COVID19 Apple Mobility Data

Group x

x(x)

x(x)

HS (x)

x(x)

Table of Contents

Data Selection / Cleansing

Data Selection

- Apple Mobility data
  - Level : Country, Region, Sub-region, County
    - Most complete -> County level
- County Distance data
  - National Bureau of Economic Research (NBER)
    - Ultimate source -> Census
  - Level of distance: 50 miles, 100 miles, 500 miles, no restriction
- County COVID data
  - Github - nytimes/covid-19-data
    - Ultimate source -> State and local governments and health departments
  - Case, Death

Data Mapping

Data Visualization

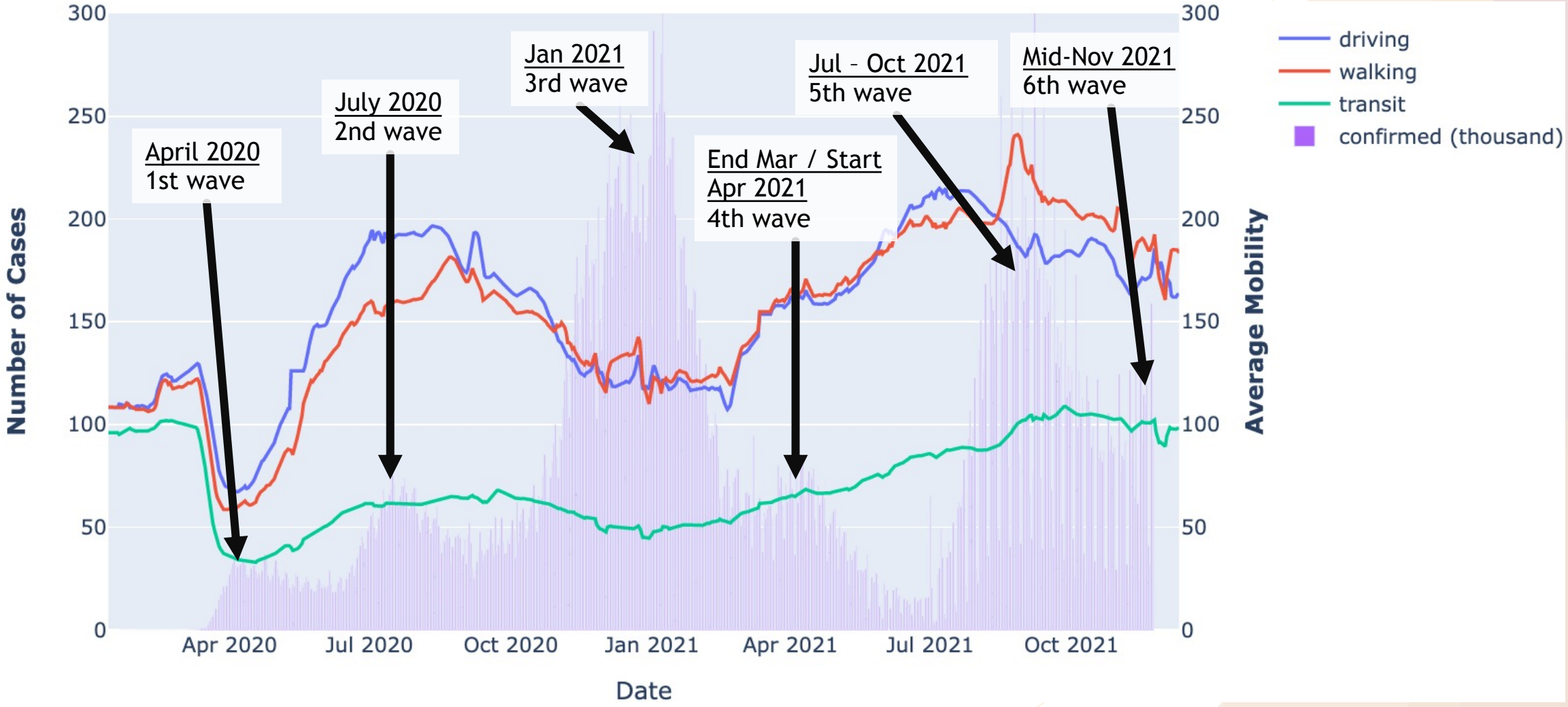
Mobility and Confirmed Cases

Definition of Mobility in Apple dataset

- Count of direction / routing requests on Apple Maps
- Define a day as midnight-to-midnight, Pacific time

Reference: https://covid19.apple.com/mobility

Mobility and Daily Confirmed Cases



Mobility and Daily Confirmed Cases

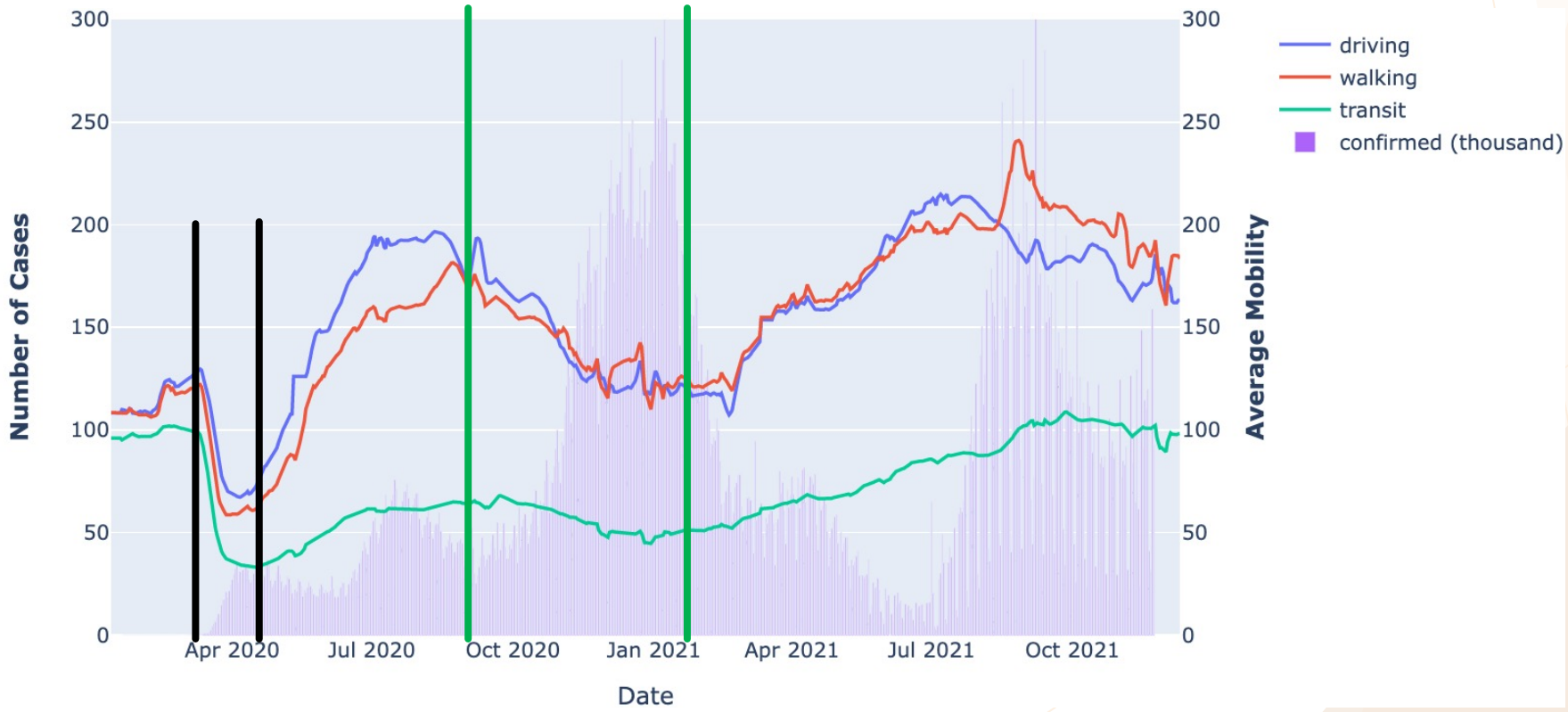
Assumption:

- Number of confirmed cases increases with mobility
- COVID-19 is an infectious disease which can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe
- more interactions between people increases the chance of infection

Mobility and Daily Confirmed Cases

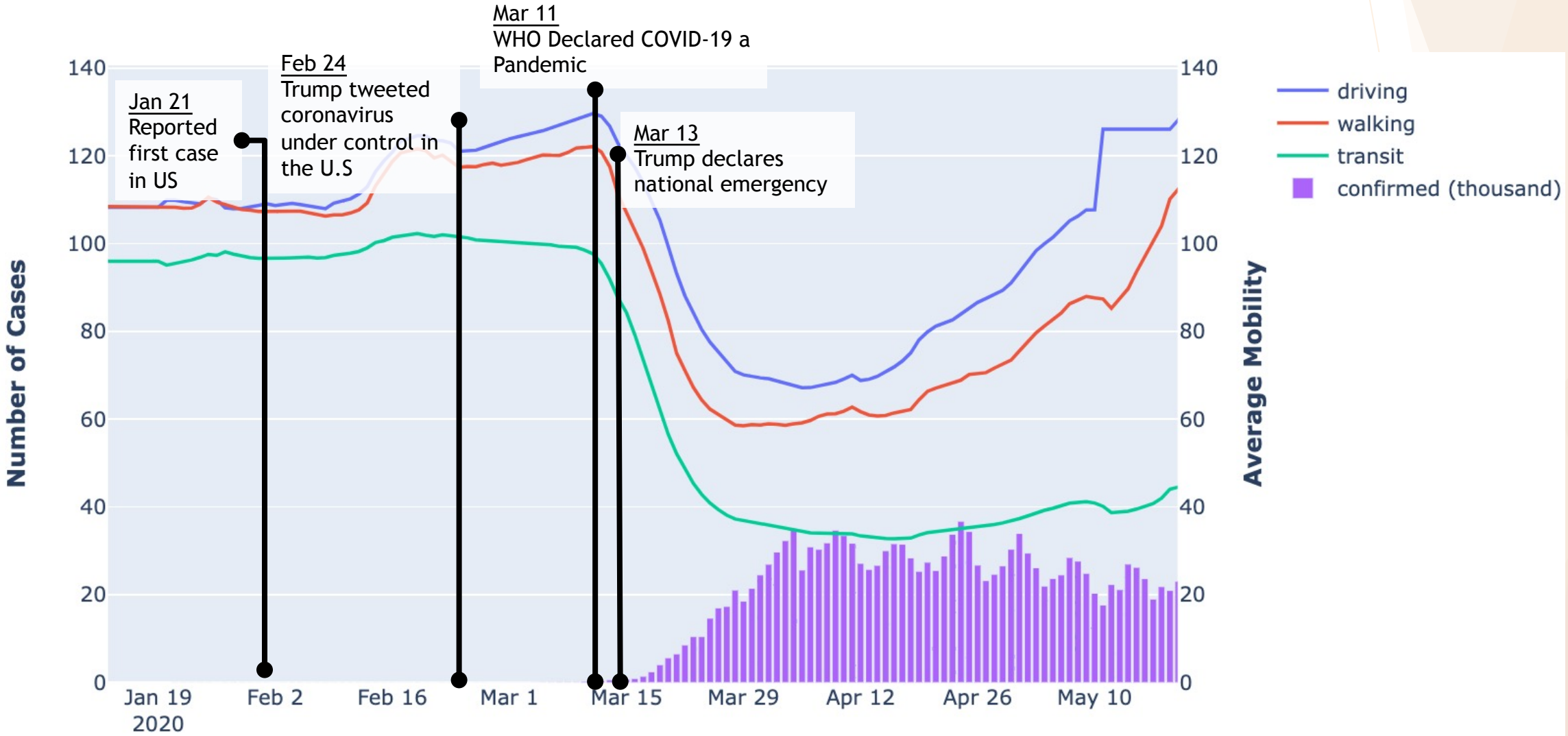
Our assumption is wrong

- Just the count of routing requests in Apple Maps
- Mobility =/= physical location/movement of users



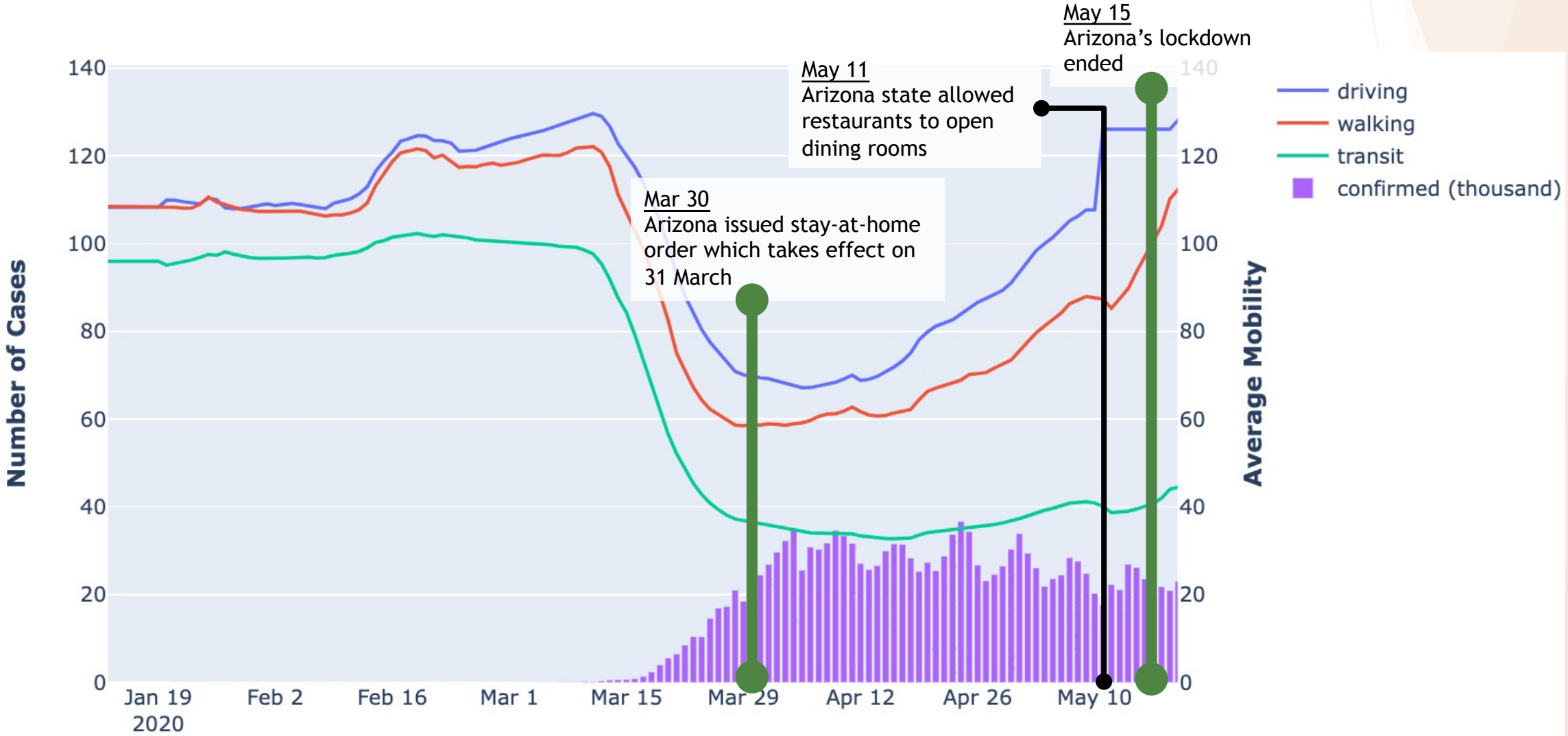
Timeline – 13 Jan to 19 May 2020

- Mobility soared after Donald Trump's tweeter post
- Great drop in mobility after 11st Mar



Timeline – 13 Jan to 19 May 2020

- Sudden soared mobility on May 11

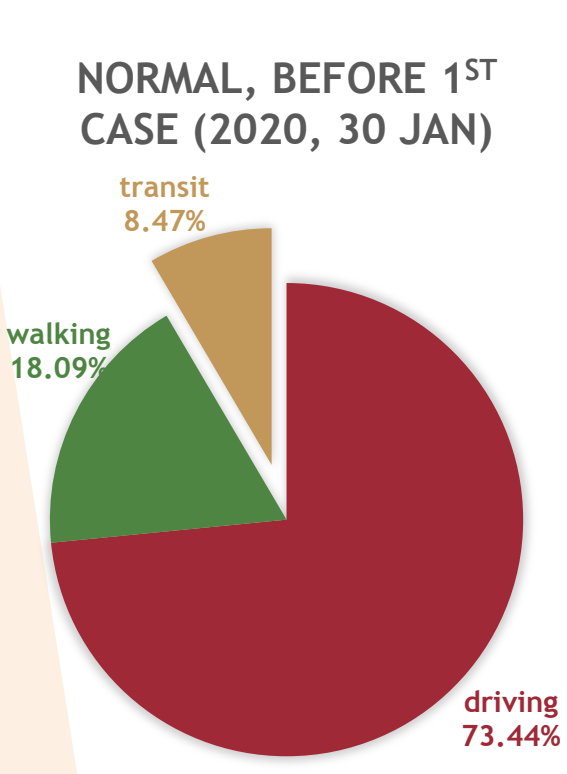


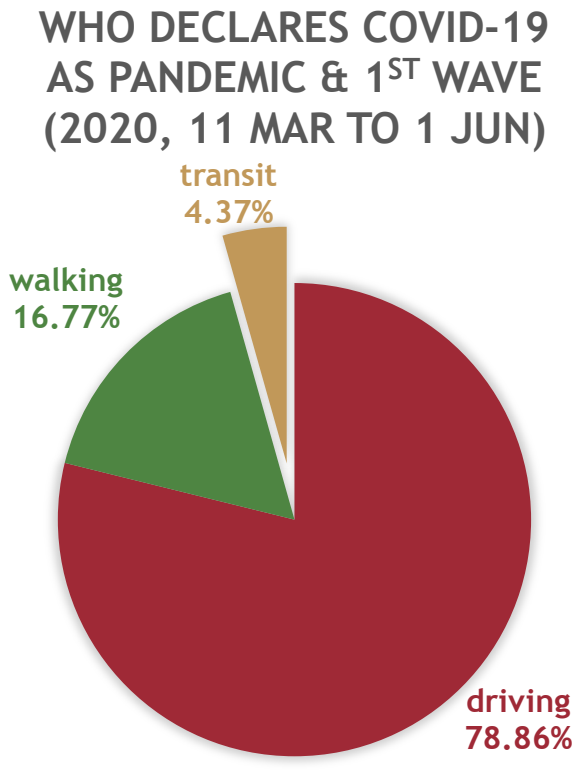
Insight – Change in Behaviors of Taking Transportation

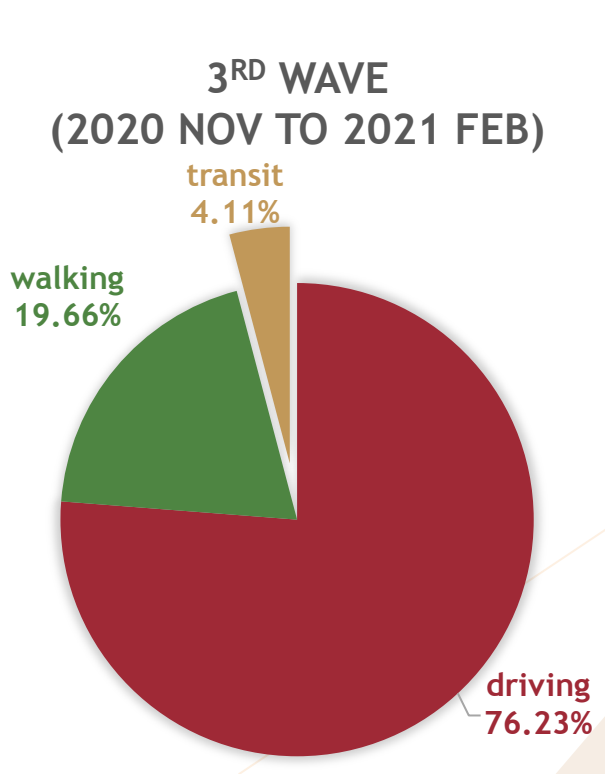
- After WHO declared pandemic and during 1st wave, the portion of taking public transports decreases
- Until nowadays, in the latest months, although portion of transit increases, it is still lower than before

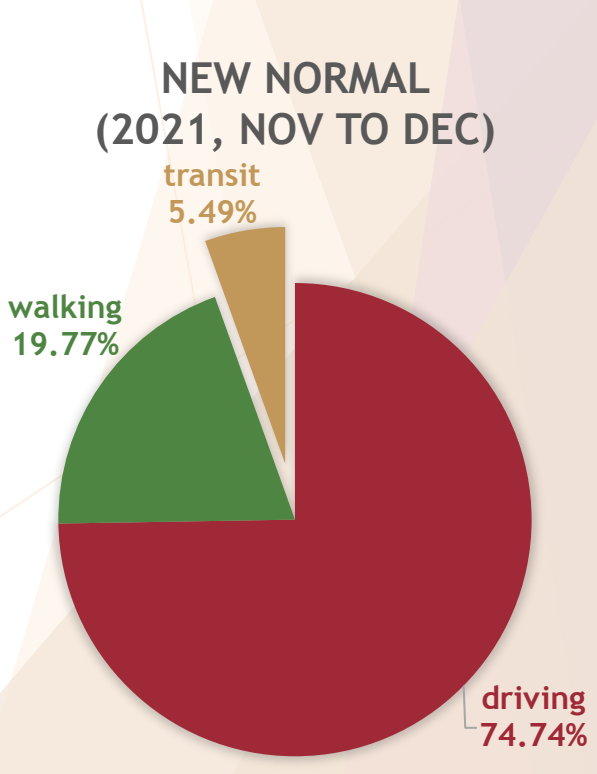
Conclusion:

- People avoid to take public transportation, they are more willing to walk and drive









Dealing with seasonal time series data

- Using 7-day moving average to filter out weekly seasonality
- Much easier to see the trend after filtering
- Before

- After

Graph Visualization

Degree, Path Length and Clustering Coefficient

Graph Machine learning

Reference

Index	Description
1	https://covid19.apple.com/mobility
2	https://www.nber.org/research/data/county-distance-database
3	https://github.com/nytimes/covid-19-data
4	https://data.nber.org/distance/internal_point.txt
5	http://www.movable-type.co.uk/scripts/latlong.html
6	https://www.kavas.com/blog/great-circle-and-rhumbline.html
7	https://docs.dgl.ai/en/0.6.x/api/python/nn.pytorch.html#ginconv
8	https://arxiv.org/abs/1811.05320
9	https://github.com/stellargraph/stellargraph