The data used in section ‘5.2. Numerical experiment on Sioux Falls network ‘come from the Sioux-Falls road network (Leblanc et al., 1975). In our works, the network consists of 24 nodes and 76 directed links. We assume that all nodes are candidate sites for charging stations, and treat every candidate site equally important. All 24 nodes are assumed as origins and destinations, a total of 552 O-D pairs. We consider five vehicle ranges from 100 to 200 with an interval of 25, coupled with 10 different deviation scenarios, i.e., K = 1, 2, 3, 4, and 5 and deviation cap (DC) = 0%,10%, 15%, 20%, and 50%. Scenario K represents the first K shortest paths, such as the scenario “K = 1” only includes essentially the shortest paths. In scenarios deviation cap, each DC includes paths that ratio of distances exceeding the shortest distance is less than the DC value. The problem complexity increases with deviations. For example, DC=0 includes just the shortest paths, and DC=10% includes the shortest paths and the paths that ratios of distances exceeding the shortest distance are less than 10%.More details are shown in Li and Huang (2014). In table 9 and table 10 of section 5.3, CPLEX and KIGALNS for ECSLP-NCBD, O-D pairs come from N nodes. For example, 380 O-D pairs are from nodes 1to node 20.

Reference

1. LeBlanc LJ, Morlok EK, Pierskalla WP. An efficient approach to solving the road network equilibrium traffic assignment problem. Transportation research. 1975 Oct 1;9(5):309-18.
2. Li S, Huang Y. Heuristic approaches for the flow-based set covering problem with deviation paths. Transportation Research Part E: Logistics and Transportation Review. 2014 Dec 1;72:144-58.

We list the two endpoints of the arcs involved and the distance of the arcs. In the actual case network, the first numbers column represents the start node of an arc, the second is end node, and the last column represents the distance of this arc.

0 1 60

1 0 60

0 2 40

2 0 40

1 5 50

5 1 50

2 3 40

3 2 40

2 11 40

11 2 40

3 4 20

4 3 20

3 10 60

10 3 60

4 5 40

5 4 40

4 8 50

8 4 40

5 7 20

7 5 20

7 8 100

8 7 100

6 7 30

7 6 30

8 9 30

9 8 30

7 15 50

15 7 50

6 17 20

17 6 20

10 11 60

11 10 60

9 10 50

10 9 50

9 15 40

15 9 40

15 17 30

17 15 30

15 16 20

16 15 20

9 16 80

16 9 80

9 14 60

14 9 60

10 13 40

13 10 40

11 12 30

12 11 30

17 19 40

19 17 40

16 18 20

18 16 20

13 14 50

14 13 50

14 18 30

18 14 30

13 22 40

22 13 40

14 21 30

21 14 30

18 19 40

19 18 40

21 22 40

22 21 40

19 21 50

21 19 50

20 21 20

21 20 20

22 23 20

23 22 20

12 23 40

23 12 40

20 23 30

23 20 30

19 20 60

20 19 60

Number of nodes：24

nd  The number of State Of Charging interval /10.00/

W0.0 / 0.32/

W0.1 / 0.34/

W0.2 / 0.36/

W0.3 /0.38/

W0.4 / 0.40/

W0.5 / 0.43/

W0.6 / 0.46/

W0.7 / 0.50/

W0.8 /0.55/

W0.9 / 0.65/

k Type of user / 2.0/

ci Construction cost of station at node i/100.00/

u Unit deviation cost/1.00/

f Energy consumption per unit distance/1.00/

β Battery driving range/150.00/

βmin Lower bound of the battery driving range /5.00/

βmax  Upper bound of the battery driving range /145.00/

δ Charging time cost coefficient at stations/ 40.00/

 Charging time cost coefficient at origins /40.00/

 Benchmark satisfaction/1.00/

 Expected satisfaction level/0.50/

 /0.30/

 Capacity-sensitive coefficient/ 1.00/

S1  Charging amount in the SOC interval 1/0.00/

S2  Charging amount in the SOC interval 2/ 0.80/

S3  Charging amount in the SOC interval 3/0.95/

S4  Charging amount in the SOC interval 4/1.00/

T1  Charging time / 0.00/

T2  Charging time / 1 hour/

T3  Charging time /2 hours/

T4  Charging time / 2.5 hours/

 / 0.2 for k=1/ /0.25 for k=2/

 / 0.8 for k=1/ /0.75 fork=2/