Response to Jacob’s questions:

1. For the problem formulation, it’s fine as you set it up now. Time-indexed method solved the problem of global identifier.

Regarding to your question, ‘can different trains be used for the same route on different days?’

There is no universal definition for a unique train in our field of research however the way I was able to find unique routes was by matching train ids with the same origin destination stations and number of stops. Train ID’s are also already date stamped e.g. 01601081489660 which is essentially, YYYYMMDD+Unique ID.

These do not repeat even on a daily basis so the only way to find “unique trains” in this problem I think will have to be via unique routes on different days and as I mentioned earlier, the **uniqueness can be found by same Origin Destination, number of stops and time period**.

I think it would be interesting to explore the assumption of a unique train as being unique routes only (i.e. a train can run the same route more than once in a day, is this possible for our model in question?)

*My thoughts: Yes, this is possible because we only care about the Origin-Destination, number of stops, and time period. We don’t care about the physical train that is actually running the route.*

1. The concept of ‘interacting train’ is fine, I think it’s appropriate. However, the definition of reactionary delay should be refined. It should be aligned with the definition in the railway literature. Detail should be referred to the paper: <https://openaccess.city.ac.uk/id/eprint/22460/1/slingsby_trains.pdf>

What is a better way to define “travelling in the same local direction” such that this notional example is satisfied?

There are only 2 ways for our problem, westward and eastward. For each unique train id, the data is already ordered wrt train station, I could provide data with train station order for each train id.