Enhancing Mass Transit Passenger Safety via In-vehicle Time Minimization While Avoiding Passenger Transfers

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Abstract

The risk of infection in a pandemic increases with duration of close contact with an infected person. For the COVID-19 pandemic, the World Health Organization defines unsafe contact as being within one meter of an infected person for more than 15 minutes. Since the application of social distancing in public transit vehicles is challenging, minimization of in-vehicle time can help to protect passengers from getting infected. Skip-stop operation is a viable strategy to reduce in-vehicle time as opposed to the conventional all-stop operation, and therefore can provide safer mobility for passengers. All-stop operation refers to service on a transit line in which each vehicle stops at every station. In skip-stop operations, vehicles provide accelerated service through the use of different stopping patterns on the same transit line. Skip-stop operations have been successfully implemented in many transit networks (e.g., New York, Chicago, Philadelphia, Santiago).

Previous research has developed optimization models capable of reducing in-vehicle passenger time by greater than one-third. However, these reductions have been attained by requiring transfers for many passengers who travel only on a single line, which is generally undesirable for transit users. In this new model, we develop optimization approaches to minimize the in-vehicle time of passengers via a skip-stop strategy, while ensuring that no passengers traveling on a single line require a transfer.

Keywords: Transportation, COVID-19, Public transit, Passenger safety, In-vehicle time

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