shifts in legal practices, advocacy efforts, or public awareness. Placing this graph at the conclusion of the platform ties back to the overarching theme of wrongful convictions, reinforcing the importance of systemic reform and serving as a powerful visual reminder of the human cost of these injustices while also providing hope by showcasing the growing number of individuals who have been exonerated. By summarizing the data in this way, the graph invites users to consider the broader implications of the information presented and to reflect on the ongoing need for accountability, transparency, and justice within the legal system.



4.4.2 Visual Images Backgrounds and Pop-Ups

Throughout the site, supporting images such as photos of exonerees, mugshots, and media stills—are placed strategically to evoke emotion and bring stories to life. These images appear above or beside charts and are styled with rounded corners and padding to maintain visual consistency. The background of this website is a prison. The angle makes users feel like they are looking down the hallway of a prison. As users scroll a little boy pops up. The further they scroll they will see the boy turn into a young man. Then at the very end of the website this young man turn into a man walking out of prison. This is done to show how often people who are wrongfully convicted go in as young as the age of 11. During this time their innocence is stripped and they do not leave until they

are all grown up. Robbing them of important years in their life

As users scroll deeper into the site, pop-up quote modals (Offcanvas components) appear. These include real quotes from exonerees like Herman Lindsay, Jabbar Collins, and Andre Davis, each paired with a portrait photo. Herman Lindsey's quote was cited from ALCU [15]. Jabbar Collins' quote was cited from the Innocence Project [11]. Andre Davis' quote was cited from People's Law Office [20]. These modals are scroll-triggered and timed based on user engagement. They pop up after users scroll past a certain part of the website. The goal of this is to keep users engaged. The pop ups are designed with a white translucent background. These pop ups contain a smooth edge radius and spacing that allows users to read the text interact with graphs and look at the pop up without anything being blocked out. The text paired with a large, centered image of the wrongfully convicted being quoted. These quotes humanize the data and create an emotional pause between visual sec-



First-Hand Accounts of Wrongful Convictions

In 2006, I was sentenced to death for a crime I did not commit. The jury in my case was split 8-4 about the death sentence. Eight people thought I should be executed, and four people thought I should not be. Despite the divided jury, I was sentenced to death. - Herman Lindsay



tions.

As users scroll to the end of the webbase, three video modals appears one by one. It contains three embedded YouTube videos of real exonerees sharing their stories: Perry Lott, Leonard Mack, and Joyce Watkins. These videos provide raw, unfiltered reflections of lived injustice, reinforcing the urgency and emotional depth of the topic. This also allows users once again to be in the shoes

✕

Joyce Watkins on what she lost because of a wrongful conviction



of these wrongful convicts.

All visual features—charts, images, modals, and animations—work in unison to engage the user and tell a cohesive story without overwhelming them with information. Furthermore, they emphasize the real human impact behind the statistics. Each element was deliberately placed to both educate and move the audience.

4.5 Ethical Considerations

The topic of wrongful convictions presents several ethical concerns that were carefully considered in the development of *Get In Jail Free Card*. Though this website focuses on advocacy, due to the sensitive nature of the data and the real human stories behind each case, the platform was built to adhere to ethics. The data used was formed from credible sources such as the National Registry of Exonerations in order to create proper graphs with Plotly.

One of the primary concerns was ensuring that data is represented accurately. Wrongful conviction cases involve real people. Misrepresentation—whether through visual design or incomplete datasets—can distort public perception. This can potentially cause harm. This is why the data was filtered in a way that accounted for all documented exonerees. This can also lead to false narratives being spread due to the false info. Simplifying complex legal cases into charts and graphs risks erasing critical nuances. Additionally, racial disparities and prosecutorial misconduct must be presented with care to avoid reinforcing harmful stereotypes.

The platform also addresses issues of data privacy and sensitivity. Although only publicly available data was used, some exonerees may not want their stories shared in a visual context. To navigate this, quotes from exonerees were shown in modals rather than banners or overlays, preserving context and preventing dramatization. Testimonial videos were embedded but user-controlled, with no autoplay or sound unless activated.

Visual design choices were informed by trauma-informed design principles. A neutral color scheme was used to reduce dramatization, and scroll-based pacing ensures users control their own experience. The platform avoids flashing visuals or jarring transitions, prioritizing accessibility and emotional safety. These trauma-informed principles were central to the visual and interactive elements of the platform, focusing on calm pacing and user agency. Care was also taken to avoid overrepresentation or underrepresentation of any demographic group to maintain balance and fairness across the data.

Visuals were designed to serve advocacy, not entertainment. Each chart, map, and animation was selected for its ability to inform and to communicate the human impact of systemic injustice. Transparency was prioritized in the use of data sources, methods, and limitations, which were all clearly stated and explained within the site. Contextual and educational information accompanied each visualization to guide interpretation and prevent misreading of patterns.

However, designing a platform centered on advocacy rather than purely objective analysis introduces its own ethical complexities. By taking a strong stance on the issue of racial injustice in the criminal justice system, there is

a risk that some users may perceive the information as biased, rather than evidence-based. Advocacy, if not done correctly can lead to users questioning whether they are being informed or persuaded. Thus leading to challenges around neutrality and perceived credibility. For example, users who enter the site with a perspective of the criminal justice system being fair may question the integrity of the visualizations, even if they are statistically accurate. Additionally, in prioritizing storytelling, there is a possibility of emotional narratives overshadowing the complex analysis. While emotional impact is crucial for engagement, it must be carefully balanced to ensure it does not override critical thinking. Furthermore users should also be analyzing the facts that come with *Get in Jail Free Card*.

In addition, ethical responsibility was maintained by ensuring that human stories were handled sensitively. Firsthand accounts were included, in order to put users in the shoes of these exonerees. This approach aligns with the platform’s core goal of raising awareness about systemic injustice while respecting the dignity of those affected by wrongful convictions.

4.6 Summary

This chapter outlined the full methodology behind the creation of *Get In Jail Free Card*. It included the website’s architecture, tools, data processing, visualization design, and ethical framework. Each technical decision from the data visualization tool to the way the information is displayed on the website—was made to ensure the platform remained informative, purposeful, and user-friendly. The emphasis throughout the process was on building a coherent, engaging, and accessible experience that could guide users through complex subject matter with clarity and depth.

The technical components, such as the scroll-based structure, use of Plotly for visualizations, and integration of firsthand narratives, worked together to produce an experience that is both evokes emotions and spreads factual evidence on the racial injustice in the legal system. These elements were carefully chosen and intentionally combined to highlight disparities in a way that is accessible, visually striking, and emotionally resonant. The seamless fusion of interactivity and lived experience encourages the audience not only to observe the data but to feel connected to the stories it represents.

By combining first hand accounts and statistics with strong visual storytelling, *Get In Jail Free Card* transforms raw data into an advocacy tool. It fosters empathy and awareness. The platform allows users to engage deeply with social injustice at their own pace, without feeling overwhelmed. It respects the complexity of the issue while providing clarity and emotional context through deliberate design choices. This approach ensures that the user’s emotional and cognitive responses are acknowledged, creating a balance between education and empathy, and reinforcing the importance of thoughtful digital engagement with systemic problems.

The next chapter will focus on evaluating the platform’s results. This chapter will provide feedback from test users. Both in terms of its visual performance

and its ability to communicate its message clearly to a broad audience. This evaluation will examine user engagement, accessibility, and the effectiveness of its storytelling model in increasing awareness and understanding of wrongful convictions. It will also reflect on areas for improvement and future development, offering insight into how the platform may evolve to reach more users and expand its impact in advocacy and public education.

5 Experiments

5.1 Experimental Design

The objective of *Get In Jail Free Card* website is for users to learn more about wrongful convictions. The experiment of letting users test it was held in order to determine whether or not the message being portrayed was being communicated. This message being the issue of systemic injustice and wrongful convictions. The goal was for users to walk away from using this webbase feeling emotionally impacted by what they just witnessed. Furthermore, users should have walked away learning something new about this topic. The intent behind *Get In Jail Free Card* was to combine information and urgency. This helps users understand the data and statistics being presented.

5.1.1 Participants

The *Get In Jail Free Card* Webbase was tested by two peers two faculty and lastly the advisor of this project. The evaluation was assessed via verbal feedback. The participants will be referred to as Participant 1, Participant 2, Participant 3, Participant 4, and Participant 5. 1 being the first peer, 2 being the second peer, 3 being the first faculty member, 4 being the second faculty member, 5 being the advisor of this project.

Participants were asked if they wanted to view the *Get In Jail Free Card* prototype. The first participant to view this project was participant 3 in its prototype form. When asked to view the project they happily accepted the offer to do so. They were instructed to simply scroll as they were using the project since this is a scroll based website. They were not told to give any feedback all they had to do was use it as if they would use any other website. This participant gave verbal feedback as they scrolled. This participant did not have a background in Computer Science and or web development. However, they did have a passion for reform in the criminal justice system. And they did have their own opinions on wrongful convictions. Participant 5, the advisor, was the next person to use this website. This participant has been a key role in the development of this website. Therefore they would be looking at this as a user and also looking for ways to improve the website. The participant has an extensive background in Computer Science and has experience with web development. The website was presented to the participant. Since the webbase was being presented to them they gave feedback as the webbase was being scrolled through. Throughout this process the advisor gave very insightful. Participant 1 was the first peer to review this website. This participant was the first to see the website after getting insight from the advisor of the project. They were instructed to scroll and they gave verbal feedback as they scrolled. Participant 4, the second faculty member, has no background in web development. However, they are very passionate about criminal justice reform. The user was allowed to scroll through the website on their own. They were not instructed on giving any feedback. They simply gave verbal feedback as they scrolled on their own

accord. Participant 2, this second peer, has no background in web development. They are very passionate for criminal justice reform. They were instructed to scroll and gave feedback as they scrolled. The participant list is in chronological order from who saw the first prototype to who saw the most recent version of the website. All participants used the laptop that was used to create the webbase since it is not up for public use yet.

5.1.2 Process

Participants interacted with the website in a variety of ways, but several patterns emerged that helped shape the feedback process. All sessions were supervised and conducted using the personal laptop used to build the website, ensuring consistency in the user experience.

Participants 1, 3, 4, and 5 all scrolled through the website freely, as if they were using a typical website. They were not given specific tasks or time constraints. Instead, they were instructed to explore the platform naturally. As they scrolled, each participant gave verbal feedback, which was collected in real-time. This feedback was spontaneous and provided rich insights into their understanding and reaction to the content. The average time spent scrolling ranged from about 3 to 4 minutes.

Participant 3, in particular, engaged with every text element on the site. Their feedback was especially helpful in understanding which parts of the project stood out and how intuitive the design was. Participant 4 and Participant 5 also used the website independently and contributed verbal feedback throughout their interaction.

Participant 5 additionally received a brief three-minute presentation of the platform. This demonstration included several pauses during which verbal feedback was actively sought and documented. The input collected from this session was especially valuable and directly informed improvements made to the site before it was shown to later participants.

Each participant’s engagement helped identify design strengths and areas for improvement. Their verbal responses, collected during and after use, played a key role in refining the site for future users.

5.2 Evaluation

5.2.1 The Good

Each participant provided their own feedback based on their individual experience with the website. Participant 3 referred to the original website as “Good stuff.” They were particularly struck by the way racial disparities were presented, stating that while they were aware of the issue, “to have it laid out in front of me the way it was really helped me understand the problem with wrongful convictions.” They also noted being impressed by the animated graphs, especially those showing Murder 2022 exonerations. (This has now been changed to a side by side bar chart of Murder Arrests vs Exonerations in 2019.) They

were also impressed by the timeline of Murder and Nonnegligent Manslaughter from 1985 to 2025 graphic. (This has now been changed to an animated graphic that showcases data from 1980 to 2020 and only shows black and white people because the data from 1985-2025 was not time based leading to the data being shown incorrectly at the time). They said the visual representation of the percentages “really made it hit different.” They concluded their feedback by saying, “This could be bigger than a senior thesis.” This feedback was provided before major edits were made based on Participant 5’s suggestions.

Participant 5 praised the pop-up elements that appeared during scrolling and felt the experience could be more emotionally engaging. They suggested several changes to enhance this, which are discussed in the next section. Participant 1 described the website as “cool” and said, “This is like an actual website where you could really find out information. I can tell a lot of work was put into this.” They emphasized their appreciation for the graphs and visuals, stating that the details stood out to them.

Participant 4 had a highly emotional reaction. While using the website, they came to tears. They said they “felt the passion behind it” and appreciated the effort that went into crafting the content and design. They spent more time with the platform than any other participant, pausing to absorb all the information and watching additional video materials.

Participant 2 echoed many of the previous sentiments. They highlighted the visuals as a strong point and said, “Even if you don’t know anything about wrongful convictions, the graphs make you want to stay.” Their comments reinforced a recurring theme: the visual design and structure of the website kept users engaged and encouraged deeper exploration.

In terms of technical functionality, the website performed well after initial demonstrations and revisions. Binary testing done with participant 5 confirmed that key components were operating as expected. The website rendered correctly during every presentation. The scroll timing was operated well. The interactive elements such as pop-up quotes and videos appeared at the right moments. Users were able to engage with the content without disruption, and the site responded intuitively to scrolling behavior. This functional reliability helped support the emotional and educational goals of the platform by ensuring a seamless user experience.

5.2.2 The Bad

As users interacted with the website, several visual and functional issues became apparent. During the first demonstration, a large white gap appeared where the pop-ups were supposed to be. Because the original background design was different at the time, this created an awkward visual break that disrupted the flow of the site. Even after users scrolled past this section, the overall layout still felt visually off. The first participant did not comment directly on this issue, as they were more focused on the factual content, but the lack of visual cohesion likely diminished the emotional impact of the platform.

Participant 5, however, provided detailed feedback that helped shape later

iterations of the project. They felt the platform fell short in several key areas. First, they noted that the animated bar chart on murder and nonnegligent manslaughter should not start at zero, as this skews the visualization. Instead, the animation should reflect actual arrest percentages year by year. They also pointed out that key terms like “offender” needed to be clarified users should not have to make assumptions or draw conclusions on their own. The goal is to assume users know nothing about wrongful convictions and to present all relevant information clearly and directly.

Participant 5 also recommended improving the racial breakdown chart for murder exonerations in 2022 by comparing those exonerations with actual arrest data from the same year. This would provide better context for interpreting racial disparities. Additionally, they suggested that all statistics, visuals, and facts be accompanied by citations to maintain transparency and credibility. The racial disparity in sexual assault exonerations needed to be visualized more clearly, possibly by using a per capita comparison.

Suggestions also included updating the map visualization to explain geographic trends more effectively, redesigning the white space to reduce visual distraction, and replacing the background with something that evokes more emotion. They recommended showing embedded videos one at a time to avoid overwhelming the user and encouraged looking at other web-based platforms as models for layout and functionality.

After incorporating this feedback, the project took a significant turn. The updated design addressed many of the visual shortcomings. However, some technical issues persisted. One major bug was that pop-ups could not be closed properly. Even when users clicked the close button, the pop-ups would immediately reappear. This glitch disrupted user flow and highlighted the need for further testing and refinement.

The feedback from Participant 5 ultimately reshaped the direction of the platform, pushing the creator to prioritize clarity, accessibility, and visual appeal. These revisions brought the project closer to its intended goal—educating and emotionally engaging users on the realities of wrongful convictions.

5.3 Threats to Validity

Users offered great insight on the website. However, there were some threats to the validity of this website that may affect the generalizability alongside the interpretation of the findings. The first threat to validity is the sample size. There were five people graced with the opportunity to test out *Get In Jail Free Card* before public use. This small amount of people does not account for the diversity of perspectives in the broader public. A commonality of all the participants was a higher education background. Only sample sizing people in higher education does not account for the high school students that may be interested in a website like this. Furthermore, everyone that viewed the website had fairly similar views on the need for reform in the criminal justice system. There may be people who do not feel as if the criminal justice system needs to change. Getting feedback from people with a different viewpoint about the

criminal justice system may have improved the website in such a way that may move people with different viewpoints.

One other limitation is the lack of anonymity during testing. Some users had the website presented to them while others used the website on their own. All of these tests were supervised. Due to all of the testing being in person and supervised users may have not given their full opinion on the website aside from the advisor of the project. Four of the five participants were peers and staff who were of close relation to the creator. That said, they may have been influenced by social desirability bias, a tendency for people to present themselves in a way that they believe will be viewed favorably by others, often at the expense of honesty or accuracy, causing them to give positive feedback over giving critical feedback in order to improve the website.

An additional threat to validity is the demo taking place on one device. The users used the Mac Os device that was used to create the website. Having users only use one device does not allow feedback for how the website may operate on a Windows device or a Linux device. Furthermore, there is now way to see how the website may deploy on another device. It may crash when being deployed on someone elses device. Having users only test the website on a Mac Os device limits the ability to assess how the platform performs across different devices, screen sizes, and operating systems. There is a possibility that the website make not work with Github Pages on another device. This is unknown for now because it was not tested on another device. The website may not look as visually appealing if a user was trying to use it on their phone. Overall potential technical issues, including compatibility or accessibility limitations, may not have been identified.

Verbal feedback being the only form of evaluation is another limitation that ocured during the experimental portion of *Get In Jail Free Card*. This limits the full depth of understanding about the users experience. Participants reacted and gave feedback as they used the website. However, there were no set of questions for them to answer in order to test if the website operated smoothly. Furthermore their were no questions asked on whether participants learned anything new while using the website. Although this can be seen as users gave their honest opinions and were given room to be as critical as possible, not having a series of questions on a form leads to difficulty in figuring out what specific features most influenced engagement or learning outcomes.

To conclude, future evaluations should be more structured in order to find where this website may be lacking. Whether that is in usability, visuals, bugs, users should a structured way to give feedback on what they just used. Future evaluations should also be more diverse and overall larger group of participants. Having people giving feedback with different backgrounds of study, different viewpoints, age groups, etc., will help the overall improvement of *Get In Jail Free Card*. The questions of, “Which graph pulled you in the most?” and “What did you take from each visual” being answered can help the benefit of this website. This will be expanded upon in the conclusions chapter.

6 Conclusion

6.1 Summary of Results

The *Get In Jail Free Card* platform was made to combat the injustice of the criminal justice system. It was made to educate, engage, and evoke emotion from users. The feedback from participants shows that this project is doing just that. Through scroll-based storytelling and interactive visuals, users were able to learn about wrongful convictions and the racial disparities within the justice system. They learned about new facts in a way that felt personal and impactful. Several users gave verbal feedback expressing how emotionally moved they were. Some participants were even brought to tears by how powerful this website was.

The visual aspects brought life to the website. The animated graphs, modals with firsthand quotes, and video stories—were commonly praised by all participants. These visuals were strong in keeping users engaged and informed. The murder and nonnegligent manslaughter graph, the sexual assault bar chart, and the exoneration by race visuals were noted as especially eye-opening. Participant 1 said it felt like “an actual website” where you could really learn something, and Participant 4 spent the most time on the site, deeply moved by the experience.

However, the project also had limitations that were revealed during user testing. There were bugs in the early prototypes, such as pop-ups not closing or visual gaps between sections. Additionally, some users expressed confusion due to undefined terms and visual inconsistencies. Feedback from Participant 5 was especially helpful in shaping updates and making the site more refined for later users. They wanted to see the website at its maximum potential and helped do just that. These challenges exposed areas where usability, clarity, and polish could be improved. Overall enhancing the *Get In Jail Free Card* Website.

The experiments revealed important design lessons: the emotional impact of content can be deeply effective when visuals are paired with real stories; however, functionality and clarity are just as crucial to ensure trust and usability. Participants responded positively to the authenticity and advocacy built into the platform. One key takeaway is that emotional engagement and visual storytelling work best when supported by clean design and straightforward communication.

The participants’ feedback also reflected the platform’s power to open conversations. Participant 4, for instance, took extra time to reflect on each visual and video, treating the content with care. This level of attentiveness showed that when users are given space to reflect, they gain more from the experience. This approach reinforces the need for slow-scrolling, user-paced storytelling rather than auto-progressing visuals.

Overall, the platform fulfilled its original goals. It informed, it advocated, and it emotionally resonated with users. The insight gained from this round of testing helped evolve the platform and revealed what parts of the site were strong and what parts still need work. The platform proved its potential to be more than an academic project—it has the potential to grow into a valuable public-facing advocacy tool.

6.2 Future Work

If more time, resources, and support were available, there are many ways *Get In Jail Free Card* could grow. First, the site needs technical refinements—bugs like persistent pop-ups and spacing issues should be resolved. Some graphs need better alignment with the actual data, and terms like “offender” should be defined to remove any user confusion. The site could also benefit from responsiveness upgrades so it runs smoothly across devices like mobile phones, tablets, and Windows-based browsers.

In terms of features, there is a lot of room for expansion. The original idea for this project was a predictive analysis tool that determined whether or not a court case is on the verge of being a wrongful conviction. However, due to a lack of time and resources, this was not able to be done. The most important factor needed to make this was a dataset that had both rightful and wrongful convictions. Though the *Get in Jail Free Card* does not have all the resources needed to make this it can serve as a tool and reference for the creation of future projects like this.

For testing, a broader and more diverse group should be included. High school students, people without a criminal justice background, and even users who don’t believe the system is flawed should be involved. Their perspectives would offer a more complete look at how the site communicates its message. Conducting anonymous surveys or follow-up forms would also help collect more detailed and honest feedback.

Collaboration with legal experts, justice reform nonprofits, and educators would take the platform to the next level. These professionals can offer real-time insights into policy discussions, provide feedback on how legal data is interpreted, and even share the platform within classrooms or public forums. Involving journalists and data ethics experts could also broaden the scope of the platform and push its utility into new arenas like policy reform and journalism.

Additionally, the back-end infrastructure could be refined to allow for real-time updates when new exoneration data becomes available. Integration with APIs from justice organizations could streamline this process. A community forum or comment section moderated by justice advocates might also help foster ongoing discussions around wrongful convictions. This would turn the platform from a static source of information into a dynamic space for learning and conversation.

Another potential direction is adding a story submission feature that allows families or exonerees to share their own stories with consent. This would provide a real-time archive of voices and experiences, empowering affected individuals and families to tell their stories in their own words. Ensuring consent and moderation will be key in maintaining the integrity and safety of such a feature.

Finally, a teacher toolkit or curriculum integration could be developed to bring the platform into classrooms. Lessons could be built around exploring the data, analyzing systemic bias, or writing reflections on the stories shared. This could inspire younger generations to get involved in justice reform and think critically about fairness in society.

6.3 Future Ethical Implications and Recommendations

Releasing *Get In Jail Free Card* publicly comes with ethical responsibilities. While this platform is built for advocacy, it handles real people’s stories and data that must be treated with care. One issue is the risk of misinterpretation—if someone comes across a chart without understanding the context, they might draw false conclusions. For example, seeing high exoneree numbers in one state might be read as that state being worse than others, when in reality it might just have a larger population.

Another concern is how exoneree stories are represented. Even though the platform uses public data, some exonerees may not want their stories shared in visual ways. The site uses modals to reduce the sense of dramatization, but as it grows, there should be stronger consent processes. If future versions include more detailed stories or interviews, consent and transparency must be prioritized.

There’s also a fine line between raising awareness and sensationalizing injustice. The tone, colors, and imagery should always aim to inform, not shock. Videos should not autoplay. Graphs should be paced and not rushed. The content should keep a trauma-informed lens, especially as some users may be directly impacted by the justice system.

From a privacy and accessibility standpoint, care must be taken to ensure that users across all internet connections, devices, and ability levels can access and use the site. This includes making the website screen reader friendly, mobile-responsive, and avoiding overwhelming visuals or flashing effects. Users with disabilities or low tech literacy should still be able to navigate and learn from the site.

One major ethical dilemma is how this tool blends advocacy with analysis. There is a possibility that emotional engagement could unintentionally overshadow facts. This could lead to users reacting to visuals and quotes without fully analyzing the underlying data. A recommendation for future designers is to always make context and source material available, and offer links or footnotes for deeper reading. Designers should allow users to differentiate between data-driven insights and emotionally charged narrative elements.

Moreover, the rise of misinformation online poses an ethical challenge. If the platform becomes widely shared, data from the site could be taken out of context or misquoted. To address this, future versions of the platform should embed citations and hover-over definitions to help ensure that users understand where each fact and figure comes from. A downloadable methodology or FAQ section could help mitigate these risks.

The use of statistics and visuals to portray deeply emotional experiences requires ethical restraint. Designers and developers must think critically about what is being shown and how. For example, showing race-based breakdowns without adequate explanation may reinforce harmful stereotypes instead of dismantling them. Therefore, visuals should always be paired with text that explains why disparities exist and what systemic forces are at play.

As a recommendation for future designers and researchers, the key is to

balance emotion with evidence. Make sure visuals do not manipulate. Focus on storytelling that brings clarity, not confusion. And always ground the experience in respect for the lives and truths behind the data. With this approach, *Get In Jail Free Card* can remain a powerful tool for justice and awareness that respects the ethical complexities of its subject matter.

In closing, *Get In Jail Free Card* was created with the goal of turning data into empathy and statistics into advocacy. With continued refinement, broader testing, and ethical mindfulness, the platform can grow into a powerful tool for awareness and justice reform. As the digital space continues to play a central role in shaping public understanding, tools like this must be built not just with technical precision—but with humanity at their core.

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