Qeios

Peer Review

Review of: "Selfish Routing on Transportation Networks With Supply and Demand Constraints"

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Comments:

"Congratulations to the authors for their commendable and novel work, as well as their innovative ideas."

Minor Revision Required

1. Assumptions on Network Topology and Capacity Constraints

The study assumes each route has a unique minimum capacity link (Assumption 1), simplifying the network dynamics.

How would the results change if multiple links had the same minimum capacity, introducing multiple bottlenecks?

The model assumes a constant exogenous flow (Φ), while in reality, traffic fluctuates dynamically.

Can the model be extended to time-dependent demand variations, e.g., peak vs. non-peak hours?

2. Dynamic vs. Static Traffic Considerations

The model is entirely static, whereas real traffic evolves dynamically over time.

Could a dynamical extension of this model be developed to study time-dependent Wardrop equilibria?

In dynamic systems, queues build up over time, which affects flow distributions.

Does the model consider queue spillback effects, where congestion in one link propagates backward?

3. Partial Transfer of Demand – Real-World Implications

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The study identifies partially transferring equilibria but does not quantify their impact on real travel times.

How does the travel time difference between fully transferring vs. partially transferring equilibria compare in real-world networks?

The paper suggests that selfish routing can reduce effective network capacity, but this is not validated with empirical data.

Could real-world traffic data (e.g., from GPS tracking, urban traffic sensors) validate these theoretical results?

4. Computation of Equilibria – Complexity & Scalability

The Wardrop equilibria characterization relies on closed-form derivations, which may not scale for large, complex networks.

What is the computational complexity of solving for Wardrop equilibria in highly interconnected urban road networks?

The model focuses on parallel and Wheatstone networks, which are relatively simple structures.

Can the model be extended to meshed road networks (e.g., full city-scale traffic grids)?

General Comments:

1. To enhance the article's quality, try revising the structure for better clarity, using simpler and more direct language, and addressing the technical questions to provide more detailed insights into the research results.
2. Add more recent and relevant studies to better support this work. The following paper is suggested for inclusion:

i. https://doi.org/10.1080/2374068X.2019.1641002

Declarations

Potential competing interests: No potential competing interests to declare.