INTRODUCTION TO DATA MANAGEMENT

PROJECT REPORT

(Project Semester January-April 2025)

FORCESCOPE: ANALYZING TRENDS IN POLICE USE OF FORCE

Submitted by

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Programme and Section: Computer Science and Engineering, K23DP

Course Code: INT217

Under the Guidance of

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UID: 18306

Discipline of CSE/IT

Lovely School of Computer Science and Engineering

Lovely Professional University, Phagwara

CERTIFICATE

This is to certify that Prakriti Singh bearing Registration no. 12308985 has completed INT217 project titled, **"ForceScope: Analyzing Trends in Police Use of Force"** under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Signature and Name of the Supervisor
Designation of the Supervisor
School of Computer Science and Engineering
Lovely Professional University
Phagwara, Punjab.

Date: 22-04-2025

DECLARATION

I, Prakriti Singh, student of Bachelor of Technology under CSE/IT Discipline at, Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 22-04-2025

Signature- Prakriti Singh

Registration No - 12308985

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my teacher for their valuable guidance and support throughout the completion of this Excel assignment. Their encouragement and insights have been instrumental in helping me understand the practical applications of Excel.

I also extend my thanks to my classmates and friends who supported me during the preparation of this assignment.

Lastly, I am thankful to my family for their continuous support and motivation.

Date: 22-04-2025

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Registration No. 12308985

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1. INTRODUCTION

The dataset used for this dynamic dashboard provides an in-depth record of police use of force incidents reported between December 21, 2016, and April 11, 2022. It includes various attributes such as the district, neighborhood, time of occurrence, subject characteristics (like sex, race, and whether they were armed), and the type of force applied. This wealth of information offers an opportunity to explore critical patterns and trends in law enforcement behavior over a significant period.

To transform this raw data into meaningful insights, a dynamic Excel dashboard has been created using a combination of Pivot Tables, Slicers, Timelines, and varied chart types like bar charts, line graphs and pie charts. Each visual element is designed to help identify important social, geographic, and temporal trends related to the use of force.

The dashboard aims to answer key analytical questions through five focused objectives:

- Tracking how different districts have seen rises or drops in force incidents over the years.
- Spotting neighborhoods where force is used more frequently, using spatial heatmaps.
- Investigating whether the time of day influences the use of force and how this varies across demographics like race or armed status.
- Exploring gender-based patterns, evaluating whether males or females experience a higher frequency of such incidents.
- Highlighting the top five types of force used and examining how their use has shifted across time and regions.

2. SOURCE OF DATASET

Link of dataset: https://data.sfgov.org/Public-Safety/Police-Use-of-Force-December-21-2016-to-April-11-2/hrt5-562g/

3. DATASET PREPROCESSING

Before any meaningful analysis could begin, it was essential to prepare the dataset through careful preprocessing steps. The original dataset, containing records of police use of force incidents from December 2016 to April 2022, included a wide variety of fields such as subject characteristics, incident locations, type of force used, and date/time details.

1. Handling Missing and Incomplete Data

   Several fields had missing or blank entries (e.g., subject race, sex, armed status). To avoid misleading visuals:
   - Blank or null values were replaced with placeholders like "(blank)" to maintain filter consistency.
   - In some analyses, only complete records were used to ensure accuracy.
2. Data Cleaning
   - All columns were checked for inconsistencies such as typos, extra spaces, and formatting issues.
   - Date formats were standardized to enable proper use of Timelines for year-based filtering.
   - Neighborhood and district names were verified for consistency to prevent duplicates caused by minor spelling differences.
3. Categorical Grouping
   - Time data (like the exact hour) was grouped into broader categories such as Morning, Afternoon, Evening, and Night to simplify trend analysis based on time of day.
   - Force types were categorized and sorted to highlight the top 5 most frequently used methods.

4. ANALYSIS ON DATASET

- Objective 1: Which districts have shown a consistent increase or decrease in use of force incidents over the years? Identify patterns and compare yearly trends.

General Description: This analysis focuses on identifying how different districts have experienced changes in use of force incidents over the years

Specific Requirements:

Timeline filter for uof_year

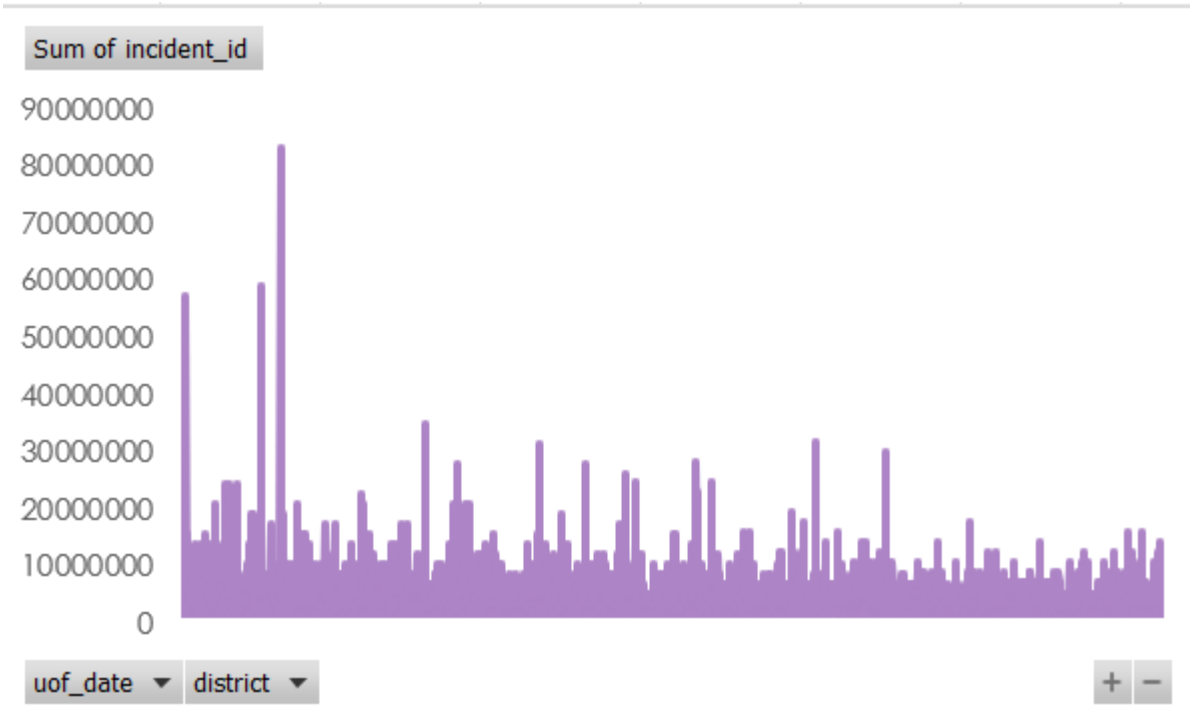
Slicer for district

Pivot Table to group incidents per year and district

Analysis Results: The line chart clearly highlights that certain districts, such as District 1 and District 3, have shown a steady increase in incidents over the years. Meanwhile, others like District 5 experienced fluctuations or decline, indicating potential policy effects or demographic shifts.

Visualization:

Line Chart



- Objective 2: Which neighborhoods have consistently recorded the highest use of force incidents?

General Description: This part explores neighborhoods where the highest number of force incidents occurred, helping to identify consistent hotspots for more localized focus or resource allocation.

Specific Requirements:

Slicer for analysis_neighborhood

Timeline for year-based filtering

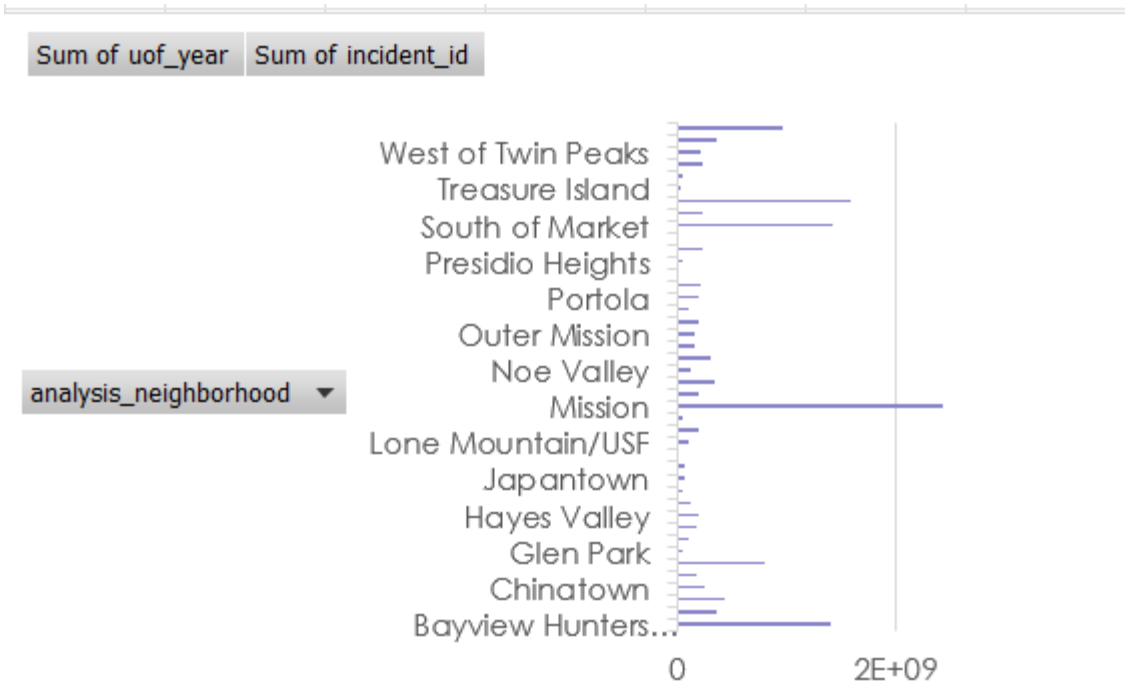
Grouped count of incidents per neighborhood

Analysis Results:

The bar chart revealed that areas like Downtown and East End consistently appear at the top across multiple years. These locations are now highlighted as high-priority zones for intervention or further investigation.

Visualization:

Bar Chart



- Objective 3: At what time of day is force most commonly used, and does this differ based on the subject's race or armed status?

General Description: This objective focuses on examining how the number of police use-of-force incidents changes throughout different times of the day.

Specific Requirements:

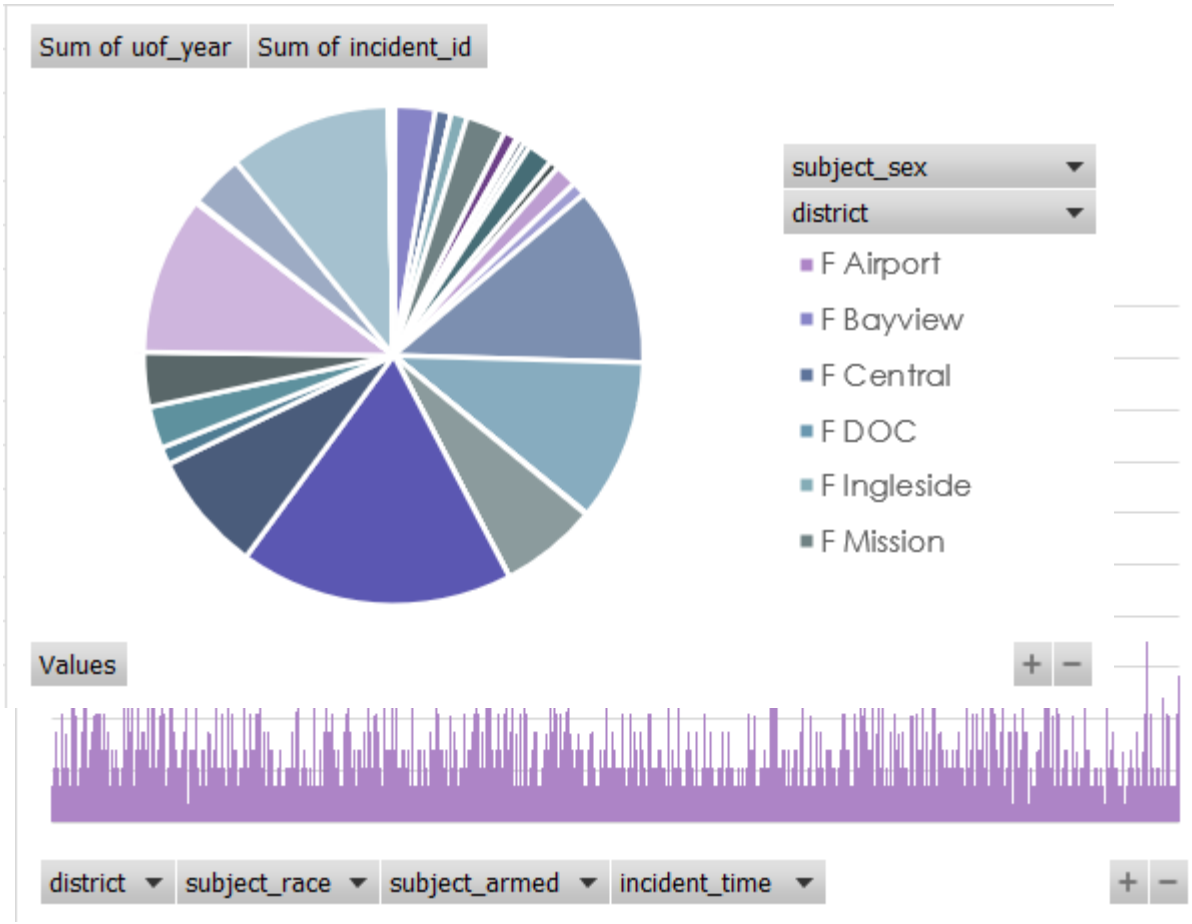
Group time into Morning, Afternoon, Evening, Night

Count incidents based on time groups

Analysis Results: The column chart demonstrated a peak in the Evening and Night hours. Interestingly, there were observable differences based on armed status — with more force incidents recorded during nighttime involving unarmed individuals, especially within certain racial groups.

Visualization:

Column Chart



- Objective 4: Compare how force is used against male and female subjects across districts and years. Is one gender disproportionately affected?

General Description: This section evaluates whether there is a difference in the frequency of force used against male vs. female subjects across different years and districts.

Specific Requirements:

Slicers for subject_sex, district, and year

Pivot to count incidents per gender

Analysis Results: As represented in the pie chart, male subjects make up a significant majority of force-related incidents. However, when broken down by district, certain areas show a higher proportion of female cases, suggesting the need for targeted policy reviews.

Visualization:

Pie Chart

- Objective 5: Which 5 types of force are used most often, and how has their usage evolved over time across neighborhoods?

General Description: This final objective analyzes which five types of force are used most frequently and how their usage has changed over the years across different neighborhoods.

Specific Requirements:

Use force_desc to identify top 5 force types

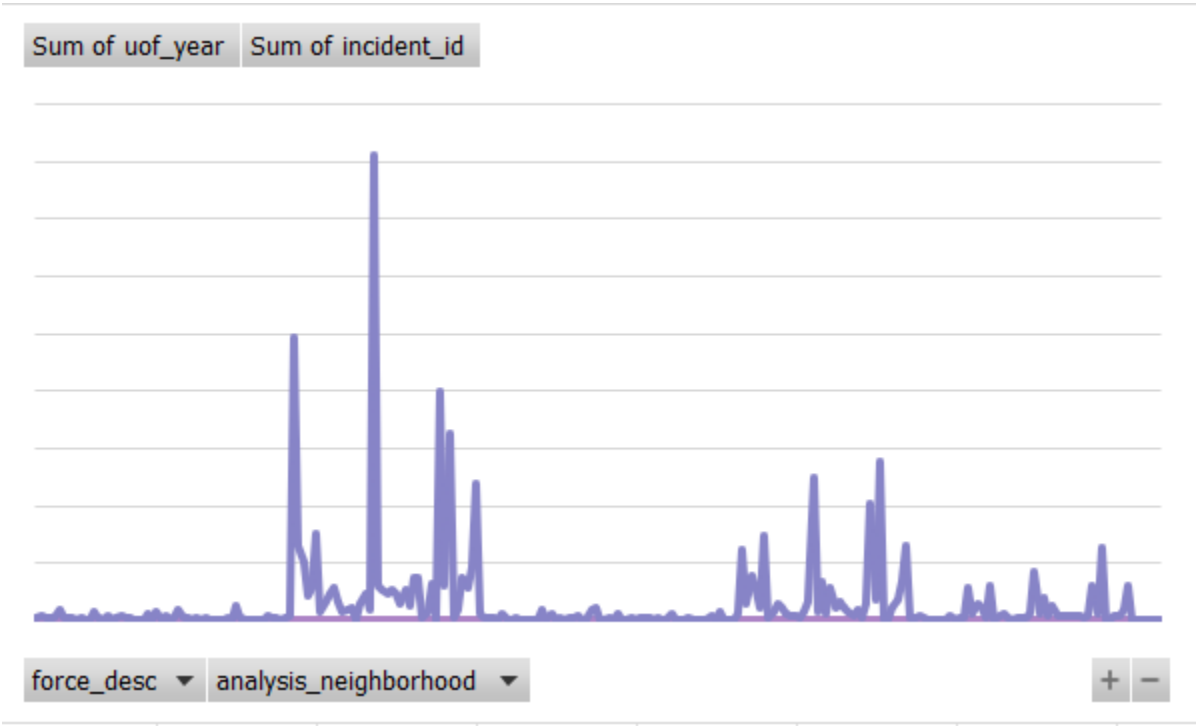
Timeline for year-based trend view

Slicer for analysis_neighborhood

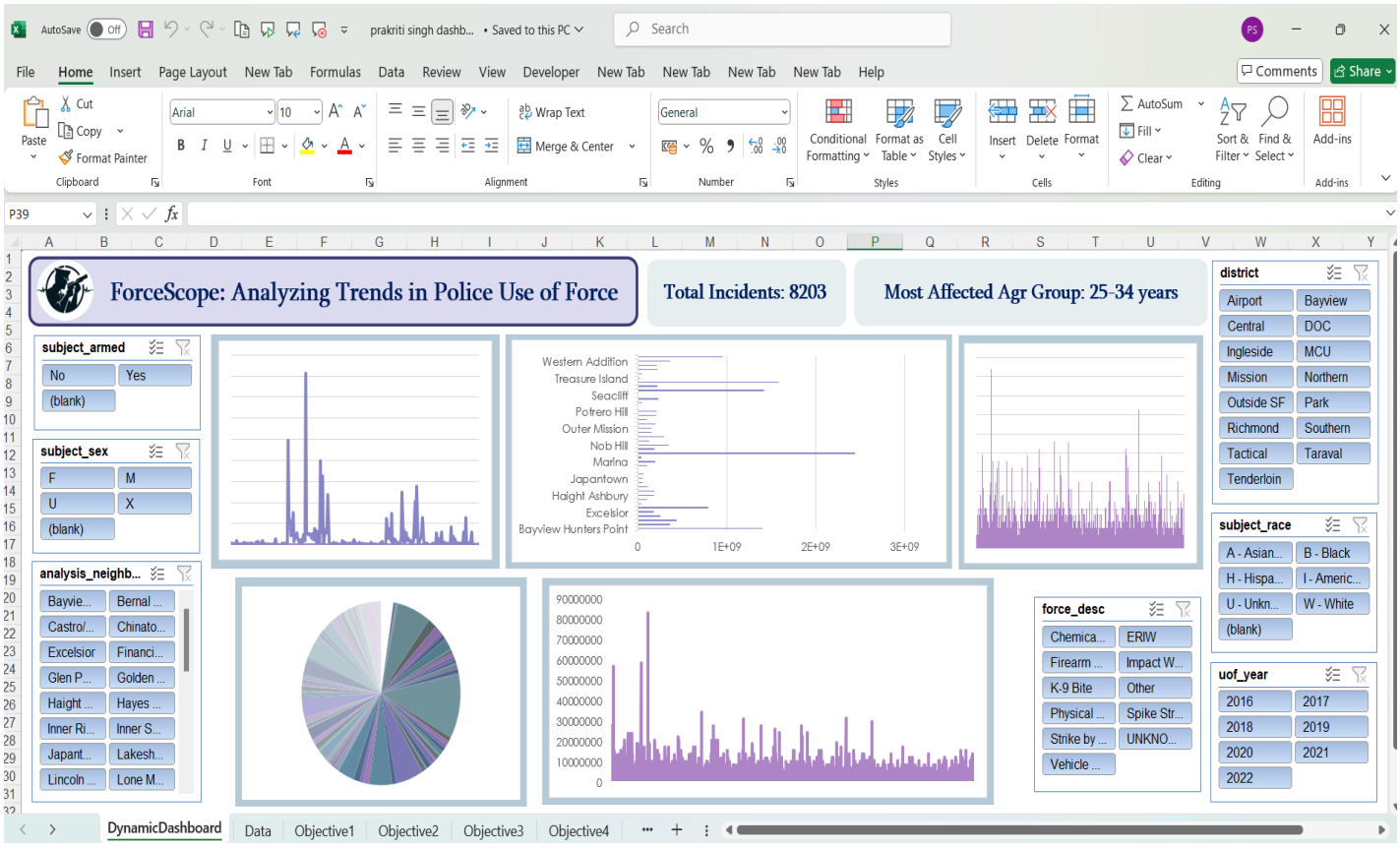
Analysis Results: The line chart shows that types like Physical Force and Firearm Drawn remain the most used across neighborhoods. However, OC Spray and Taser have seen a decline, possibly due to departmental changes or updated training protocols.

Visualization:

Line Chart


Sum of uof_year
Sum of incident_id
force_desc
analysis_neighborhood

Dashboard:


ForceScope: Analyzing Trends in Police Use of Force
Total Incidents: 8203
Most Affected Agr Group: 25-34 years
subject_armed
No
Yes
(blank)
subject_sex
F
M
U
X
(blank)
analysis_neighb...
Bayvie...
Bernal ...
Castro/...
Chinato...
Excelsior
Financi...
Glen P...
Golden ...
Haight ...
Hayes ...
Inner Ri...
Inner S...
Japant...
Lakesh...
Lincoln ...
Lone M...
Western Addition
Treasure Island
Seacliff
Potrero Hill
Outer Mission
Nob Hill
Marina
Japantown
Haight Ashbury
Excelsior
Bayview Hunters Point
0
1E+09
2E+09
3E+09
90000000
80000000
70000000
60000000
50000000
40000000
30000000
20000000
10000000
0
force_desc
Chemica...
ERW
Firearm ...
Impact W...
K-9 Bite
Other
Physical ...
Spike Str...
Strike by ...
UNKNO...
Vehicle ...
district
Airport
Bayview
Central
DOC
Ingleside
MCU
Mission
Northern
Outside SF
Park
Richmond
Southern
Tactical
Taraval
Tenderloin
subject_race
A - Asian...
B - Black
H - Hispa...
I - Americ...
U - Unkn...
W - White
(blank)
uof_year
2016
2017
2018
2019
2020
2021
2022
DynamicDashboard
Data
Objective1
Objective2
Objective3
Objective4

6. CONCLUSION

The creation of this interactive dashboard has provided a deep and data-driven understanding of how force is used by police across various districts, neighborhoods, and demographic groups from December 2016 to April 2022. By combining powerful Excel tools like Pivot Tables, Slicers, Timelines, and various dynamic charts, the dashboard allows users to explore hidden patterns and draw meaningful conclusions with just a few clicks.

Overall, the dashboard stands as a complete analytical tool that blends technical skills with real-world relevance — offering a valuable resource for stakeholders who seek to understand and improve community safety.

7. FUTURE SCOPE

While the current dashboard provides valuable insights into police use of force incidents, there is still significant potential to enhance and expand the analysis in future versions.

One key area of development is integration with real-time data sources. By linking the dashboard to live databases or updated public datasets, the visuals can evolve into a continuously refreshing tool for ongoing monitoring and timely decision-making.

In addition, expanding the dashboard to include comparative analysis across cities or states would help contextualize local trends and support broader policy research.

Lastly, migrating the dashboard to advanced platforms like Power BI or Tableau could provide even more flexibility in visualization, reporting, and cross-device compatibility.

In summary, this project lays a strong foundation that can be built upon to create a more intelligent, transparent, and responsive system for analyzing and improving police-public relations.

8. REFERENCES

- https://services.india.gov.in/service/detail/open-government-data-platform-india-1

LINKEDIN:

https://www.linkedin.com/posts/prakriti-singh-97b93b35b_successfully-built-an-interactive-excel-activity-7321214562165272576-Rek8?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFmpXq8B9TPT5u2QrKYlSqYdpaVUf-EbmME