Harnessing Big-Data for Estimating the Energy Consumption and Driving Range of Electric Vehicles - DTU Orbit (06/02/2019)

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This study analyses the driving range and investigates the factors affecting the energy consumption rate of fully-battery electric vehicles under real-world driving patterns accounting for weather condition, drivers' characteristics, and road characteristics. Four data sources are used: (i) up to six months driving pattern data collected from 741 drivers, (ii) drivers' characteristics; (iii) road characteristics; (iv) weather data. We found that the real-world driving range of BEVs is highly sensitive to driving pattern and weather variables. The most important determinants of energy efficiency found to be driving patterns (acceleration and speed, both non-linearly) followed by seasonal variation (a winter dummy), temperature (non-linearly) and precipitation. Mean ECR is higher by about 34 % and the driving range is lower by about 25 % in winter than in summer. A fixed-effects econometrics model used in this paper predicts that the energy saving speed of driving is between 45 and 56 km/h. In addition to the contribution to the literature about energy efficiency of electric vehicles, the findings from this study enlightens consumers to choose appropriate cars that suit their travel demand under the driving environment they live in, to know about energy saving patterns of drive, and to reduce driving range anxiety problem.

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