

Travel Latency Cost Function and Map of the Eastern Massachusetts Highway Network

1 Cost function

By use of the inverse VI formulation in [1, 2, 3, 4], the following travel latency cost function was estimated based on the actual traffic data from the Eastern Massachusetts network for the PM period of Apr. 2012:

$$f(x) = 1.0 - 0.00303133x + 0.0577207x^2 - 0.195677x^3 + 0.620789x^4 - 0.905919x^5 \\ + 0.935921x^6 - 0.469131x^7 + 0.108528x^8.$$

Note that the well-known BPR counterpart is $f(x) = 1 + 0.15x^4$.

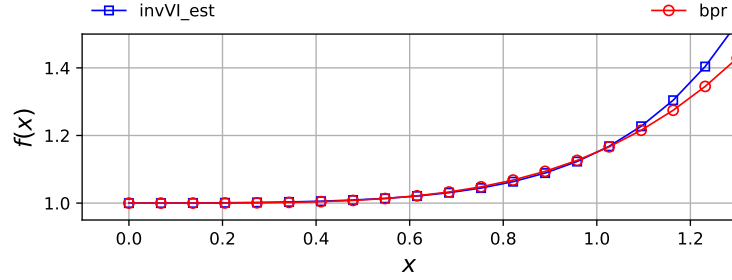
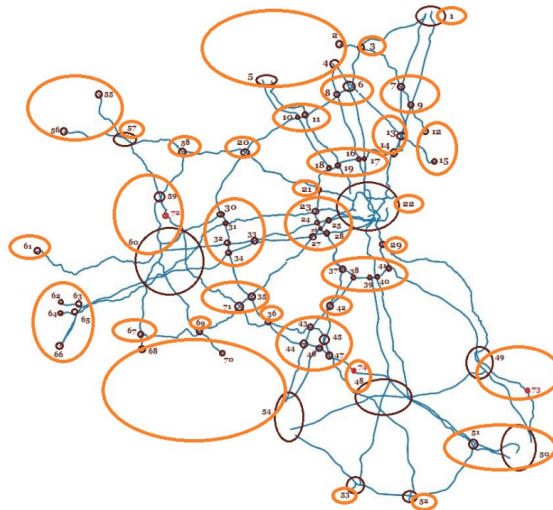
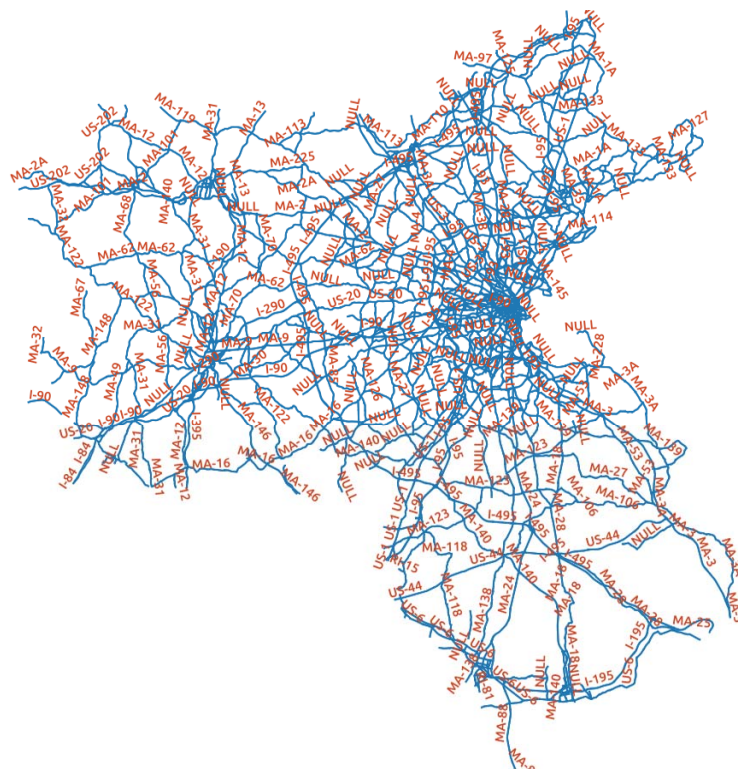


Figure 1: Comparison of the inverse VI estimation and the BPR cost function.

2 Map



References

- [1] J. Zhang, S. Pourazarm, C. G. Cassandras, and I. C. Paschalidis, “The price of anarchy in transportation networks by estimating user cost functions from actual traffic data,” in *2016 IEEE 55th Conference on Decision and Control (CDC)*, Dec 2016, pp. 789–794.
- [2] —, “Data-driven estimation of origin-destination demand and user cost functions for the optimization of transportation networks,” in *The 20th World Congress of the International Federation of Automatic Control*, accepted as Invited Session Paper, *arXiv:1610.09580*, July 2017.
- [3] J. Zhang and I. C. Paschalidis, “Data-driven estimation of travel latency cost functions via inverse optimization in multi-class transportation networks,” in *2017 IEEE 56th Conference on Decision and Control (CDC)*, submitted, *arXiv:1703.04010*.
- [4] J. Zhang, S. Pourazarm, C. G. Cassandras, and I. C. Paschalidis, “The price of anarchy in transportation networks: Data-driven evaluation and reduction strategies,” in *Proceedings of the IEEE: special issue on “Smart Cities,”* in preparation.