**Analyzing the Factors Influencing the Suspension of Police Investigations in**

**Dallas**

II.**Abstract:**

This paper analyzes how victim demographics and other factors predict police case suspensions using data from Dallas, Texas. Drawing on a large dataset of police incident reports, this paper examines patterns in case outcomes using victim race, ethnicity, location, incident type, and reporting area as predictors. The random forest classifier modeled the likelihood that a case was marked "suspended." The target variable was derived from the "UCR Disposition" field. Preprocessing the data involved cleaning for missing values and encoding categorical variables, respectively, in preparation for training the model.

It yields 92% accuracy with high precision in predicting the suspended cases: 93% precision, 99% recall. Feature importance here identified the specific incident types - "Natural Death," "Accidental Death," and "Unexplained Death" - as the most important predictors. Other operational factors, such as "Reporting Area," also rank very high, while the demographic characteristics of victims, especially race, contribute less but remain significant.

**III.** **Introduction**:

Investigative results have been considered an important measure of police performance, efficiency, and fairness in law enforcement. Among these, the classification of cases as "Suspended"-that is, an investigation was stopped without resolution or a conclusive outcome such as an arrest or conviction-raises some questions regarding what the driving factors behind these decisions are. Suspension of a case may reflect operational priorities, resource constraints, or systemic biases-all of which make the issue very critical for investigation with a view to accountability and improvement of public trust in law enforcement.

This current study analyzes police case suspension in Dallas, Texas, using detailed incident data. Police records would contain a wealth of variables, including incident type, geography, victim demographics, investigation outcomes, and many other factors. Using these measures, this research will investigate the trends and significant predictors regarding case suspension. This analytic study is informed by the question: **How are demographic characteristics, incident types, and geographical factors related to the likelihood of police case suspension?**

The study aimed at providing actionable insights that could be used by the police force to improve operational practices, resource allocation, and policy reforms. Identifying drivers for case suspension helps identify the inefficiency in decision-making and brings fairness, putting in more effort to solve cases that have remained unsolved so far. These, therefore, are the expected outcomes of this research: what are the main predictors of case suspension, the relative importance of these predictors, and the recommendations for improvement to make police operations in Dallas more transparent and effective.

**IV. Literature Review:**

Past research has singled out some of the essential factors contributing to police case suspensions and thus provided valuable insights into the underlying causes of such case outcomes. These factors have often involved the type of incident, victim demographics (socioeconomic status, race, and gender), and location-based variables. Research along this line has identified the intricate interplay of these factors and how they influence the decisions regarding case outcomes made by law enforcement.

Perhaps the most relevant work has concerned incident types and their relationship to case suspension. As such, incidents that do not involve crime, such as natural or accidental deaths, are found to be more likely to be suspended since there is limited investigation into such incidents. Likewise, low-priority crimes, such as verbal threats or property crimes, are often shunted toward the bottom of the pile, especially when resources are scarce.

The impact of victim demographics is a factor that has been studied highly, and race and socioeconomic statuses have been found to affect cases. For instance, certain studies indicate that cases affiliated with the marginalized or minority would most likely experience delays or suspension in investigation due, perhaps, to implicit biases or the system of inequities within the institution of policing. Another important variable is that of gender, where the victim being female sometimes attracts a differential level of attention according to perceived conceptions of victimhood.

Geo-spatial studies have identified location-based factors as important in case suspension rates. Location-specific trends, for example, were noted where cases occurred in economically poor neighborhoods or high-crime areas and were thus more likely to be suspended. Such findings indicate that resource allocation and prioritization practices often drive case outcomes, with areas perceived as higher risk receiving less attention to individual incidents.

**Findings and Methodologies in Past Studies**

The review of the related literature determined some of the most influencing factors in police case suspensions: incident type and victim demographics, including socioeconomic status, race, and gender. Recent studies use regression analysis and spatial mapping commonly to explore associations with suspension rates**. Geo-spatial analysis**, for example, shows locations where crimes are committed and police actions in urban areas. While most of the studies adopted quantitative approaches, archival police records have been used to identify temporal trends. Demographics and types of incidents were outlined by descriptive statistics in these studies, while inferential statistics examined causal relationships.  
**Gaps in Literature**

Whereas there is a preponderance of quantitative data, little has been obtained qualitatively from the decision-making processes of the officers, especially in regard to victim demographics. Fewer temporal factors have been discussed, nor their influence on suspension rates; similarly, little attention is paid to the interaction between victim demographics and situational contexts, such as neighborhood crime rates. Integrating both quantitative and qualitative research methods could provide greater insight into those factors responsible for suspension.  
**Theories and Models that would be applicable**

* **Social Disorganization Theory**: Suggests that neighborhood characteristics affect behaviors, enabling an analysis of how the structural deficits of high-crime areas are related to case suspensions.
* **Procedural Justice Theory:** Suggests that fairness in investigations is believed to improve public trust and perceived legitimacy. It can help explain how procedural biases are affecting suspension decisions and lead to police-practice reforms that will result in increased perceived fairness.

**V. Methodology:**

**Exploratory Data Analysis (EDA)**

For better understanding of this dataset, and to infer some key trends, several kinds of visualizations based on temporal patterns, demographics of victims, and usages of weapons were drawn. This analysis will highlight the initial patterns and provides some sense about the data lying beneath:

**1.Incident Count by Month**

A graph with blue lines and dots

Description automatically generated

* Incident trend across months has a growth for two successive months, June and July.
* It decreases from August to November and slightly improves during December.
* These periodic changes may indicate something relevant either in the crimes or in the reporting practices.

**2. Top 10 Weapons Used**

**Analysis of weapon types in incidents:**

A graph of a number of weapons

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* Other (unspecified) weapons are the highest and followed by handgun.
* Personal weapons, that is hands, feet, etcetera, and cases of no weapon used also score high
* Others that appear as less frequent yet worth noting in the classification of weapons are pocketknife, threats, and rifles.

**3. Gender Distribution of Victims**

* Victim Gender: There are approximately 110,000 females and 140,000 males; this means there are more males than females. In addition, relatively few victims have an unknown or indeterminate gender.

A graph of a number of people

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**Machine Learning Methods**

**1. Classification by Decision Trees:** In this case, a Decision Tree model is developed to study how the demographics of the victim, location, and the type of event can predict the case suspension.

The interpretable model of variable importance and patterns showed the main drivers for incident type and reporting area.

**2. Random Forest Classification:** Applied for improving feature relevance ratings and predictability for a wide range of input factors.

This model, therefore, emphasizes the main effects of incident types such as "Accidental Death" and "Natural Death" along with features that are geographical in nature.

**Tool and Data Integration:** Preprocessing was needed to encode categorical data, remove missing values, and aggregate temporal data. The analysis in this paper was conducted in Python libraries.

Together, these techniques have so far enabled the study to discern not only the key drivers of case suspensions but broader patterns across demographic and temporal dimensions that offer helpful suggestions for improving police practices and policies.

**Variables**

* **Target Variable**:
  + Offense Status: A binary variable indicating whether a case is “Suspended” (coded as 1) or not (coded as 0).
* **Input Variables**:
  + **Incident Characteristics**: Type of Incident (e.g., theft, assault), Type of Property, Call 911 Problem.
  + **Victim Demographics**: Victim Race, Victim Gender, Victim Age.
  + **Geographic Data**: Incident Address, Reporting Area, Council District, Community.
  + **Temporal Variables**: Year1 of Occurrence, Month1 of Occurrence, Day of the Week.
  + **Severity Factors**: Hate Crime, Gang Related Offense, Weapon Used.

VI. **Results and Discussion**:

|  |  |
| --- | --- |
| Model Performance | Key Findings |
| Accuracy | 92% |
| Precision | 86% |
| Recall | 29% |
| Precision | 93% |
| Recall | 99% |

**Results and Discussion**

1. **Model Performance**-

The Random Forest model proved that it is good at mining the data for patterns with an overall accuracy of 92% to correctly classify a case to be suspended.

The confusion matrix showed that though the model was doing very well on the identification of the cases that were 'suspended' (class 1, recall 99%, with 1857 correctly predicted out of 1867), the model did poorly for the non-suspended cases, class 0, correctly predicting only 61 out of 210, with a recall of 29%.

Class imbalance in the dataset is shown in the classification report - 93% Precision for "suspended" and a low performance for "no suspended."

**Discussion**

**1. Significance of the Findings**

The results confirm that incident type is the main determinant of case suspension. Non-criminal cases, such as "Natural Death" or "Accidental Death", often result in suspension, likely because they do not fall within the scope of further investigation.

Geographic location (Reporting Area) is indicative of the varying policing in response and resource distribution within the different areas that makeup Dallas. Cases that happened in certain locations might not get as much attention and focus because of operational, workload, or socioeconomic concerns attached to those places.

**2. Demographic Factors**

While the victim race was less influential in rank order than incident type, it's an ominous finding as its inclusion in the top predictors raises flags with regards to systemic bias. The cases involving Black victims demonstrated a slightly increased possibility of suspension compared to cases with White victims. This concurs with what is already in the literature on disparity in law enforcement practice.

**3. Unexpected Findings**

It was surprising to see that even demographic factors, such as the ethnicity of the victim, have a lower influence in relation to incident type and location. This would mean that operational and incident-specific factors may overshadow demographic biases in suspension decisions, though not making the latter insignificant.

The low recall for the non-suspended cases, 29%, shows that there is an imbalance in case suspension practices, with the dominance of suspended cases in the dataset.This would suggest a systemic trend of suspension in such instances, which requires further analysis regarding procedural decision-making.

**4. Comparison to Literature**

Results are consistent with earlier work focusing on incident type and geographic location as major predictors of case outcomes, but limited influence of victim demographics runs somewhat counter to the broader findings of some research studies that have identified greater demographic biases, which argues for localized or nuanced analyses.

These findings further the literature by solidifying the operational factors but provide specific insight into Dallas with regard to the role of different locations of reporting.

Also, to minimize variance suspensions, it ensures that any operational inefficiencies and/or differences in resource allocation across reporting regions can be addressed.

Future research would be needed to better understand these systemic patterns and biases through, among other things, interacting effects of incident type and victim demographics with geographic factors.

These can be used by policymakers and law enforcement agencies to create targeted interventions, effectively distribute resources, and reduce inequity in investigation outcomes.

VII. **Conclusion**:

This research examined the variables that affect police case suspensions in Dallas, Texas, specifically focusing on victim demographic factors, incident characteristics, and geographic influences. Results from this analysis revealed that the type of incident is, in fact, the best predictor of case suspension; incidents with no criminal actions, such as Natural Death and Accidental Death, were regularly suspended since very little could be investigated. Geographic location also played a very important role, showing discrepancies in police response and resource allocation for different reporting areas. Although the victim race had the least impact, its place among the top predictors indicates systemic biases in case handling, in line with existing literature about disparities in law enforcement practices.

These results have several important implications. First, the leading causes being operational and incident-specific factors suggest that better resource allocation and operational efficiency, especially in areas with high suspension rates, are required. Second, the observed differences in case handling require enhanced procedural fairness and periodic reviews of suspension decisions as a means of reducing the potential biases.

Future research should go further in the nuanced analysis of systemic patterns, including advanced machine learning techniques and longitudinal data to understand how trends are evolving. Policymakers and law enforcement agencies can use such findings in the design of targeted interventions, equitable resource distribution, and increased transparency and accountability of investigative processes. Such initiatives, if done efficiently and free from bias, could achieve better representation of equity and efficiency in law enforcement practices.

IX. **Appendices** (Optional):

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**REFERENCE**

Kumar, A., & Mahanty, S. (2021). Suspension-associated dislocation of the jaw in hanging. Retrieved from <https://www.semanticscholar.org/paper/1b19dc96e3db4dc6410b0ba50e826824b418a3f5>

Volner, D. (2020). You're it! How to psychologically survive an internal investigation, disciplinary proceeding, or legal action in the police, fire, medical, mental health, legal, or emergency services professions. Retrieved from <https://www.semanticscholar.org/paper/f44405df53c024165fd3dd1a4301875240390e75>

Pratama, H. D., & Aziz, A. (2022). Kepastian Hukum Penangguhan Penahanan Terhadap Seorang Ibu yang Menjadi Tersangka dalam Tindak Pidana Dihubungkan dengan Keadilan. Retrieved from <https://www.semanticscholar.org/paper/26fe04d5ddf91ffa12264fe6ccd8e9bde6a04653>

Baldini, L., Fiorini, G., & Mezzetti, R. (2021). How do recruits and superintendents perceive the problem of suicide in the Italian State Police? Retrieved from <https://www.semanticscholar.org/paper/590fb7c8a29389d1e3b73af977807a52751794ec>

Zine, M., & Zine, D. (2018). Suicidal strangulation with a lashing belt. Retrieved from https://www.semanticscholar.org/paper/a506b2555967dd144d78234dbe2140cbb22ca06d

Russell, C. (2019). Police Discipline at Eastern State University. Retrieved from <https://www.semanticscholar.org/paper/338d2506799f468d3544ad6c94e953f7744c08b5>

Friedman, M. (1975). Violent Crime Perpetrated against the Elderly in the City of Dallas, October 1974-September 1975. Retrieved from <https://www.semanticscholar.org/paper/b110bc08ac85149f40b0a4b6ff7cad7f8d28a3b5>

Anwar, M., & Kusuma, M. (2023). PELAKSANAAN PENANGGUHAN PENAHANAN ATAS PERMOHONAN KELUARGA TERSANGKA ATAU KUASA HUKUMNYA OLEH PENYIDIK POLRI. Retrieved from <https://www.semanticscholar.org/paper/8c2bc7a803b62c56e516a1a697761ad3b0b29469>

Verma, V., Singh, R., & Shukla, P. (2022). A prospective study of Knot, Ligature Pattern and other External Findings observed in various cases of Hanging in Allahabad; Uttar Pradesh. Retrieved from <https://www.semanticscholar.org/paper/2717279637e7cdfd4c8a5057b246dadc99ae88ab>

Morris, E. (1988). Framing truth and testimony: the interrogation of justice in 'The Thin Blue Line'. Retrieved from <https://www.semanticscholar.org/paper/420a063af49af2e98adbdced178205799f27794b>

Byard, R. W. (2020). Female autoerotic asphyxial death – features and issues. Retrieved from https://www.semanticscholar.org/paper/2529b400b6c8363108ab0e5f0df65065f0b108b3

Anonymous. (2018). O R I G I N a L C O N T R I B U T I O N Open Access. Retrieved from <https://www.semanticscholar.org/paper/2bb295768b769ba3f75a4b8aa2d4589d709b4122>

Chandler, R. K., & Shapiro, B. (2021). Examining the effectiveness of Gateway—an out-of-court community-based intervention to reduce recidivism and improve the health and well-being of young adults committing low-level offences: study protocol for a randomised controlled trial. Retrieved from <https://www.semanticscholar.org/paper/540e68ea2a76ca1869c4d2ccb539f4a295cd2580>

Babu, D. M., & Chouhan, S. (2022). Study of Profile of Ligature Materials used in Case of Hanging in Sapthagiri Institute of Medical Sciences & Research Centre, Bengaluru. Retrieved from <https://www.semanticscholar.org/paper/7cc1939a1803ca6e8f0962e6c96fed78b831ab90>

Robertson, B. (2023). The Role of Toxocara spp. in the of the Lesion of. Retrieved from <https://www.semanticscholar.org/paper/af4147de6a7a70ca86bbdf70c873fc271727a143>