COVID-19 Seed Funding Proposal

1. COVID-19’s impact on the public transit demand in the United States.

As the COVID-19 pandemic hit the US and the nationwide practice of self-quarantine and social distancing, the consequent sudden meltdown of the public transit ridership also imposed catastrophic impact on the transit systems. As this recession continues, the demand to use transit systems continues to decrease and more transit systems began to face financial and staff healthy difficulties due to sharply reduced revenue. On the other hand, due to lack or delay of the release of official ridership statistics, it is very hard to track the depth and width of the impact for transit systems across the whole nation.

Crowdsourcing on the mobile phone platforms provides another way of acquiring transit demand data. As less people need to use transit systems, people are also less likely to open transit apps for trip planning and real-time information; these apps can capture the frequency of usage to roughly estimate the transit demand. Therefore, we requested the app frequency data from the Transit app, a popular transit planning app with millions of users in more than 200 cities. The data contains 121 transit systems in 71 metro areas, 55 counties, and 30 states in the United States. The data contains daily and hourly demand measures for these transit systems from Feb 15th 2020.

With these data, we will first measure the speed and extent of the recession for each cities and compare their geographic and temporal difference. Generally, the demand will rapidly diverge from the normal value and then stabilize around a floor value, then persist for the rest of time. The floor values represents many aspects of the system and the cities’ social and demographic aspects. One most prominent factor is the ratio of people that cannot work from home regardless of the pandemic. We will also compare the development of the pandemic and local community spread and the actual response of the transit system and demonstrate the response speed of each city and her citizens. For example, when the local transit demand started to decrease earlier than the first confirmed local COVID-19 case, it means the local community acted faster than the major outbreak of the pandemic.

For the City of Columbus, the ridership and demand decrease also created a significant impact on the local public transit system. COTA also witnessed a huge and rapid decrease due to the pandemic. Therefore, we also requested demand decrease data for Franklin County in higher spatial and temporal resolution. We will analyze the response time, speed, and extent for different zones of the City of Columbus and investigate the dynamics of transit users and system before, during, and after the epidemic. This will also help to reveal and provide important proofs to future city planning and system designing.

1. Impact of COVID-19 on the mobility in Columbus, Ohio

To mitigate the COVID-19 pandemic, Columbus is experiencing the unprecedented *de facto* lockdown. The most direct impact is the drastic decrease for different modes of mobility. For Franklin County, the daily vehicle mile travelled (VMT) has decreased by 72% and the transit demand has decreased by 65% by April 7th. In response to this sudden recession, it is necessary to investigate the speed, extent, geographic and temporal variation of the decrease and how the recession will impact the future mobility in the City of Columbus. Therefore, it is urgent and necessary to measure the impact of COVID-19 on different transportation modes.

To do this, we will first collect different mobility datasets before and during the pandemic. We have:

* Transit demand data: we collected transit demand data from Transit app and they will provide us data with high temporal and geographic resolution in the Franklin County.
* Traffic metrics from ODOT: we requested and maintained the traffic counter data for measures in 2018, 2019 and the most recent period.
* OD matrix, zone activities, average VMT data from StreetLight. We have access to the Streetlight mobility data from 2017 to April 2020 with high spatial and temporal resolution.
* Bike sharing data from COGOBike: we collected the open data from the official data portal of CogoBike. The dataset contains all the anonymous trip data in the COGOBike system.
* COTA APC data: we requested and maintained the Automated Passenger Counter (APC) data from the Central Ohio Transit Authority (COTA) from 2018 to 2019. Automated passenger counters are installed on the COTA buses and can count the riders aboard and alight. The data contains the official statistics for ridership and we plan to request the new APC data for the comparison purposes.
* Smart Parking data: we requested the smart packing transaction data in the area of Short North before and during the pandemic. The smart parking can record the usage of the parking lots and we can infer the activities change in this area.

Bitter as it is, this recession is also a good chance to reconsider the city planning strategy and mobility policies by a comprehensive opportunistic analysis. The results of the analyses can provide very important advices for the future city planning in the City of Columbus.