

Supplementary Information of  
“Identifying the most influential roads based on traffic correlation  
networks”

August 22, 2019

## Supplementary Figures

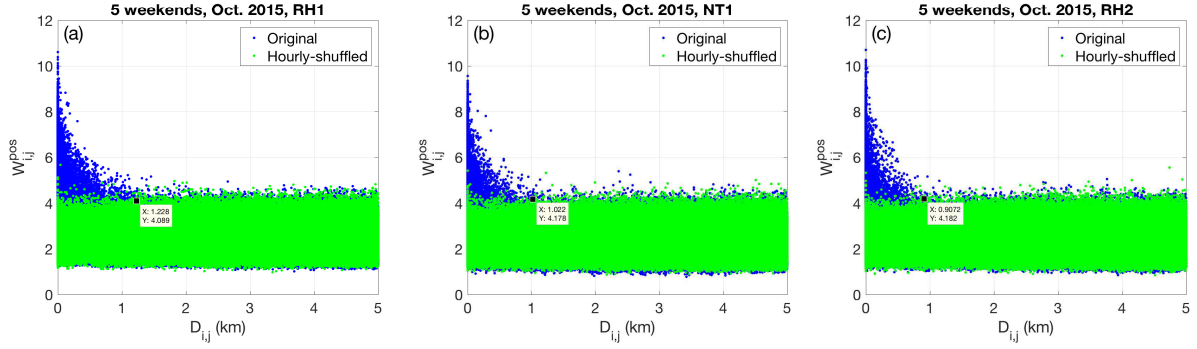


Figure S1: Thresholds for constructing correlation networks for weekends. (a)  $W_{i,j}^{\text{pos}}$  VS  $D_{i,j}$ . The results after hourly shuffling are shown by green points. Here, for each pair of nodes  $i$  and  $j$ , we randomly shuffle the two time series independently with hourly intervals. To make the comparison clearer, the  $x$ -axis is limited from 0 to 5km. The thresholds for constructing network is thus  $W_{\min} = 4.1$  and  $D_{\max} = 1.23$  (km). (b,c) The same as (a) but for NT1 and RH2. The corresponding thresholds are  $W_{\min} = 4.2$ ,  $D_{\max} = 1.02$  (km) for NT1, and  $W_{\min} = 4.2$ ,  $D_{\max} = 0.91$  (km) for RH2. The data is combined from 5 weekends (11/17/18/24/25, Oct. 2015),  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

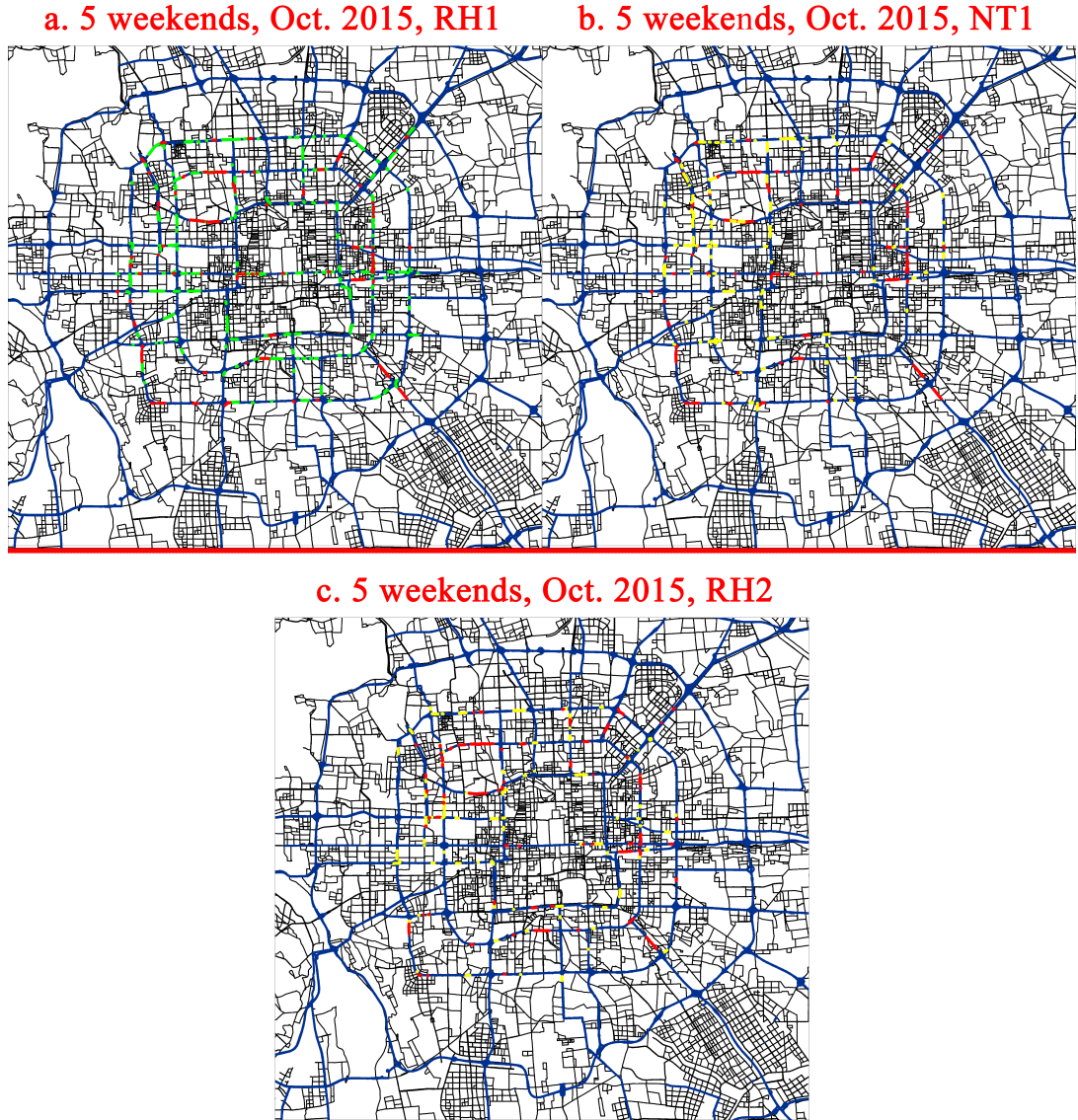


Figure S2: Road sections with the 20% largest weighted degrees on Beijing map. (a,b) RH1 and NT1. 349 nodes in RH1 (green segments) and 196 nodes in NT1 (yellow segments), with 90 overlapping nodes (red segments). The percentages of the overlapping nodes among the selected hub nodes in RH1 and NT1 are 25.8% and 45.9%, respectively. (c) RH2. 185 nodes in RH2 (yellow segments), with 88 overlapping nodes with RH1 (red segments). The percentage of the overlapping nodes among the 185 selected hub nodes is 47.6%. The data is combined from 5 weekend days (11/17/18/24/25, Oct. 2015),  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

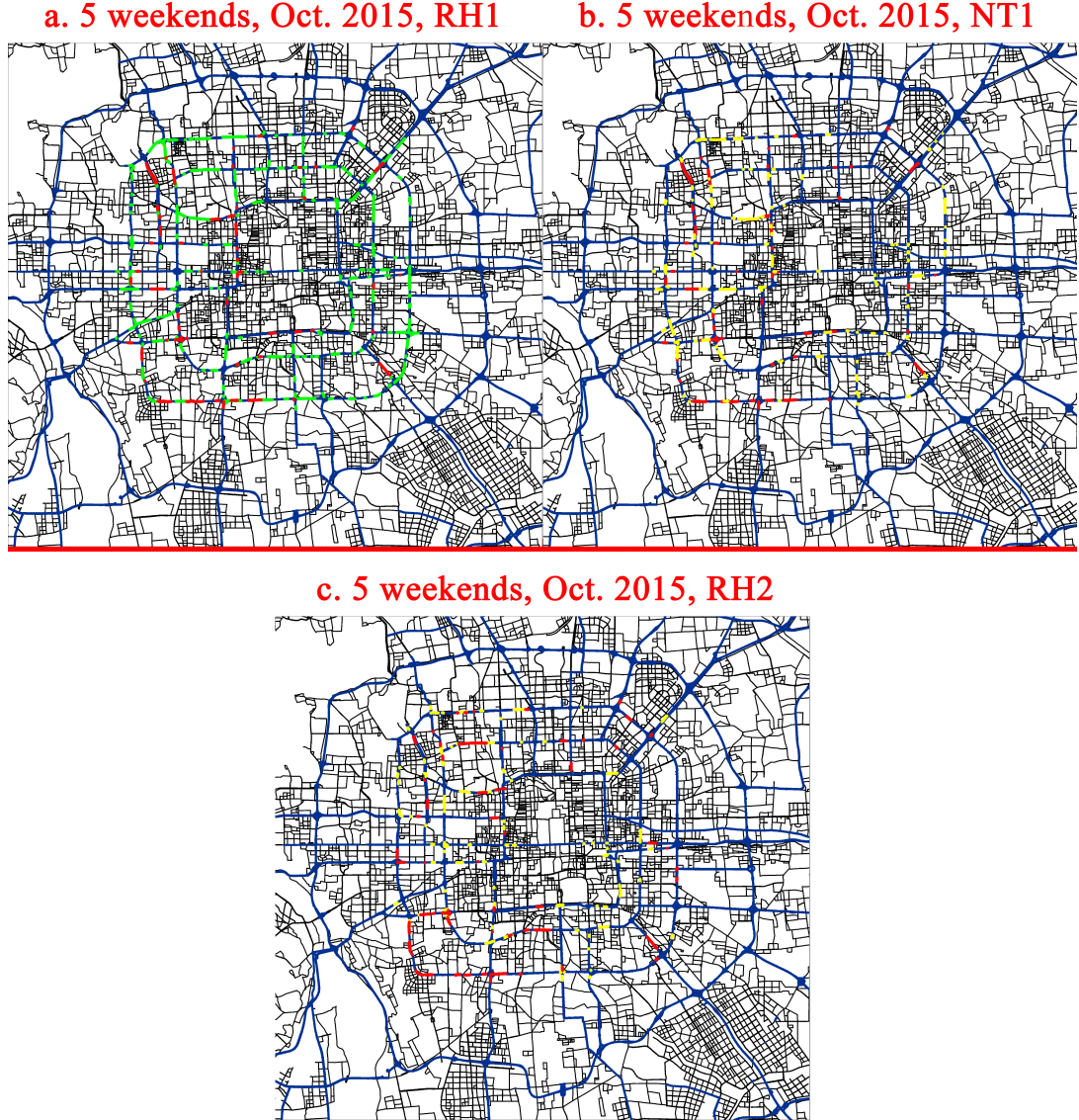


Figure S3: Road sections with 20% largest mean impact distances on the map. (a,b) During RH1 and NT1. The map shows 349 nodes in RH1 (green lines) and 196 nodes in NT1 (yellow segments), with 72 overlapping nodes (red segments). The percentages of the overlapping nodes among the selected 349 and 196 nodes in RH1 and NT1 are 20.6% and 36.7%, respectively. (c) During RH2. On the map we show 185 nodes in RH2 (yellow segments), with 75 overlapping nodes with RH1 (red segments). The percentage of the overlapping nodes among the 185 selected hub nodes is 40.5%. The data is combined from 5 weekends (11/17/18/24/25, Oct. 2015),  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

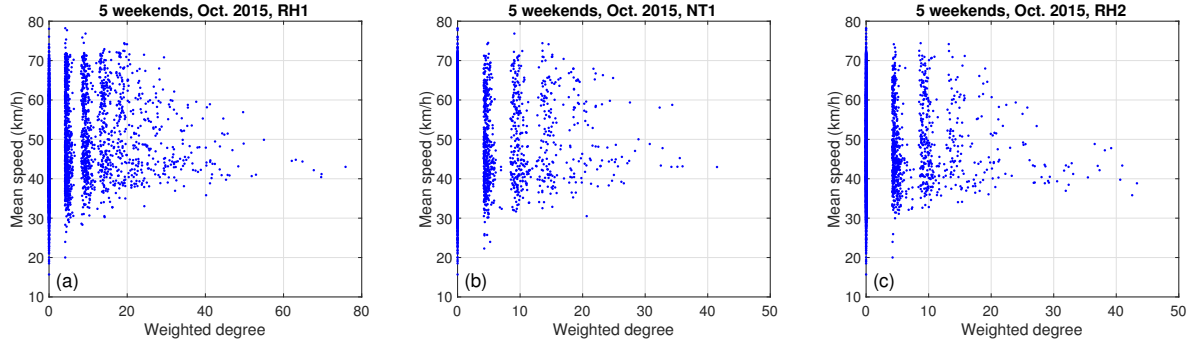


Figure S4: Mean road speed over the considered time period VS weighted degree. (a) Mean road speed (in  $\text{km}\cdot\text{h}^{-1}$ ) over the time period VS weighted degree during RH1. Pearson's correlation: 0.1099. (b,c) The same as (a) but during NT1 and RH2. Pearson's correlations: 0.0531 and -0.0170. The data is combined from 5 weekends (11/17/18/24/25, Oct. 2015),  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

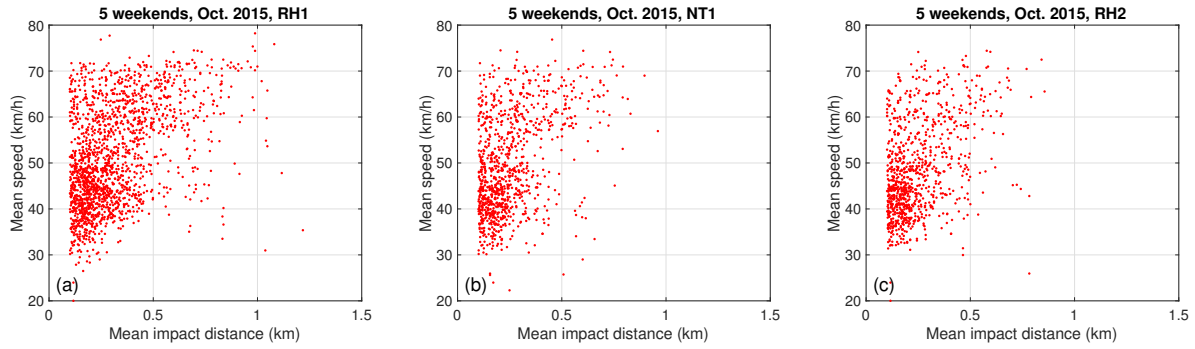


Figure S5: Mean road speed over the considered time period VS mean impact distance. (a) During RH1 (b) During NT1. (c) During RH2. The data is combined from 5 weekends (11/17/18/24/25, Oct. 2015),  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ . Pearson's correlation: (a) 0.4493 (b) 0.4336 (c) 0.4280.

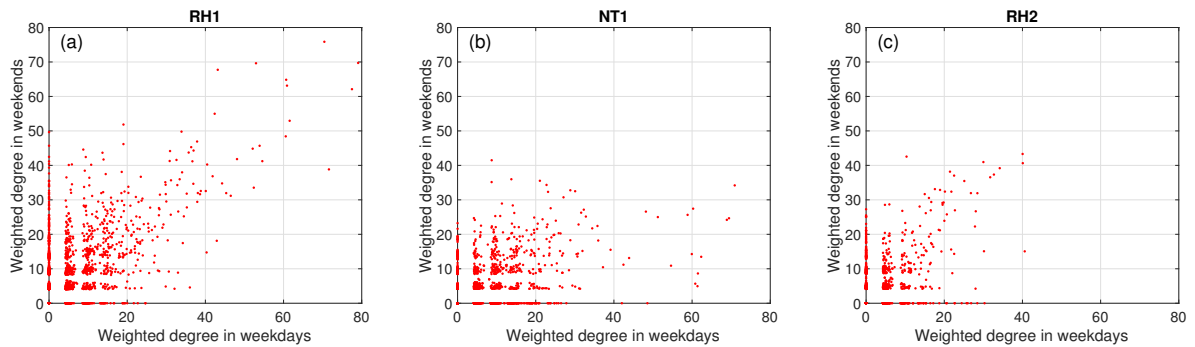


Figure S6: Weighted degree in weekends VS weighted degree in weekdays. (a) Weighted degree in weekends VS weighted degree in weekdays, during RH1. Pearson's correlation: 0.6425. (b,c) The same as (a) but during NT1 and RH2. Pearson's correlations: 0.5410 and 0.5338. The data is combined from 5 weekdays (26-30 Oct. 2015), and 5 weekends (11/17/18/24/25, Oct. 2015), respectively.  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

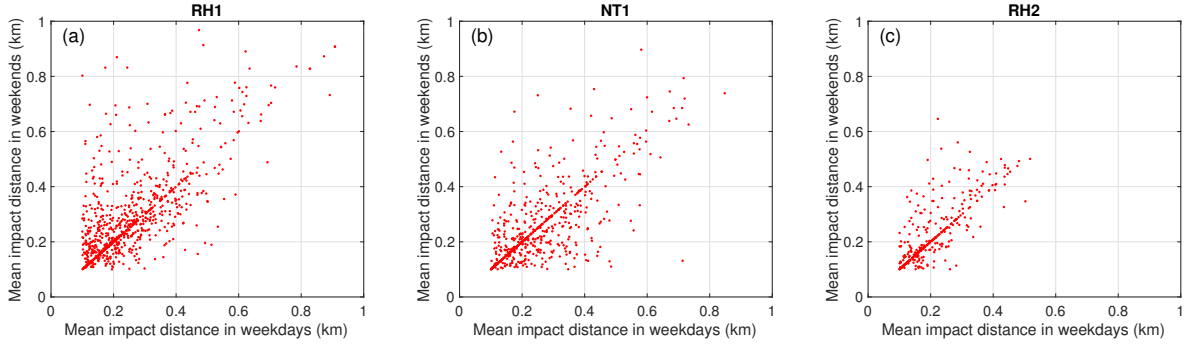


Figure S7: Mean impact distance in weekends VS mean impact distance in weekdays. (a) Mean impact distance in weekends VS mean impact distance in weekdays, during RH1. Pearson's correlation: 0.7058. (b,c) The same as (a) but during NT1 and RH2. Pearson's correlations: 0.7189 and 0.7784. The data is combined from 5 weekdays (26-30 Oct. 2015), and 5 weekends (11/17/18/24/25, Oct. 2015), respectively.  $N = 4530$ ,  $L = 900$ , and  $\tau_{\max} = 150$ .

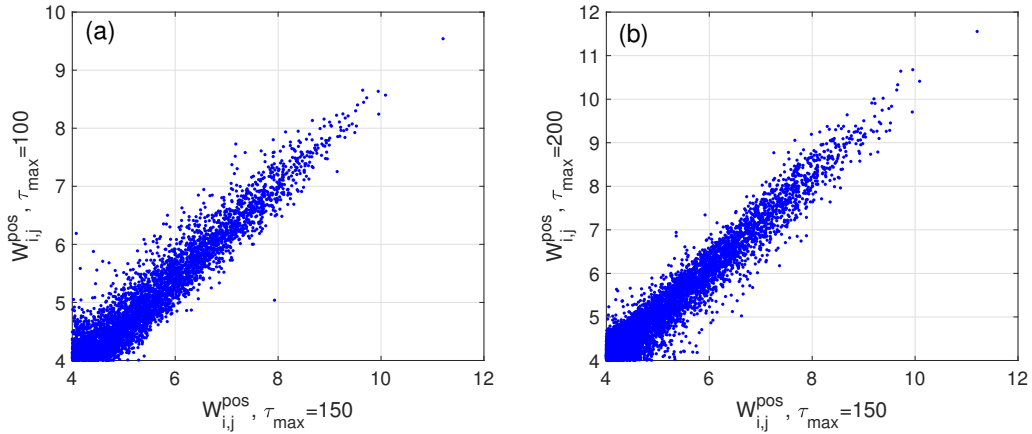


Figure S8: Effects of varying  $\tau_{\max}$  on  $W_{i,j}^{\text{pos}}$ . (a)  $W_{i,j}^{\text{pos}}$  with  $\tau_{\max} = 100$  VS  $W_{i,j}^{\text{pos}}$  with  $\tau_{\max} = 150$ , RH1. (b)  $W_{i,j}^{\text{pos}}$  with  $\tau_{\max} = 200$  VS  $W_{i,j}^{\text{pos}}$  with  $\tau_{\max} = 150$ , RH1. The data is during 26-30 Oct. 2015,  $N = 4530$ , and  $L = 900$ . Pearson's correlation: (a) 0.9554 (b) 0.9685.