DATA CAPSTONE PROJECT

Part 2

Group: Insight Ink Crew

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Date: 11TH Nov 2023

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Analytical Objectives

1- Descriptive

- What are the historical trends in homicide incidents in Toronto in terms of frequency, location, and time of occurrence?
- How many Homicide cases were reported in the last 5 years in Toronto, which regions were hotspots?
- What is the distribution of homicides across different divisions within Toronto, and are there divisions with consistently higher or lower rates?

- Is there any significant difference between Ottawa and Toronto regarding Homicide crime frequency within the last 5 years?

2- Diagnostic

- To what extent do external factors like economic conditions and major events (like pandemic) or immigration rate impact homicide rates in Toronto?
- Is there any correlation between the type of homicide and the neighborhood (region) it occurs in?

- Are homicides increasing in specific neighborhoods?

- Are there specific socio-economic factors, such as unemployment rates or income inequality, that show a strong correlation with the occurrence of homicides?

3- Predictive

- How can a predictive model be developed to estimate resource requirements for future homicide incidents in Toronto, incorporating historical data, immigration trends, and other relevant variables?
- What is the likelihood of homicides occurring in specific areas within the next six months?

- How many police resources need to be allocated to be responsive, according to the increasing rate of the population?

4- Prescriptive

- What specific strategies and interventions can be recommended to law enforcement agencies to enhance response times or proactive initiatives for homicide incidents, taking into account factors like location, time of day, and historical data?

- How can law enforcement agencies be provided with actionable insights to <u>allocate resources</u> effectively in areas where future homicide incidents are predicted to be more likely, using the developed predictive model?

- What sort of educational programs can be implemented that promote the negotiation of disputes and the avoidance of violence within neighborhoods and schools?

- What efforts may be made to get high-risk communities more engaged with community policing to avoid homicides?

Evaluation

Here the evaluation of objectives have been provided based on each question:

Descriptive Objectives

These objectives focus on understanding historical data and response times, which is crucial for building a solid foundation for further analysis and predictions. They aim to provide context and insights into past occurrences.

- How many Homicide cases were reported in the last 5 years in Toronto, which regions were hotspots?

  Type of Analytics: Descriptive

  Insight: Provides an informative overview of the number of homicides and identifies hotspot regions.

  Actionability: The data can inform law enforcement and local authorities to allocate resources to high-risk areas for crime prevention.

  Stakeholder: Toronto Police, local government, residents, researchers.

  Impact: Improved public safety, resource allocation, informed policy decisions.

- What are the historical trends in non-fatal violent incidents in Toronto in terms of frequency, location, and time of occurrence?
- How does the reporting and handling of assault incidents vary based on location, time of day, and historical data, and what areas may require improvements in emergency response procedures?

The descriptive objectives aim to understand the historical trends in non-fatal violent incidents in Toronto, focusing on frequency, location, and time of occurrence. This analysis provides a comprehensive understanding of past occurrences, enabling informed resource allocation and aiding in establishing targeted preventative measures and emergency response planning.

- What is the distribution of homicides across different divisions within Toronto, and are there divisions with consistently higher or lower rates?

  Type of Analytics: Descriptive

  Insight: Highlights variations in homicide rates across different divisions within Toronto.

  Actionability: Guides targeted community engagement and law enforcement efforts in specific divisions with higher rates.

  Stakeholder: Law enforcement, community organizations, local government.

  Impact: Enables a more focused allocation of resources and interventions in divisions with higher rates, contributing to localized improvements in community safety. This insight supports evidence-based decision-making for law enforcement and local government, fostering collaboration for safer neighborhoods.

Diagnostic Objectives

These objectives delve into understanding the relationships between external factors and identifying anomalies in the data. This is important for understanding the underlying causes and potential outliers that may affect the analysis.

- Is there any correlation between the type of homicide reported and the neighborhood (region) it occurs in?

  Type of Analytics: Diagnostic

  Insight: Explores causal relationships and helps understand if certain types of homicides are more likely in specific neighborhoods.

  Actionability: Informs targeted interventions and law enforcement strategies.

  Stakeholder: Law enforcement, local government, researchers.

Impact: More effective crime prevention and law enforcement efforts.

● Why are homicides increasing? / Are homicides increasing in specific neighborhoods?

   Type of Analytics: Diagnostic

   Insight: Identifies reasons for increasing homicides and whether they are concentrated in particular areas.

   Actionability: Allows for focused interventions to address the root causes.

   Stakeholder: Law enforcement, local government, community organizations.

   Impact: Crime reduction, improved public safety, addressing social issues.

● To what extent do external factors like economic conditions, weather, and major events impact assault rates in Toronto?

   Diagnostic objectives focus on evaluating the extent to which external factors such as economic conditions, weather, and major events impact assault rates in Toronto. This assessment helps in understanding the influences affecting assault rates, offering the potential for informed policy adjustments and resource deployment to address varying conditions.

● Are there specific socio-economic factors, such as unemployment rates or income inequality, that show a strong correlation with the occurrence of homicides?

   Type of Analytics: Diagnostic

   Insight: Establishes a correlation between socio-economic factors (e.g., unemployment, income inequality) and homicide rates.

   Actionability: Prompts the development of targeted interventions addressing socio-economic disparities to mitigate the risk of violent crime.

   Stakeholder: Policymakers, law enforcement, community organizations.

   Impact: Informs policy decisions to address root causes of homicides, leading to socio-economic interventions that contribute to long-term crime prevention. This insight is crucial for crafting comprehensive strategies that aim to create a more equitable and safer community.

Predictive Objectives:

These objectives target the development of models for estimating resource requirements and forecasting future incidents. This forward-looking approach is critical for preparedness and resource allocation.

- What is the likelihood of homicides occurring in specific areas within the next six months?

  Type of Analytics: Predictive

  Insight: Provides a forecast of potential future homicides in specific areas.

  Actionability: Enables proactive policing, community engagement, and resource allocation.

  Stakeholder: Law enforcement, local government, community organizations.

  Impact: Crime prevention improved public safety.

- How can a predictive model be developed to estimate resource requirements for future assault incidents in Toronto, incorporating historical data, immigration trends, and other relevant variables?

Predictive objectives aim to develop models that estimate future resource requirements and forecast the occurrence of future assault incidents. Creating a predictive model based on historical data and relevant variables enables proactive resource planning, aiding in anticipating and preventing future incidents, while also facilitating improved public safety and emergency preparedness.

- How many police resources need to be allocated to be responsive, according to the increasing rate of the population?

Predictive objectives aim to involve developing a model that anticipates future resource requirements based on population growth and other relevant factors. This approach enables proactive planning and allocation of police resources to ensure responsiveness to the changing needs of the community. By evaluating and forecasting population trends alongside historical data and other pertinent variables, the model can contribute to efficient resource allocation and improved public safety. This predictive model can assist law enforcement agencies in adapting their strategies to match the evolving demands of a growing population, enhancing overall responsiveness and community safety.

Prescriptive Objectives:

These objectives focus on providing actionable recommendations based on the insights gained from the analysis. This is essential for implementing practical solutions and improving response procedures.

- What sort of educational programs can be implemented that promote the negotiation of disputes and the avoidance of violence within neighborhoods and schools?

  To create and execute educational initiatives that encourage negotiations, resolution of disputes, and prevention of aggression in Canadian communities as well as schools. This goal is to create and execute curriculum, training, and tools that are successful in empowering people with the knowledge and abilities needed to settle conflicts amicably and without using violence. Establishing a framework for educational programs that encourage avoidance of violence and conflict resolution would help keep neighborhoods and educational institutions safer.

- What efforts may be made to get high-risk communities more engaged with community policing to avoid homicides?

  To develop and carry out programs that actively include high-risk populations in the country's community police activities to lower the country's homicide rate. Creating focused community outreach initiatives, fostering cooperation and confidence between law enforcement and the public, and putting plans into action to increase the involvement of the community in crime prevention are all necessary to achieve this goal. The objective is to develop a methodical strategy that raises community involvement in law enforcement activities and, in the end, makes the neighborhood safer, which reduces the likelihood of killings in these areas.

- What specific strategies and interventions can be recommended to law enforcement agencies to enhance response times to assault incidents, taking into account factors like location, time of day, and historical data?
- How can law enforcement agencies be provided with actionable insights to allocate resources effectively in areas where future assault incidents are predicted to be more likely, using the developed predictive model?

  Prescriptive objectives focus on providing actionable strategies and recommendations based on the insights gained from the analysis. Recommending specific strategies to enhance response times to assault incidents, considering location, time, and historical data, helps in improving emergency response procedures and reducing incident response times. Similarly,

providing actionable insights for effective resource allocation in areas predicted to have a higher likelihood of future assault incidents informs resource distribution based on predicted risks, leading to proactive measures and enhanced community safety.

Prioritization and Final Objectives

Based on the evaluation discussions that have been provided in advance, the following are the final objectives.

Type of Analytics	Objective name	Value	Effort
Descriptive			
	What are the historical trends in homicide incidents in Toronto in terms of frequency, location, and time of occurrence?	5	2
	How many Homicide cases were reported in the last 5 years in Toronto, which regions were hotspots?	4	2
	What is the distribution of homicides across different divisions within Toronto, and are there divisions with consistently higher or lower rates?	4	4
	Is there any significant difference between Ottawa and Toronto regarding Homicide crime frequency within the last 5 years?	5	5
Diagnostic			
	To what extent do external factors like economic conditions and major events (like pandemic) or immigration rate impact homicide rates in Toronto?	5	5
	Is there any correlation between the type of homicide and the neighborhood (region) it occurs in?	4	4
	Are homicides increasing in specific neighborhoods?	3	2
	Are there specific socio-economic factors, such as unemployment rates or income inequality, that show a strong correlation with the occurrence of homicides?	5	5
Predictive			
	How can a predictive model be developed to estimate resource requirements for future homicide incidents in Toronto, incorporating historical data, immigration trends, and other relevant variables?	5	5
	What is the likelihood of homicides occurring in specific areas within the next six months?	5	5
	How many police resources need to be allocated to be responsive, according to the increasing rate of the population?	5	5
Prescriptive			
	What specific strategies and interventions can be recommended to law enforcement agencies to enhance response times or proactive initiatives for homicide incidents, taking into account factors like location, time of day, and historical data?	5	3
	How can law enforcement agencies be provided with actionable insights to allocate resources effectively in areas where future homicide incidents are predicted to be more likely, using the developed predictive model?	5	5
	What sort of educational programs can be implemented that promote the negotiation of disputes and the avoidance of violence within neighborhoods and schools?	3	3
	What efforts may be made to get high-risk communities more engaged with community policing to avoid homicides?	5	5

Plan

Tasks	Responsible	Output	Deadline	Prerequisite
1 Descriptive	Team			
1.1 Data cleaning		Cleaned data		
1.2 Data Exploration				1.1
1.3 Analysis		Report including summary statistics, frequency distributions	Nov, 22	1.2
1.4 Data Visualization		Dashboard or charts	Nov, 22	1.2
2 Diagnostic	Team			
2.1 Univariate Analysis		Report and Visualization	Nov, 25	1.3
2.2 Bivariate Analysis		Report and Visualization	Nov, 25	1.3
3 Predictive	Team			
3.1 Model selection and		Model	Nov, 27	2.2

development (statistical models or machine lear)				
3.2 Model training				3.1
3.3 Model evaluation		Report	Dec, 06	3.2
4 Prescriptive	Team			
4.1 Scenario analysis		Actionable insights	Dec, 13	

OBJECTIVES

Descriptive	Diagnostic	Predictive	Prescriptive
• What are the historical trends in homicide incidents in Toronto in terms of frequency, location, and time of occurrence?	• To what extent do external factors like economic conditions and major events (like pandemic) or immigration rate impact homicide rates in Toronto?	• How can a predictive model be developed to estimate resource requirements for future homicide incidents in Toronto, incorporating historical data, immigration trends, and other relevant variables?	• What specific strategies and interventions can be recommended to law enforcement agencies to enhance <u>response times or proactive initiatives</u> for homicide incidents, taking into account factors like location, time of day, and historical data?
• How many Homicide cases were reported in the last 5 years in Toronto, which regions were hotspots?	• Is there any correlation between the type of homicide and the neighborhood (region) it occurs in?	• What is the likelihood of homicides occurring in specific areas within the next six months?	• How can law enforcement agencies be provided with actionable insights to <u>allocate resources</u> effectively in areas where future homicide

			incidents are predicted to be more likely, using the developed predictive model?
• What is the distribution of homicides across different divisions within Toronto, and are there divisions with consistently higher or lower rates?	• Are homicides increasing in specific neighborhoods?	• How many police resources need to be allocated to be responsive, according to the increasing rate of the population?	• What sort of educational programs can be implemented that promote the negotiation of disputes and the avoidance of violence within neighborhoods and schools?
• Is there any significant difference between Ottawa and Toronto regarding Homicide crime frequency within the last 5 years?	• Are there specific socio-economic factors, such as unemployment rates or income inequality, that show a strong correlation with the occurrence of homicides?		• What efforts may be made to get high-risk communities more engaged with community policing to avoid homicides?