Abstract

The aim of this project is to analyse the effect of the Covid-19 vaccination on the number of positive Covid-19 cases, as well as its effect on the number of hospitalizations in Ontario.. All data used was from `https://data.ontario.ca/dataset/`. The available vaccination data begins from January 2021. Routine VOC PCR testing of positive Covid-19 samples ceased on November 12th 2021 [1], and so to compare the effect of vaccinations to positive Covid-19 cases, we use analyse data from 1st January 2021 to 31st October 2021. The effect to be analysed is whether administration of the Covid-19 vaccination led to a reduction of positive Covid-19 cases, as well as to analyse if administration of the vaccine reduced the number of intensive care unit hospitalizations caused by Covid-19 (in Ontario).

Methods Used

The data from the data.ontario website was downloaded and plotted as discrete time series. Before using techniques to compare different data sets (i.e. to see correlation between vaccine doses administered and positive Covid-19 cases etc), the data was filtered using techniques used in class, to remove any unwanted noise. In order to filter the data, techniques from lab 3 were used, where our original time-series was de-trended by removing a numpy.polyfit line (of sufficiently high degree, at least degree 8).The de-trended data was Fourier Transformed (using Numpy's built in FFT), with the Fourier spectrum in the frequency domain set to zero for high frequencies. This filtered detrended time-series was then inverse Fourier transformed back to the time domain (using Numpy fft.ifft), with the original trend finally added back in. Below is an example of such filtering for the number of confirmed positive Covid-19 cases reported.

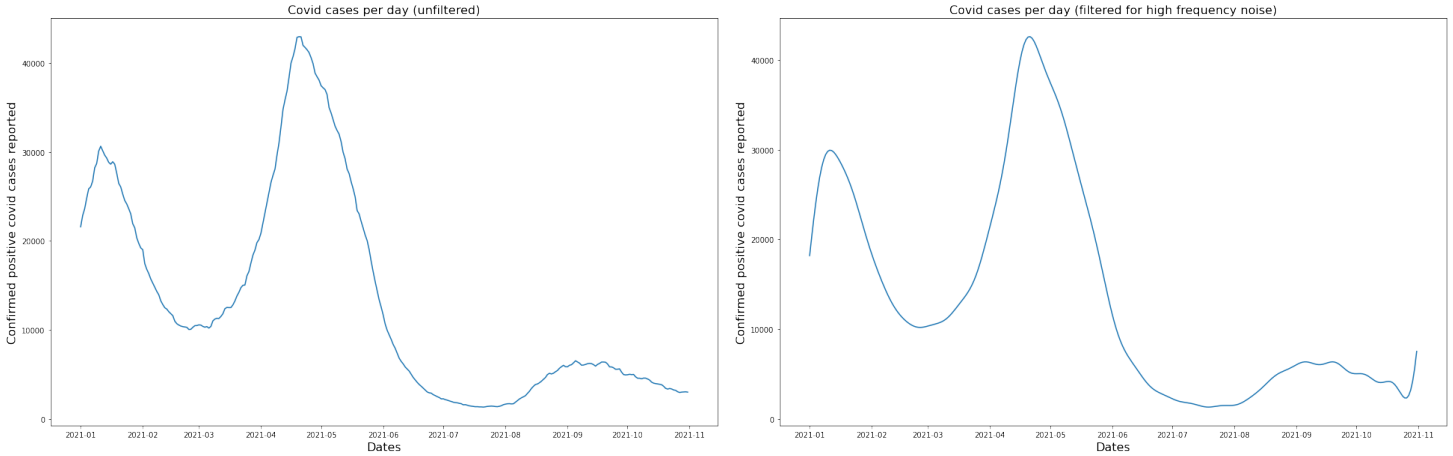

Figure 1: F-domain filtering comparison; unfiltered (left) versus filtered (right)

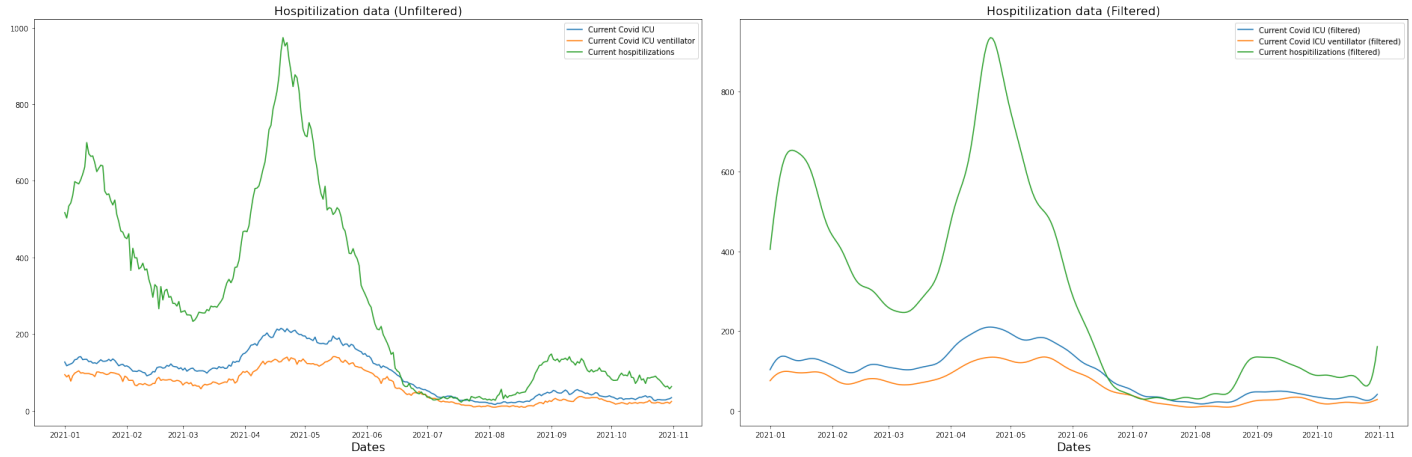

Figure 2: F-domain filtering comparison; unfiltered (left) versus filtered (right)

The plots for the rest of the datatsets (filtered versus unfiltered) can be found on the figures page.

Figures

References

[1] data.ontario.ca. Status of covid-19 cases in ontario. https://data.ontario.ca/dataset/status-of-covid-19-cases-in-ontario/resource/ed270bb8-340b-41f9-a7c6-e8ef587e6d11, 2022. [Online; accessed 19-April-2022].