

COVID-19 Crime Analytics in Canadian Provinces

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Project Purpose

- 1) Investigating the relationship between crime rate and socioeconomic status across Canadian Provinces.
- 2) Focusing Primarily on COVID-19 years as it was one of the time period where factors such as income, employment status were greatly affected.
- 3) Target audience: to show law enforcement agencies, government officials, and policy makers how COVID-19 affected crime rate across Canada with the hope that new crime prevention strategies, and areas for improvement are addressed.

Project Hypothesis/RQ

During the COVID-19 years (2019-2021), we hypothesize that there is a correlation between changes in crime rates and fluctuations in employment rates and average incomes across Canadian provinces. Specifically, we anticipate that economic disruptions caused by the pandemic may influence crime dynamics, with potential variations based on employment levels and income disparities.



Project Platforms and Tools

Python



SQL Databases



Flask API

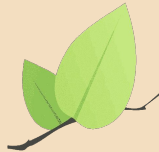


Flask

Javascript



Leaflet/Plotly



plotly

Chart.js



Chart.js

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General EDA

The dashboard allows for quick visual comparisons of crime data for a given province and year.

From the map you can decide on a geographic area to look into first.

- Top Categories of Calls Made
- Persons with income under \$5000
- Mean Unemployment Rate

Crime Numbers

- Investigate key areas of crime over a given period.

Average Income Across Provinces and Employment Over Time

- How do these socio-economic factors correlate?



ETL and Data Cleaning

3 CSV's were downloaded from StatsCan containing data on:

- Crime
- Employment
- Income


Data Cleaning and Preprocessing


- Some provinces were missing entirely
- Some data was only available for 2019-2021 limiting our scope.



Database Schema

| crime | | |
|---------------|---|-------|
| Index |  | int |
| VectorID | | str |
| Year | | int |
| Month | | int |
| Province | | str |
| CrimeCategory | | str |
| CrimeType | | str |
| Coordinate | | str |
| Value | | float |

| income | | |
|-----------------|--|-------|
| Index |  | int |
| VectorID | | str |
| Year | | int |
| Province | | str |
| EmploymentType | | str |
| TypeOfStatistic | | str |
| UnitOfMeasure | | str |
| Value | | float |

| employment | | |
|----------------------------|---|-------|
| Index |  | int |
| VectorID | | str |
| Year | | int |
| Province | | str |
| LabourForceCharacteristics | | str |
| Sex | | str |
| UnitOfMeasure | | str |
| Value | | float |
| Coordinate | | str |

Flask routes

```
#Route to Welcome page
@app.route("/")
def welcome():
    """ Welcome to the Crime Data APP """
    return (
        f"Welcome to the Crime Data from 2019-2021 Page!"
        f"Available Routes:<br/>"
        f"/api/CrimeData<br/>"
        f"/api/CrimeData/<Prov><br/>"
        f"/api/CrimeData/<Prov>/<Year><br/>"
        f"/api/EmploymentData<br/>"
        f"/api/EmploymentData/<Prov><br/>"
        f"/api/EmploymentData/<Prov>/<Year><br/>"
        f"/api/IncomeData/<br/>"
        f"/api/IncomeData/<Prov><br/>"
        f"/api/IncomeData/<Prov>/<Year><br/>"
    )
```



Key Takeaways

- Significant increase in the number of overall crimes
- Large variability the the type of crime that decreased or increased
- Little to no decrease in the average income from 2019-2020
- Average Income stayed the same or increased slightly from 2019-2021
- Number of individuals employed decreased from 2019-2020
- Significant increase in employed individuals from 2020 to 2021



Challenges and Limitations

- The crime data was merely from the reported stage from 9-1-1 calls, there's no way of knowing if it was charged or alleged
- Varying sample sizes among data
- Missing Province and Territory Data
- Challenges with errors such as SQL injection
- Data does not adjust for inflations
- Income Data not a true reflection of individual/family survivability
- Crime data does not take into account cybercrime or changes in policing priorities
- More data across more years needed to make better conclusions if socio-economic status influence crime

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Future Directions

Refine Data Sources

Refer to census data to get more samples in our data

Predictive Model

Creating a predictive model/visualization that can help influence decision making

Comparative Models

Comparing crime data with other countries can give us insight into how Canada is doing



Missing

Conclusion

- Data does not show any key indicators of a correlation between crime rate and socioeconomic status.
- Regional variability suggests that there are other factors that may influence crime rates
- For government officials, law enforcement, and policy makers this data shows the importance of considering a provinces needs at the provincial versus federal level
- As mentioned before, our data also suggests that a more in depth study is required to draw stronger conclusions

Thanks!

Do you have any questions?

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