1.208 Project Proposal
Resilience of Access Equity in Public Transit Networks

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1 Introduction & Background

Natural disasters such as extreme weather events and pandemics can hit Public Transit (PT) agencies where it matters most, on their service network, curtailing access for urban populations to socio-economic facilities such as schools, hospitals, and grocery stores. While extreme weather events lead to physical damage to the network and vehicles [4], pandemics can result in government mandates to reduce the service. Such unplanned or planned service cutbacks disproportionately impact already disadvantaged groups that rely most on public transportation, thereby exacerbating existing socio-economic disparities among varying demographic groups [3, 5, 6, 2, 7].

For this project, we will relate to the work by Berche et al. [1], who identified that PT networks behave like scale-free networks. We extend their analysis of the connectivity and centrality measures to how random and targeted attacks affect access equity within the served population. Through this analysis, we identify the most critical edges in the network for socio-economic access and suggest that those should be protected and retained active as long as possible during extreme events.

1.1 Data Used

We will only be using openly available census[1], GIS[2], and PT network[3] data. The resulting framework should be generalizable and reproducible for multiple cities, which is only possible with such an open-data approach.

2 Objectives and goals

The components of this project are:

- Create a graph representation of a city's PT network.
- Apply random and directed attacks on the generated networks, assessing how these attacks affect network centrality and connectivity measures as in [1].
- Assess how these attacks affect transit equity
- Attempt to identify the most critical links for socio-economic access equity.

[1] US: https://data.census.gov/ and Netherlands: https://data.overheid.nl/
[2] https://www.geofabrik.de/data/
[3] https://www.transit.land/

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