高速公路充电设施选址优化

随着电动车的推广和普及，电动车用户数量不断增加。高速公路作为电动车的主要应用场景，其充电设施的选址对于电动车用户的便利性和可用性至关重要。然而，由于高速公路上电动汽车的OD（起点-终点）轨迹数据的获取十分困难，传统的选址方法存在一定的局限性。为了解决这一问题，本文采用了一种基于优化算法和手机信令数据的方法来模拟电动车的行驶轨迹。通过手机信令数据来确定高速公路上电动汽车的流量数据，进一步反推出电动汽车在高速公路上的OD轨迹数据。利用优化算法，可以使得推测出的轨迹数据尽可能地接近真实数据，从而使得模拟出的用户充电需求更加可靠。除此之外，本文还结合Agent-Based Modeling (ABM) 模型，考虑用户的出行模式、充电需求和偏好等因素，使得充电设施的选址更具准确性和可行性。最后，通过将该方法得到的结果与广州市实际数据对比，来验证其可行性，并为高速公路充电设施的选址提出方案和建议。

With the promotion and popularization of electric vehicles (EVs), the number of EV users is continually increasing. Highways, as the primary application scenario for electric vehicles, hold significant importance in the location selection of charging facilities for the convenience and availability to EV users. However, acquiring Origin-Destination (OD) trajectory data for electric vehicles on highways is notably challenging, rendering traditional location selection methods somewhat limited. To address this issue, this paper employs a method based on optimization algorithms and mobile signaling data to simulate the driving trajectories of electric vehicles. Mobile signaling data is used to ascertain the flow data of electric vehicles on highways, further inferring the OD trajectory data of electric vehicles on highways. Utilizing optimization algorithms allows the inferred trajectory data to approximate real data as closely as possible, thereby rendering the simulated user charging demand more reliable. In addition, this paper integrates the Agent-Based Modeling (ABM) model, considering factors such as user travel patterns, charging needs, and preferences, to make the location selection of charging facilities more accurate and feasible. Finally, by comparing the results obtained from this method with the actual data from Guangzhou, the feasibility of the method is verified, providing proposals and suggestions for the location selection of highway charging facilities.