COVID-19 Projection & Policy Recommendation

Introduction:

- Analysis on British Columbia, Canada
- Recommendations based on South Korean NPIs

1. Time-Series Data Wrangling
2. Exploratory Data Analysis
3. Modified SIR Implementation & Projection
    a. SIR & Modified SIR
    b. Short-Term & Long-Term Projections
4. Policy Recommendation

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Initial Global Dataset

Province	Country	Lat	Long	1/22/20	1/23/20	...	12/1/20
NaN	Afghanistan	33.9	67.7	0	0	...	46717
NaN	Albania	51.2	20.2	0	0	...	39014
...	...	...	...	...	...	...	...

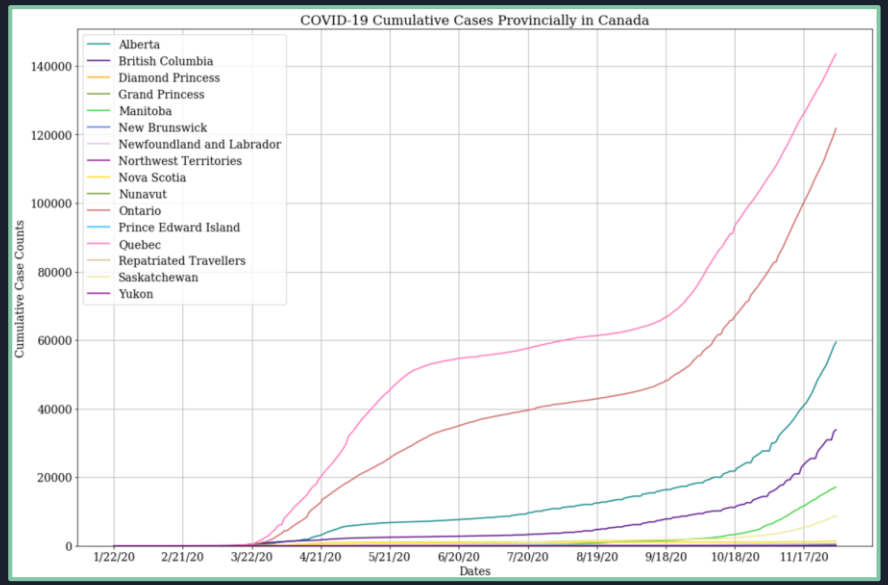
BC Time-Series

Date	1/22/20	1/23/20	...	12/1/20
Infected	0	0	...	33894

Exploratory Analysis

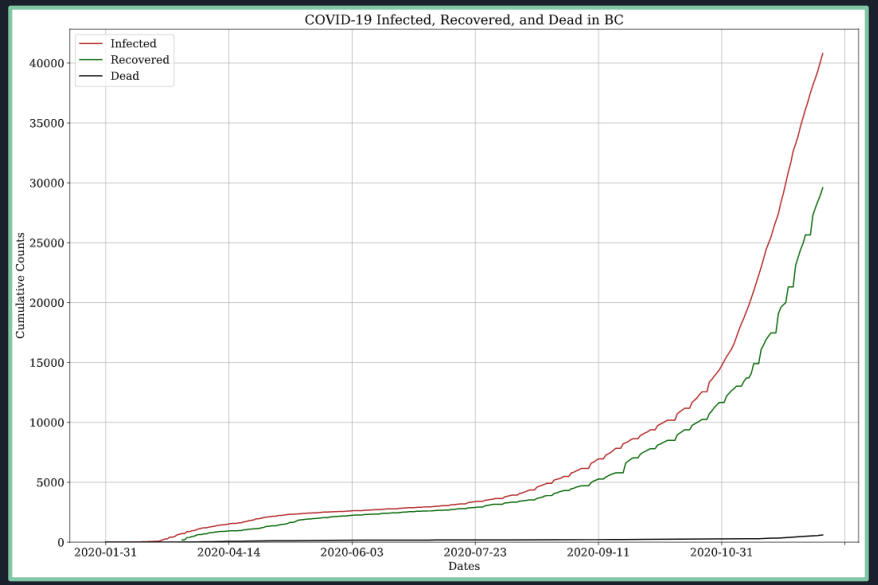
Hardest Hit Provinces:

- Quebec and Ontario
- Followed by Alberta, BC, and Manitoba



COVID Trends in BC:

- COVID cases exponentially rising in BC
- Could use an exponential/sigmoid fit
  - Ultimately settled on an SIR model



SIR Implementation & Projection

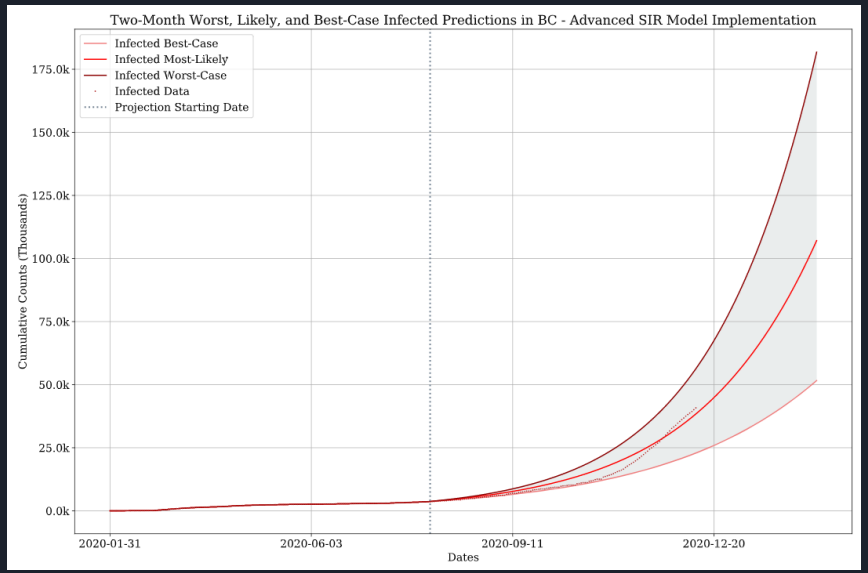
SIR Euler Update Equations:

$$
\begin{aligned}
s_i &= s_{i-1} - b\, s_{i-1} i_{i-1} \cdot \Delta t \\
i_i &= i_{i-1} + (-k i_{i-1} + b\, s_{i-1} i_{i-1}) \cdot \Delta t \\
r_i &= r_{i-1} + k\, i_{i-1} \cdot \Delta t
\end{aligned}
$$

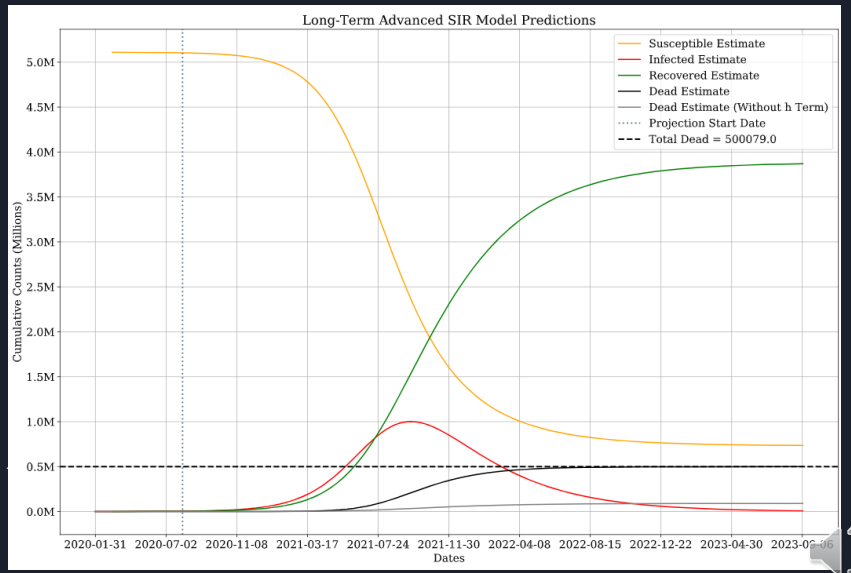
Modified SIR Euler Update Equations:

$$
\begin{aligned}
s_i &= s_{i-1} + (-b\, s_{i-1} i_{i-1} + \mu\,(s_{i-1} + i_{i-1} + r_{i-1}) - \mu\, s_{i-1} - c) \cdot \Delta t \\
i_i &= i_{i-1} + (-k i_{i-1} + b\, s_{i-1} i_{i-1} - \mu\, i_{i-1} - \alpha\, i_{i-1}) \cdot \Delta t \\
r_i &= r_{i-1} + k\, i_{i-1} \cdot \Delta t
\end{aligned}
$$

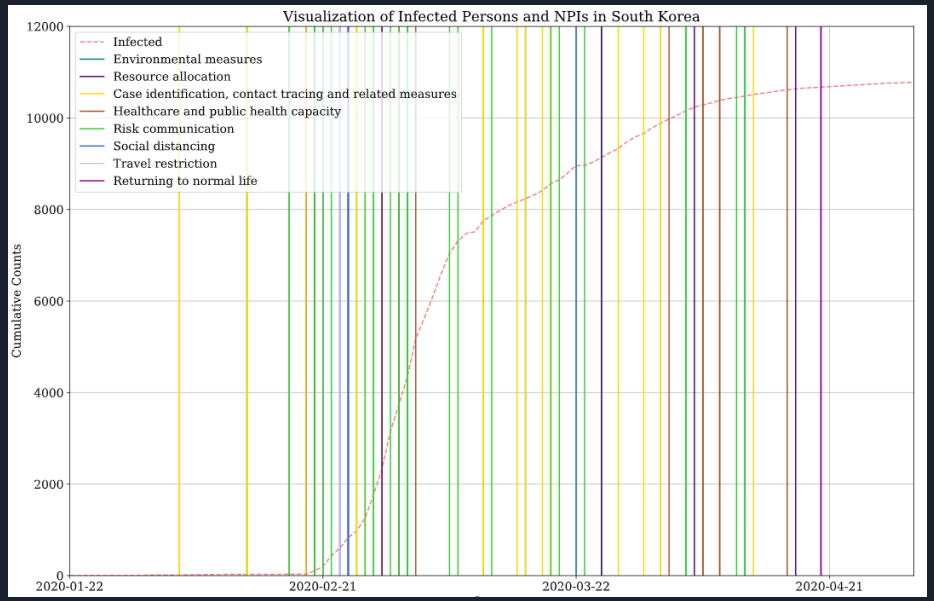
Modified SIR Short-Term Prediction:



Modified SIR Long-Prediction:



Data-Driven Policy Recommendation



- Modelled after South Korean mitigation plan
- Aiming to completely level out the curve

South Korean Mitigation Plan:

- Frequent and aggressive NPI
- Mandatory testing
- Contact tracing program
- People have since returned to work

Plan for BC:

1. BCCTP (BC Contact Tracing Program)
2. Mandatory testing, especially in high-risk areas
3. Informed event closures and shutdowns