COVID Information Commons (CIC) Research Lightning Talk

Transcript of a Presentation by Aron Laszka (University of Houston), December 9, 2020

Title: *Collaborative Research: RAPID: Addressing Transit Accessibility and Public Health Challenges due to COVID-19*

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Transcript

Aron Laszka:

Slide 1

Thank you for the introduction and the opportunity and welcome everyone. Please let me know if you cannot see the slide.

Katie Naum:

I can see it, it's great.

Aron Laszka:

Perfect, thank you. My name is Aron Laszka and in this talk I will talk about the significant challenges that public transportation faces due to COVID-19 and how our research project addresses these challenges. This is a collaborative research project in collaboration with Professor Abhishek Dubey from Vanderbilt University as well as the public transit agencies of Nashville and Chattanooga, Tennessee.

Slide 2

I would like to begin by emphasizing how important public transportation is to many communities. Public transit services connect people with access to employment, education, and other public services, which they will not be able to access otherwise. Unfortunately, COVID-19 has significantly disrupted the operation of many public transit agencies and have created a lot of challenges for them. These challenges include, on the one hand, resource challenges. For

example, due to social distancing requirements vehicles have to operate with reduced capacity. So, a vehicle that could, under normal conditions, transport 30 or 40 people now can only carry about 10 or 15 passengers- of course this is a necessity due to social-distancing requirements. To make matters even worse, a lot of transit agencies are also struggling with driver unavailability. A lot of drivers are unavailable due to isolation or quarantine requirements, or maybe they're in an at-risk population. So, in the end, resource challenges are really significant. Transit agencies have to operate fewer vehicles at a lower capacity, which has significantly reduced transit accessibility. Unfortunately, these resource challenges are made even worse by data challenges. Due to COVID-19, how people use transit has significantly changed. Ridership patterns have changed both temporally and spatially, and, in order to respond to these changes, transit agencies need new data, but it's really difficult to collect this data in a short notice. To make things even worse, a lot of transit agencies have switched to fare free operations which not only decrease their income, but also basically make them unable to collect data from fare collection.

Slide 3

Our research project addresses these changes through three main thrusts. First, we performed data analytics. This is based on data collected from Nashville and Chattanooga through a variety of means, including automated passenger counters as well as manual counting. Using this data, we perform data analytics. The purpose of this data analytics is to help transit agencies estimate ridership patterns, see which lines need more resources where transit agencies could save resources, as well as predicting ridership using machine learning models so they can optimize proactively. We're also planning to develop applications, mobile applications, for passengers that will provide guidance to passengers on how to travel more safely and more conveniently by avoiding crowded vehicles.

In our second thrust, we provide guidance to transit agencies; we're helping them with operational optimization. This includes proactive optimization using predictions in order to optimize vehicle dispatch, routes, and schedules proactively. The goal here is to maximize transit accessibility, while at the same time maintaining social-distancing requirements and considering other exigent challenges like disinfecting vehicles regularly. We're also providing on-demand optimization for dispatching paratransit vehicles, which are really important since a lot of the passengers on these vehicles are from at-risk populations.

Finally in our third thrust, we're applying computer vision to collect ridership data using on-board cameras and video analytics as well as monitoring passengers from compliance with requirements, such as social distancing and wearing facial covering.

Slide 4

Finally, I would like to present some preliminary results around data analysis, which I hope you will find interesting. First, we performed temporal analysis. We looked at how ridership has changed over time. Now, one obvious finding is, of course, that ridership has significantly decreased. In the plot in the upper right corner, you can see how ridership, the red line, has decreased significantly in this spring and remained consistently low. More interestingly, ridership has changed temporally within a week and within a day. We specifically see a much larger decrease on weekdays as well as during early morning and afternoon hours, typically when people commute, which suggests that most people don't use transit for traveling to work or from

work while they still use transit for other purposes.

Slide 5

Finally, we also perform spatial, social, and economic analysis. For example, we have investigated which areas had the most significant decrease in ridership. Interestingly we have found that areas where there are a lot of retail and shopping opportunities have seen a much larger decrease, which is of course not surprising. We have also considered socio-economic factors, for example, income levels. As you can see in the bottom right corner, we have found that areas where residents generally have lower income have seen a lower decrease in ridership. We have also found similar correlation between other socioeconomic factors, for example, housing values as well as certain races.

Slide 6

And with that, I would like to thank you all for your attention. I would like to ask you to please enter your questions in the chat or contact me or my co-authors by email at a later time, thanks everyone.