Final Project Research on COVID-19

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Introduction

01 Datasets

- global_time_series (Canada)
- apple_mobility_transportation

02 Data Visualization

- The Cumulative Number of Confirmed and Recovered Cases in Canada
- The Cumulative Number of Active Infected and Deceased Cases in Canada
- Daily Increase of the Confirmed Cases in Canada
- Mobility Data Trend in Canada with respect to Transportation Types

03 Three Projections

- Base case, Best Case, Worst Case Spread
- SIR Model
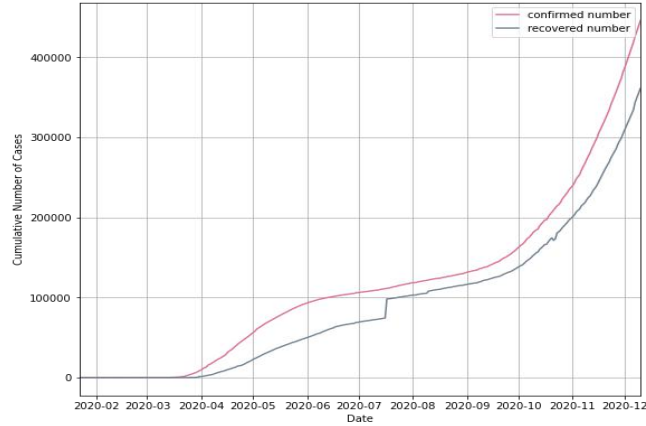
04 Correlation to Other Factors

- Factor 1: Transportation Mobility
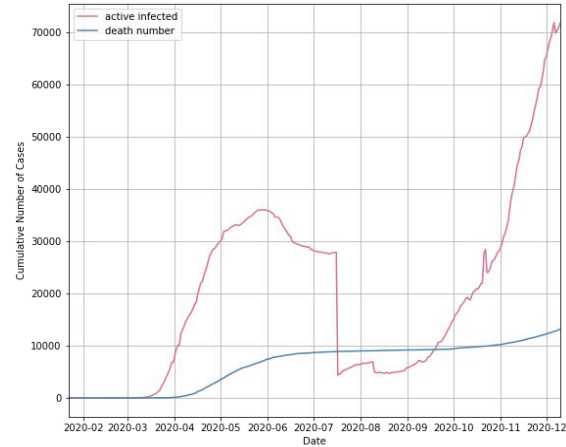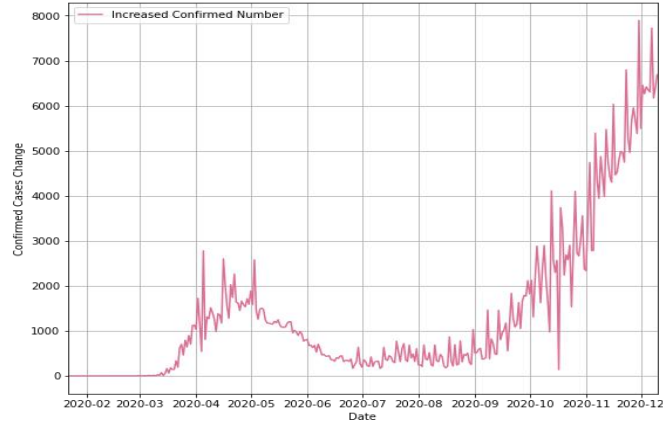- Factor 2: Social Distance Metric

05 Insights about Policy and Guidance

- Different Aspects

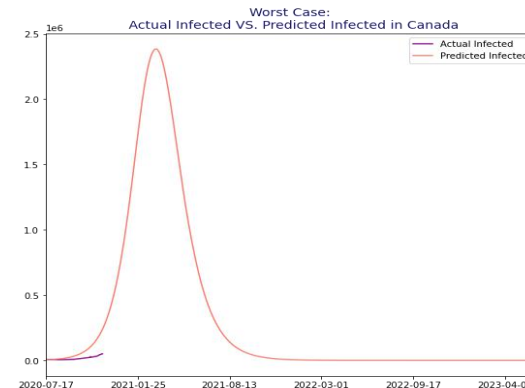DATA VISUALIZATION
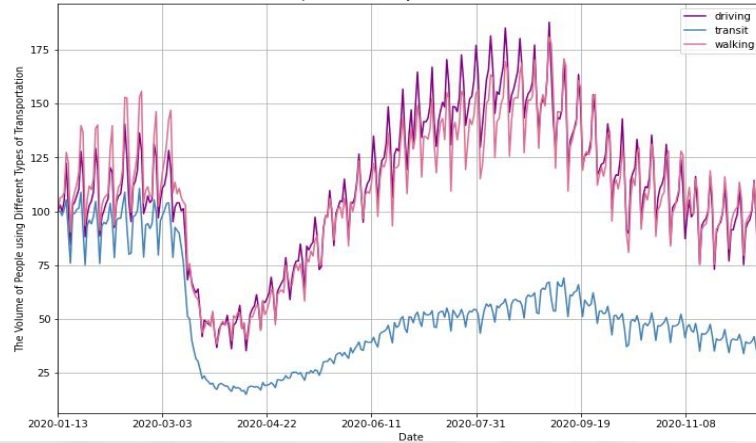
Three Projections (SIR Model)
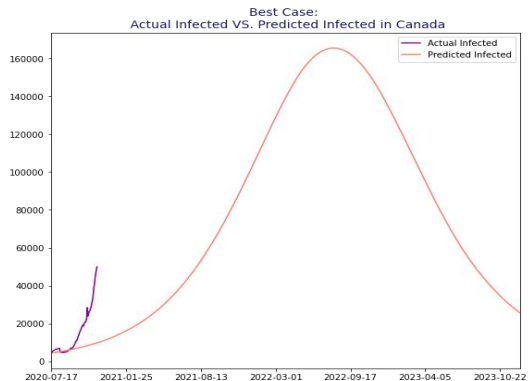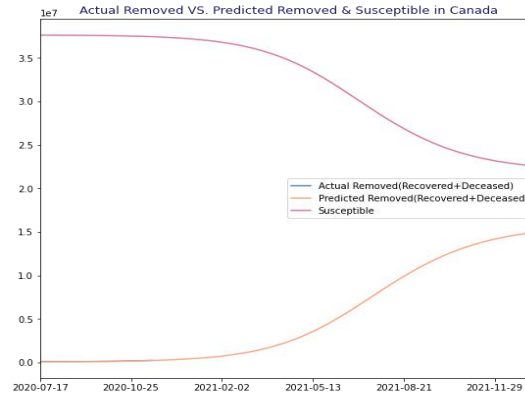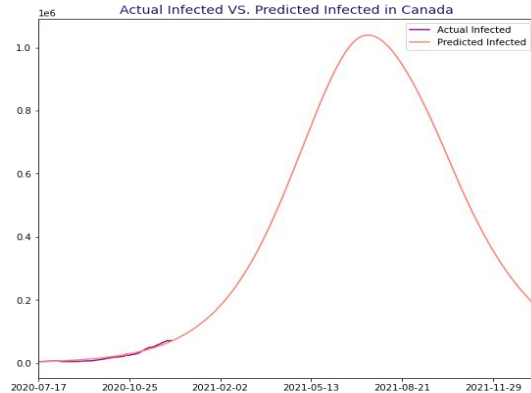
Base Case:
beta=0.0848
gamma=0.0658
R0:1.2900
Maximum infected proportion of the population at a time : 2.75%
fit time length: 2020/07/17~2020/11/17
predicted time length: 2020/11/18~2022/1/15

Best Case:
beta=0.0724
gamma=0.0658
R0:1.1000
Maximum infected proportion of the population at a time is: 0.44%

Worst Case:
beta=0.0987
gamma=0.0658
R0:1.5000
Maximum infected proportion : 6.32%

Correlation to Other Factors

Factor 1: Transpotation Mobility

Driving Mobility's Correlation with Increased Confirmed Cases in Canada
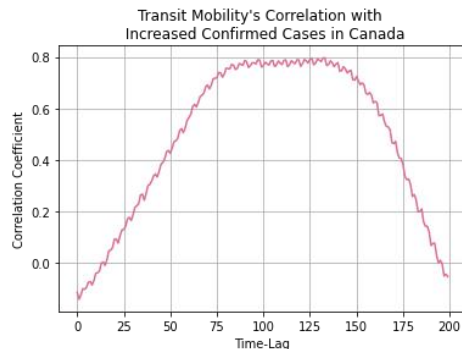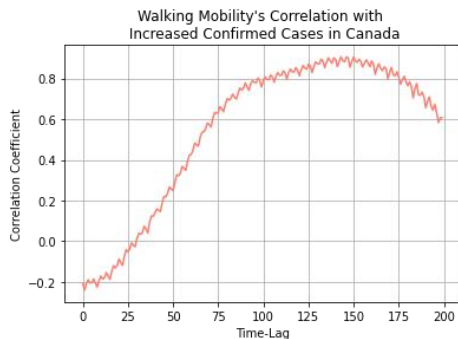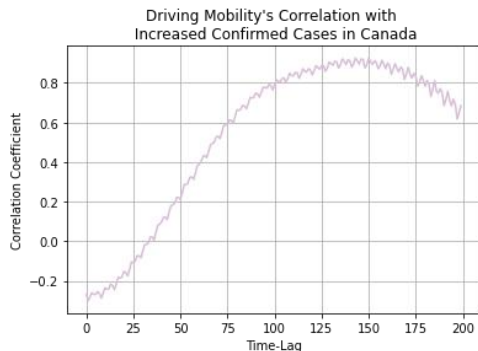

Transit Mobility's Correlation with Increased Confirmed Cases in Canada

Walking Mobility's Correlation with Increased Confirmed Cases in Canada

Notes

The lag 143 of 'driving' is most correlated with increased confirmed cases
The maximum correlation coefficient is 0.9252401306277778

The lag 133 of 'transit' is most correlated with increased confirmed cases
The maximum correlation coefficient is 0.7968696544354402

The lag 143 of 'walking' is most correlated with increased confirmed cases
The maximum correlation coefficient is 0.9064202210491603

Factor 2: Social Distance Metric

Data Source:
https://www.bbc.com/news/science-environment-52522460

According to the website, the risk of being infected is estimated to be 13% within 1m, but only 3% beyond that distance.

And the study says that for every extra metre of distance up to 3m, the risk is further reduced by half.

β can be reduced by half if other factors remain unchanged.

Insights about Policy and Guidance

The Government:
1) Encourage people to take vaccines if they are proved effective in test.
2) Assist scientiest financially to develop more effective drugs against COVID-19.
3) Force all residents to keep social distance rules and severely punish those who violate the discipline.
4) Forbidden non-essential gatherings with more than 10 people to decrease the mean contact.

The Doctors or Healthcare Professinals: Develop more effective therapeutics.

The Scientists: Spend more energy to develop more effective drugs against COVID-19 to reduce infectious period.

The Industry: Promote online shopping and encourage the customers to buy things online.

The Residents:
1) Keep a social distance between each other as much as possible .
2) Avoid non-essential gatherings.
3) Reduce the activities which need people go out.
4) Buy things online instead of going to the store as much as possible.