Analysing Causal Effect of London Cycle Superhighways on Traffic Congestion

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Abstract : Transport operators have a range of intervention options available to improve or enhance their networks. But often such interventions are made in the absence of sound evidence on what outcomes may result. Cycling superhighways were promoted as a sustainable and healthy travel mode which aims to cut traffic congestion. The estimation of the impacts of the cycle superhighways on congestion is complicated due to the non-random assignment of such intervention over the transport network. In this paper, we analyse the causal effect of cycle superhighways utilising pre-innervation and post-intervention information on traffic and road characteristics along with socio-economic factors. We propose a modeling framework based on the propensity score and outcome regression model. The method is also extended to doubly robust set-up. Simulation results show the superiority of the performance of the proposed method over existing competitors. The method is applied to analyse a real dataset on the London transport network, and the result would help effective decision making to improve network performance.